

Vermont 1924 and 1925

doc. 126



Return to

Professor Charles Shuchert  
Yale University  
New Haven  
Connecticut

Sep. 1924.

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Sunday September 21-1924

Left New Haven at 9.37 P.M. for St. Albans, Vermont to meet Doctor Keith and Doctor Prindle. This is my fifth trip to northern Vermont since 1921. I hope this time we will be able to adjust the Cedars Pasture succession.

Will get to St. Albans 8.10 to morning morning.

Monday Sep. 22 - 1924

Keith and Prindle at depot to meet me. Then talked over the stratigraphic issue west of St. Albans, and at ten o'clock we are off west of the town about 2 miles to get started on a determined horizon and from it work up into the debatable Middle Cambrian.

← On the direction  
any further stripes  
slate.

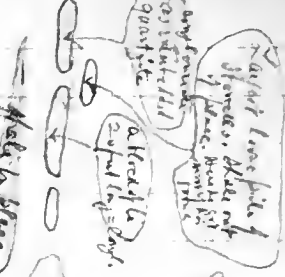
→ Bag of deposits in the Williams  
Basin, west of St. Albans  
East.

→ 100'  
distance from  
slate in place

100'

total 100'

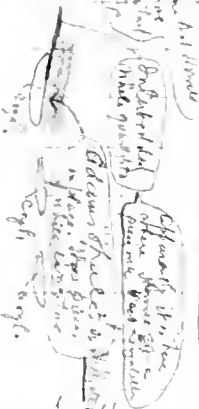
North



No outcrops

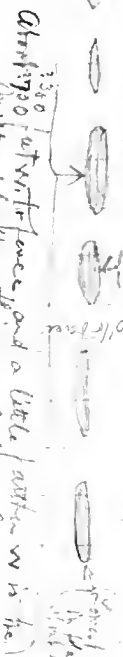


No outcrops.



South

1a



→ 300'  
at water face and a little farther w is the  
Millin definite. thickness of Millin def  
about 35 feet

→ distance about 1000' base  
in place, Schist  
indicate

← Road from St. Albans to St Albans in the Bag.

Sept. 22-1924

(7)

About 2 miles west and for half mile farther  
west are long exposures of the Mallett sandstone, and  
these just above the Shelburne and the same series as at Phillipsburg.  
I noted these last year with Koenigsd. He examined  
them on the south side of road about 1/2 mile west of  
St. Albans. Here they are in the lower part of the  
Mallett. <sup>They dip in west. Some tan 15° to the east.</sup> It has scattering angular pieces of intra-  
formational dol. There is considerable (may be 10' or 12')  
of rounded large grained sand that appears to be wind  
blown sand. There is considerable thickness of  
Mallett here, but by no means 500 feet - the thickness  
given by Keith for the Mallett at its best.

From here is a slowly ascending road <sup>toward the east</sup> and on the  
north side near the intersection there is a good ex-  
posure of basal Shelburne dolomite. In a direction  
it is almost identical with the Mallett <sup>and at this point there is 35 feet here</sup> north of the  
road in the bushes one sees that the basal 15' part  
of the Shelburne is a giant conglomerate, a dolomite  
matrix with rounded sand grains, in which are blocks  
(angular) of the Mallett dolomite and Chateaufort  
shale in signs up to at least 10' in diameter. It rests  
directly upon the Chateaufort. Here in the upper

Atorjira may occur here. Howell and I got the  
same things on Aug. 12-1925

15  
10  
5 quartzite  
5  
35 ft. Milton →

Then follows a part of black shale, probably belonging  
of the Middle Cambrian shale series. This is  
located near to the W. of the first house on  
N. side of St. Albans road. The black shale  
is directly north of first house or vice versa to S. of same  
road. I should locate this place on the G.S.A. map  
measuring to the corral on Adams and allowing about  
15 degrees to get the full thickness of the St. Albans shale.





(later called Mill River)

This congl. could be called the Adams Pasture congl. and is to be regarded as the base of the diprate shale series. It has no Minisquiri li. that piece and should have no fossils younger than the St. Albans shale. Another exposure of it is to be seen near Rockledge.

This Adams Pasture <sup>congl.</sup> is also localized (see page 1a).

I went over this field with Howell on Aug 12-1925

This is not the drunter congl. but ~~is~~ one at the base of the high rate shale. <sup>It may be 15 feet thick and not more so.</sup> It has no Minisquiri shaly li. There is a layer of that li piece some inches long but none have fossils. Only this congl. should give a sparse *Perrinites* de laud and some other forms. The white quartzite with *Crin.* *Leizidellus* near base to the E of the congl. should be a post-lake

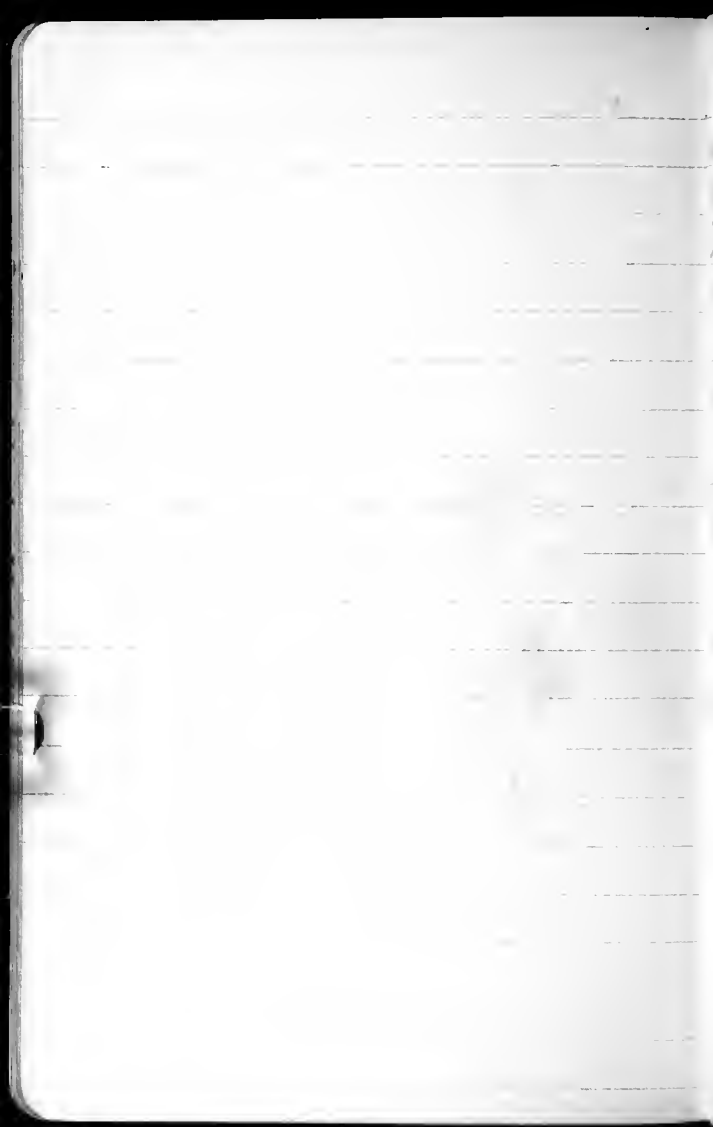
Sep. 22 1924

(3)

great conglomerate near the middle of the pasture  
in the Swanton congl. Therefore the shales in situ  
here are Highgate, and those above are  
Georgia.

After lunch we examined the pasture with  
care and tried much to get fossils, and while a few  
were seen, the most important one was found by Prindle  
in the shales just beneath the Swanton conglomerate  
an *Amplexites* near *psidiformis*. Then I made  
the sketch on page (1a) so that I may talk over  
with Howell the place. He collected from the  
rearing the middle intervals I talked over the  
sequence with Keith, and pointed out that the  
fossils gotten by Howell beneath the conglomerate  
are not Highgate, but Middle Cambrian. The  
question now arises what to call this shale -  
Hilton or give it a new name = H. Albans  
Above the Swanton conglomerate <sup>is the Adams Pasture</sup> lies the  
Highgate shales, <sup>and not the Highgate</sup> those are the east end of the  
pasture. become more and more rounded, but  
not lying as at Highgate Falls.

— north of the conglomerate



Sep. 22, 1924

(4)

Keith thinks the Middle Cambrian pinches out to the north. Clearly the fossiliferous Meltan of the Highgate Group is not in the Adams Pasture. This pinching out he thinks is due to overlap and not to faulting. The intervals of erosion between the different formations is usually of considerable time geologically.

I doubt if the St Albans shale has half the thickness west of Rockledge it has in Adams Pasture. It certainly is not here at Highgate Falls. Hence it has pinched out and probably is gone even in the Humphred Brook area.

Was here again with S. Howell on August 12, 1925.  
Found 2 frag. of *Parodipides* and other things. Howell  
had worked a half day here yesterday, and got some  
large smooth *Ag. costus*. *Cyst. & plates* are common.

There is a nice stretch here of low land, looks like  
it all is shale - St. Albans and Jossigate. This side  
level track goes south some 2 mi., at least + some  
road, and then back.

In places the St. Albans shale has fine bands, but  
no fossils. One trilobite is out of this fine material.  
The track, on a mile or more of decidedly elevated  
dull blue shale, these shales are certainly <sup>in the *Parodipides* zone</sup> <sup>here</sup> over 100 feet  
thick.

September 25 1924 Tuesday.

Started out west on the road to St Albans Bay and then south along the Rugg Brook road to the place that Raymond and I last year thought was Colchester. The place is on the land of Martin Connor, and crossed a cross road into St Albans.

At the corner of the St. Albans Bay and Rugg Brook roads we yesterday saw the "Milton" with a little of the St Albans Middle Cambrian slate.

On the west side of the Rugg Road all is Milton and not Waltham as I have it on geological maps.

On the east side, Martin Connor's land there is more Milton and the highest bed is a dolomite conglomerate. It has small dolomite blocks up to 4 1/2 feet across. The matrix is a sandy dolomite. There are other dol. congl. down in the Milton to the west.

Over the dip and small dol. congl. lies <sup>to the east</sup> the St. Albans dark <sup>blue</sup> shale. We found slate for more than one ton without getting fossils, and then near the Connor's south fence we saw up to an 18 ft or more that yielded a number of trilobites. Among them was

Aug. 14-1925 - went over the road among Ruff Brook onto Howell  
but crossed over the place of the Swanton ls. congl. on the map.  
Therefore there is here to the W. of the congl. St Albans up to the  
200 ft. of Milton. To the E. of the congl. is diplicate all the way E. to  
the next congl.

The question must be answered as there is a break between  
the Milton dol. and St Albans shale. So far seen  
no evidence of a gap. Howell tells me he is an  
Agnostus only the Milton on the Parkers Quarry loc.  
This must have been covered into. Invertebrate fossils  
abundant about the congl. covered into since latter  
was from Milton fossils mixed with the Lower C.



two globella of Paradoxides, and a number of Gy-  
nostrus. We have therefore now established the pre-  
 sence of Middle Cambrian strata in place. Farther  
 east the land is low and we could see no further  
 outcrops. I took away a bag of slate having large  
 crinoid fossils.

In the afternoon went over <sup>to</sup> the same <sup>place</sup> N. S. road to Ruff Brook  
 but soon after getting on this N. S. Road went west over  
 the Milton and soon came upon a cliff of the  
 Colchester slate here very much truncated. Farther  
 west is Challett. Saw no fossils, although all day  
 looked for them. After going <sup>south</sup> about 1/2 mile the Challett  
 crossed the road, and at the next mill-cum was  
 the Colchester crossed it. It is well exposed on a cliff  
 to the east of Ruff Brook, and although all of us searched  
 long for fossils, none were collected.

Just east of these Colchester slates, is a little of Milton  
 dolomite, probably lower than so far is shown, and it  
 is overlain to the east by the St. Albans Middle E.  
 slates. This geology around Milton just explains our  
 due to stratigraphic work up, the sea level coming in later.

Note that there is here no *Menisporis* li. This end.  
must be as in the lower part of the series  
of the high rate shale series. Then about 20 feet thick.

These Middle Cambrian slates do not continue to the east far, and the next sharp rise in the road brings in to the south of the road a fine exposure of limestone conglomerate. It has at the base, underlying the St. Albans slate a sandy siltstone to about 6 feet thick that passes down into a fine shaly li. congl. which up there is from 15 to 20 feet of heavily laminated limestone conglomerate, in which there is thin flat limestone and shaly li. line of the same. occurs 3 feet across. Trace of fossiliferous

Underlying this is a red. congl. with thick slate, here decidedly brown and as at Gore Hill. Some of fossils in it. Just the line of the road was out down into.

so far have seen no fossils in slates.

Half of the conglomerate of Gore Hill we have seen pieces of Strophomena or Hindoo, and of the eastern Chazy quartzite. [Later on we <sup>see</sup> a few pieces of Hindoo.]

See these fossils - very important.

These pieces of  
an invertebrate li. from West  
also, in the same li. found in the same  
as the li. Coyle, above the Mid E.

September 24 1924, Wednesday.

Started north on Rockledge to see the great boulders and the conglomerate about it.

Pindle soon had a large piece of li. out of the conglomerate that yielded a large lot of Milton fossils like those discovered by Sargent. <sup>(near the summer houses)</sup> <sub>of the</sub> Some same boulders. Each boulder is wrapped in mica. This shows that the cong. is at least not from Milton, <sup>= Mississippian li.</sup> <sub>at all.</sub>

Then Pindle found a place next to the great boulder when there was a bed of sandy limestone described as the base of the conglomerate. This bed also 3 inches thick <sup>bed</sup> <sub>is</sub> <sup>the</sup> <sub>base</sub> <sup>of</sup> <sub>the</sub> <sup>cong.</sup> <sub>er</sub> <sup>ate.</sup> <sub>ate.</sub> This bed also 3 inches thick forked out in one direction and <sup>by</sup> <sub>the</sub> <sup>bed</sup> <sub>is</sub> <sup>the</sup> <sub>base</sub> <sup>of</sup> <sub>the</sub> <sup>cong.</sup> <sub>er</sub> <sup>ate.</sup> <sub>ate.</sub> in the other, the whole about 4 feet long. It had fossils and strike ones than one time at it and got about a half dozen <sup>thin</sup> <sub>are</sub> <sup>of</sup> <sub>the</sub> <sup>cong.</sup> <sub>er</sub> <sup>ate.</sup> <sub>ate.</sub> <sup>li.</sup> <sub>conglomerate</sub> <sup>to</sup> <sup>be</sup> <sup>seen</sup> <sup>at</sup> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup> <sup>bed</sup> <sup>of</sup> <sup>sandy</sup> <sup>limestone.</sup> <sub>near</sub> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup> <sup>bed</sup> <sup>of</sup> <sup>sandy</sup> <sup>limestone.</sup>

The thin <sup>bed</sup> <sub>is</sub> <sup>the</sup> <sub>base</sub> <sup>of</sup> <sub>the</sub> <sup>cong.</sup> <sub>er</sub> <sup>ate.</sup> <sub>ate.</sub> <sup>li.</sup> <sub>conglomerate</sub> <sup>at</sup> <sup>about</sup> <sup>10</sup> <sup>feet</sup> <sup>west</sup> <sup>of</sup> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup> <sup>bed</sup> <sup>of</sup> <sup>sandy</sup> <sup>limestone.</sup> <sup>near</sup> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup> <sup>bed</sup> <sup>of</sup> <sup>sandy</sup> <sup>limestone.</sup> Pindle had a large <sup>quantity</sup> <sub>of</sub> <sup>of</sup> <sub>the</sub> <sup>cong.</sup> <sub>er</sub> <sup>ate.</sup> <sub>ate.</sub> <sup>li.</sup> <sub>conglomerate</sub> <sup>at</sup> <sup>about</sup> <sup>10</sup> <sup>feet</sup> <sup>west</sup> <sup>of</sup> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup> <sup>bed</sup> <sup>of</sup> <sup>sandy</sup> <sup>limestone.</sup> Lead. I saw that these fossils were the same as I found yesterday on Martin's <sup>land.</sup> <sub>land.</sub> After working

is described, good locality for *Paraspidos* fossils  
since the cleavage is bedding and alike. Much  
Sals when sandy soil at.

August 12-1925 Saw some small shells, and the rock was  
a lot of material, many thin, the good of shells of *Paraspidos*.  
All suggest high Middle. It was several things, a part of *Par.*  
and in the middle of the white.

All fossils refer to page 8.

The li. conglomerate at the base, the Highgate is from 8 to 10' but  
thick and is made of white fine-grained li. seen as lenses in  
the li. The pieces are angular to subangular and range up to  
8 feet long, but many below 2 feet. The matrix is a sandy loam  
rusty weathering filler. Saw and there are pieces of 18" long of  
a very sandy dol. such as one seen in the collection. In some  
thin, or Miller dol. fragments have a coarse appearance to the W.  
There is no piece here of the thin bedded Missisquoi, nor  
did I see a trace of fossils in any of the li.

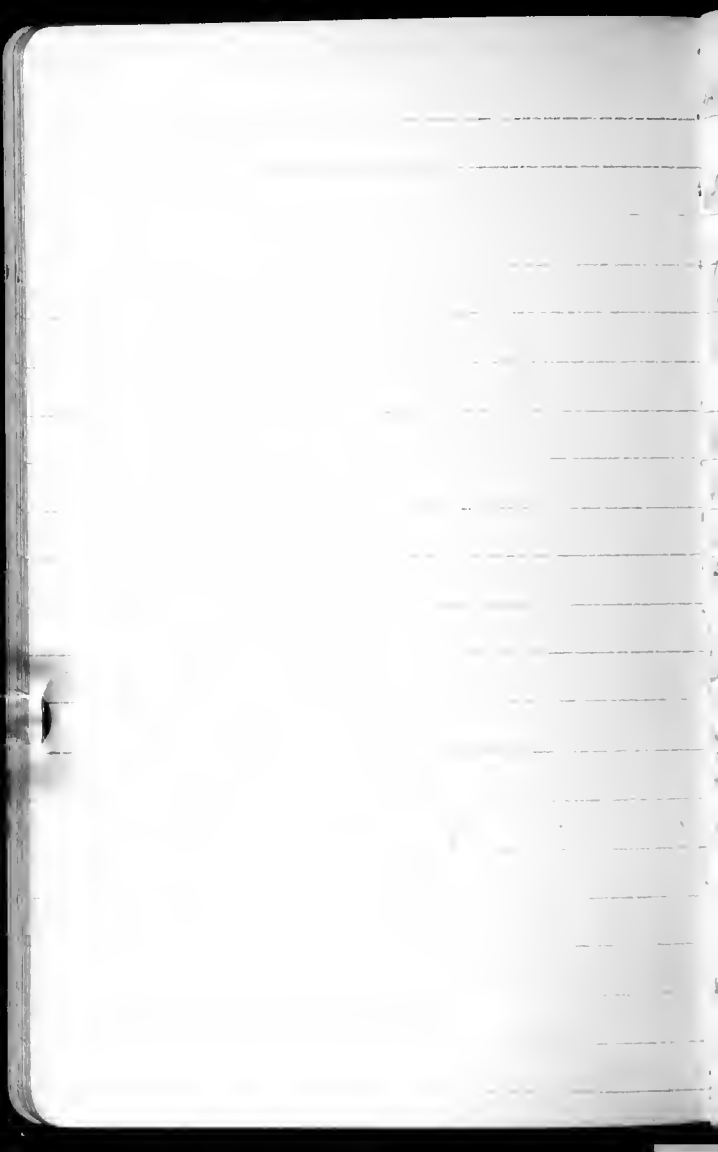
The congl. may be 50 ft or more; the same for 60 yards when  
there is more congl. in 15 yards elsewhere the Highgate shale  
into cleavage the + Albans shale. There can be no doubt  
of the natural conglomerate.

here and here one gets a number of trilobites, and finally  
 I got a fair Paradoxide glabella. I had come across  
 other fragments of the same trilobite, <sup>for prompt recognition</sup> therefore the  
 state is St Albans = Middle Cambrian. Tertiary  
 sand then about 50 feet of Milton slate <sup>a sandy</sup> and  
 old with one quartzite bed.

Beneath the Milton is flaggy sandy slate in  
 layers. Some of it is current ripple. Keith says  
 it is unmistakably a slate.

In the afternoon went north to Shields Barnes  
 and then west a few hundred feet. Worked north and  
 west of the Beaumont exposures. ... it there is a  
 well exposed series of well bedded ... High-  
gate slate. Primarily got free cheeks of trilobites  
 and that was all the fossils we saw in it. These  
 were fairly common.

Beneath the High-gate slate are other dark  
 slates, not so fine grained <sup>that might be of Middle Cambrian</sup> as we saw in High-gate  
 it, nor is there here a line, the conformity to  
 separate the two masses of slate. The High-gate  
 here is not seen any more than that seen further south.





The Middle Cambrian

Evidence is pointing out to the north.

Farther west was a small thickness of sandy dolomite, <sup>followed down gradually by</sup> a zone of white quartzite, and still lower a zone (? 5 feet or so) of dolomite conglomerate. This is undoubtedly the Milton. The whole is less than 25 feet thick.

Just farther west and at once beyond the Milton came in the Colchester sandy and thin slates. Some thin beds of trilobites but none were clearly identifiable. One fragment may have been *Plectambonites*.

The first place visited this afternoon was about 1/3 mile N.W. in Swanton <sup>Stippgate</sup> where we saw what appeared to be about 30 feet of Milton, and it was too dol. conglomerate with pieces of white, and beneath with the great thickness of a milky white limestone. On either side there was no more to be seen in the farm lands.

The morning was very productive, but the afternoon was negative as far as fossils are concerned.

Mirigui

Base of the li. of this section <sup>is</sup> made up of the  
thin bedded <sup>sh. limestone</sup>, <sup>probably 3/4 of it</sup>, and <sup>is</sup> <sup>el-</sup>  
emented by a sandy dolomite. None of the <sup>limestone</sup> <sup>has</sup>  
foreign rocks, all are from the <sup>Waldett</sup> up to the <sup>top</sup> <sup>Millington</sup>

The base beds of <sup>Highgate like waste</sup> <sup>Shellburne</sup> are metamorphosed into  
marble but show no <sup>of</sup> <sup>no</sup> structure. <sup>The</sup> <sup>Shellburne</sup>  
is known <sup>as</sup> <sup>the</sup> <sup>Highgate</sup> <sup>marble</sup>, and <sup>is</sup> <sup>it</sup>  
is common <sup>in</sup> <sup>the</sup> <sup>Waldett</sup> <sup>and</sup> <sup>Merigui</sup>. It  
must have been <sup>in</sup> <sup>place</sup> <sup>here</sup> <sup>at</sup> <sup>the</sup> <sup>base</sup> <sup>of</sup> <sup>the</sup>  
Merigui <sup>deposition</sup>. But are these <sup>Shellburne</sup> li., which  
one also meets in the <sup>Waldett</sup>, at the base of the <sup>Highgate</sup>.

September 25 - 1974 Tuesday

Started in at the Swanton conglomerate locality (see map), 3/4 mile south of Rockledge. First examined the foot block of Lower Cambrian white li. It is of the same li. as the foot block of Rockledge. Shows much flow structure and the <sup>anomaly</sup> more abundant the dolomite fragments. Asked Prindle what his metamorphism took place and after looking over the block he said before the time of its burial in the Swanton conglomerate. Everyone who has seen these massive flows to this conclusion, and yet no one knows of a Cambrian orogenic time. One is led to this <sup>triple</sup> conclusion <sup>of orogeny and metamorphism</sup> because of the great rotation extension of the block, and another one close by with the same flow structure, <sup>but taken</sup> contrasted with the other li. blocks, <sup>unassociated</sup> more are seen to have flow structure and <sup>perhaps</sup> more are drawn out. Little known of from similar li. blocks in the Catskills, <sup>in the</sup> <sup>area</sup> <sup>of</sup> <sup>the</sup> <sup>1840's</sup>, <sup>ins</sup> <sup>which</sup> <sup>face</sup> also seen. How these great blocks got into the Swanton cong. is not known, unless they <sup>slide</sup> down hill into basin, or fell from sea cliffs. The

Missisquoi limestone

St. Albans slate

only other way these large blocks could have gotten where they are would be by ice action. In this connection we see not the slightest evidence of ice action; nor strange marks just those of the immediate formation.

and great block. T. mantle rests very irregular upon the <sup>base</sup> ~~top~~ ~~of~~ ~~the~~ ~~block~~. Prindle soon had a ledge with fossils and finally we all concluded that these beds are in place and that upon it rest the great block. I then broke rock for nearly two hours and got out a number of fossils, among which Cyprina is most conspicuous. All reminded me of the middle fossil zone of the Upper Milton, and this then led to the view that the U. Milton is here in place. Some fossils were found he was holding the bed, to be the waste filling in the space underneath the great block.

The shale beneath these is from the same level as the great block and therefore Middle Cambrian. There is a great amount of these shales throughout the west to the basal part of the Lower Milton. Prindle and Leitch collected a few fossils and when I saw them concluded they were of M.

August 12-1925

It may be that the congl. in the one in the Upper Milton

- Missisquoi seen at High Falls gorge. As it has thin  
fossiliferous pieces it shows that some of the Lower Missisquoi  
must have been exposed to get into this congl.

Missisquoi limestone

Carboniferous time. See the small list, for the Carboniferous.  
This <sup>MP</sup> Milton disconformity has a new kind in the  
Inconformity. It is no longer at the base of the Ord.  
but at the base of the Highgate.

Reddocks appears to rise to rest upon the Highgate, <sup>tended slope.</sup>  
Certain there is no Upper Milton here.

After lunch we went into the gorge of the Missis-  
sippi at Highgate Falls, and now we see that the  
Inconformity is also here, and <sup>that it</sup> follows in sequence  
and contact back upon the then bedded Upper Milton  
and is followed by more the bedded Milton. Finally  
there is another large block described into the thin  
bedded Milton. <sup>There is a little distance of strata beneath the block.</sup> This is near the former disconformity  
back into the gorge. Still more of the Upper Milton  
<sup>in some directions</sup> appears to be upstream end of the main disconformity  
and then the Highgate slate commences. There  
is no real here in the disconformity in the Mississippi  
<sup>Highgate series.</sup>  
We then went down stream to determine the  
base of the Upper Milton. I pointed out to Swift-

The white sand is unknown in any of the  
other dolomite, therefore it has chromogenic value.

Here in the case one sees about 200 feet of the true  
hilltop, and the red sand. ex. remains are at  
an end.

Corlin sm. in the.



The place just the lowest Milton fauna collected  
 the near Clinton was with me. Keith looked at  
 the Milton dolomite before then bedded basal  
 Upper Milton limestone, and since they had to call  
 Clark said that they are of the true Milton. It  
 is a series of tetroformations flat with the singly  
 conglomerates.

If this is true then we have here a discon-  
 formable contact of the Lower or true Milton  
 followed out by the M.C. state, but by the  
 Upper Milton then bedded limestone series.  
 The strike of the Lower Milton is 30 degrees different  
 from that of the Upper Milton. I should like to trace  
 the Upper Milton, the Mississippi is the  
 The Middle Cambrian state will be called the  
 St. Albans state. The Clinton conglomerate  
 name will be retained as a remnant of the  
Mississippi.

The Clinton Ledge conglomerate at top of  
the Georgia one will call the Clinton  
conglomerate.

See the detailed measured section made the year  
before and fit into this one.

The lower fossil zone in the Missisquoi makes the base of this formation. It is a thin bedded li. zone, the li. separated by thin beds of dark to black shale, about 8 to 10 feet thick. Over it lies 6 to 8 feet of a fine quartzite. Higher still is a coarse zone of conspicuously red li., and then another quartzite of superior quality. Then another coarse zone, followed by a bank of dolomite, then the dark shale zone, in which lies the main mass of cross bedded li. and zones of interbedded thin bedded sandy dolomite, etc up to the top of the Missisquoi limestone.

We then went to the little quarry in the Webster road road metal diggings about 1/2 mile N.W. of Highgate Center. Much quarrying has been done since last year and we saw the strata more plainly than ever. Below are exposed about 6 feet of laminated black sandy slate and thin bedded limestone. Then about 4 feet of sandy dolomite, followed up,wards by about 6 feet of thin bedded sandstone and some

1932 Mt. St. Helens 80'

}

Nathan play divides

slate that have the *Leiorosmia taenica* and  
*Aconitella* gotten in previous hills. Higher still the  
 follows the true Milton. In this general re-  
 gion Keith holds that the Milton is not far  
 from 800 feet thick, and that the Mahett is  
 a like thickness. There is a noticeable swelling  
 out of the Milton since to the south of Phillipsburg  
 there is from 30 to 50 feet of Milton followed  
 by some hundreds of feet of St. Albans slate.

When then met at about 1000 feet to the  
 north west through base of Mahett to the base  
 movement, a large boulder of granite.  
 It is an erratic from Canada and is smoothed  
 almost to a polish by the glaciers. It is one of the  
 most faulted masses I have ever seen and must  
 have taken place under water.

They are well rounded. It is one of the most  
 prominent and very appropriate to the place.

The metased. D. W. and found large quartz  
 in the middle of the east side of mountain. The  
 same zone seen at Phillipsburg.

Chazy near Highgate Springs

From D.E. about 1/2 miles where Reed & others  
 Colchester and Chazy are all near together. Much  
 faulting here. The Chazy is very thick bedded, and  
 one of the <sup>beds</sup> is made up of Strophochetus. Have  
 two pieces. It was not too hard to see  
 fossils.

It was a bit like ... role ... in the coil, but  
I kept ... inside ... I tried to ... all ...  
... with these ... but found ... Finally  
concluded that ... was not in place.



September 26-1924 Friday.

Started north on Highgate road to next left land road north of Skulls Corners going west. At the corners is *Oranor* sandstone, and west of it is the well banded Highgate slate going down to the thin dolomite layers seen in the *Pessisquir* gorge. These make a well <sup>marked</sup> <sup>facies</sup> <sup>with</sup> <sup>these</sup> <sup>same</sup> <sup>same</sup> <sup>same</sup> fragment of the *Vingulella* seen at Highgate Center, and fragments of *unimarginata* & *tridolites*.

To the west is <sup>low</sup> <sup>land</sup> <sup>with</sup> <sup>no</sup> <sup>exposure</sup>, and then appears <sup>intercepted</sup> <sup>by</sup> <sup>the</sup> <sup>thin</sup> <sup>and</sup> <sup>low</sup> <sup>lying</sup> <sup>with</sup> <sup>interformational</sup> <sup>conglomerates</sup>. The <sup>beds</sup> <sup>terminate</sup> <sup>below</sup> in a giant conglomerate that to the south is chiefly made up of <sup>thin</sup> <sup>dolomite</sup> <sup>fragments</sup> and to the north of several kinds of limestone and marble. Some of these rocks are up to Cambrian. To one of the rocks to my great surprise I got *Bryozoa* and possibly *Stropholobites* showing that the limestone is probably of Chazy age. The limestone looks like the Chazy seen yesterday.



Below the conglomerate is soft dark to black  
slates in which no fossils were seen, but they  
have the looks of Middle Cambrian. Then a  
space without exposure followed by an outcrop  
of a white limestone interpreted sometimes as a  
lentil in the slate. It looks much like  
the Proledge one, but does not have its flow  
structure and primary color, although it weathers  
in places like dolomite. The li. grades into det.  
Keith says the block outside the woods is 300  
feet long by 100 feet wide, while another one wholly  
in the woods is 100 by 150 feet across. In the Hall  
partially outside of the trees, Prindle called my  
attention to cylindrical nodules there, that I  
could not make out. Later when I found the  
Bygonia in the conglomerate it appeared that these  
also may be Bygonia more completely not a matter.  
If so these lentils are also about Chazy in  
age, and the matrix conglomerate is still younger.  
Keith sees <sup>strata</sup> structures here that lead him to  
think there are great faults connected with these

Angem. 200. 100. 100. 100. 100.

deposits. In any event there is to the east of the  
state followed by Swanton conglomerate. What  
the age of the black slate is and the time limits  
are not known.

See the samples of the above fossils.

There is then a <sup>narrow</sup> belt of low land of Champlain  
sands in which no rocks are shown. To the  
land rises into Milton dolomite and further  
west Colchester slate of my locality (10), but  
a few miles here. Then looked at the little  
locality near (10) (10) and near the farmers  
house. It is a sort of Birdseye limestone. See  
the small samples. The slates around the  
locality are very much exemplified. The fossiliferous  
Colchester is underlain by the well bedded  
and banded sandy and flaggy dark blue  
micaceous slates. This horizon is seen in many  
places and it appears to be about the same  
way in the flaggy Colchester.

From some south-west to a place named red on  
my map and here in the flaggy Colchester we saw



many fragments of trilobites among them poor material  
 of *Hyoliths*, *Clonellus* or *Mosiacis*, and many  
 are or two other trilobites. This flabby material is  
 near shore deposits and is quite nice. Before  
 going to these flabby deposits we passed  
 near Milton's dolomite, Milton's coal with blocks  
 up to 10 ft across. Little fault makes the  
 section repeat itself.

In the afternoon went to Lucas's Ledge south  
 of Altman's to see what had interpreted as  
 Cryptozoa. It looks as if it were some  
 complex, associated with *Hyoliths* but again  
 look like *Hyoliths*. At the extreme north  
 end of this ledge there is a *Trinucleus*  
 and trilobites. It took some several pieces.  
 Not appear to have trilobites. To be sure the  
 ledge are soft jet-black shale. Looked for  
 fossils but got none. Longman Raymond thought  
 he could find fossils here.

Farther south and more to the east a large  
 ledge is another similar formation. It strikes

All the Engl. for George Lodge with and are very  
much drawn out and scholastic, so that I have  
had that the interpretation of Prokledge was  
made at the same time as these Engl. In  
other words, when the whole was now transferred  
into Ital.



southward to the next E-W road, to the series of exposures for 5/8 mile there are many large blocks of white shell sand marble and the repetition small pieces of the Minisquir li. These congl. begin in the west above the black shale with shales large small pieces of limestone, and then the repetition fragments like small round pebbles in sandy dolomite. In this line of congl. there are several large blocks of white up to 600 or more feet long. See in no way, I don't feel we will have to call these blocks as at

place. In one place there is a thin series (about 30 feet) of coarse grained white quartzite. It is the same as the one seen in the foot of the ... of the congl.

In places of ... black soft sand, but farther west there is greenish sandy slate. Life abundant.

Even if we say that the largest blocks are lentils, still the congl. have large blocks dumped into the mass along with the bulk of Minisquir thin bedded limestone. Most of these blocks like the shell ...

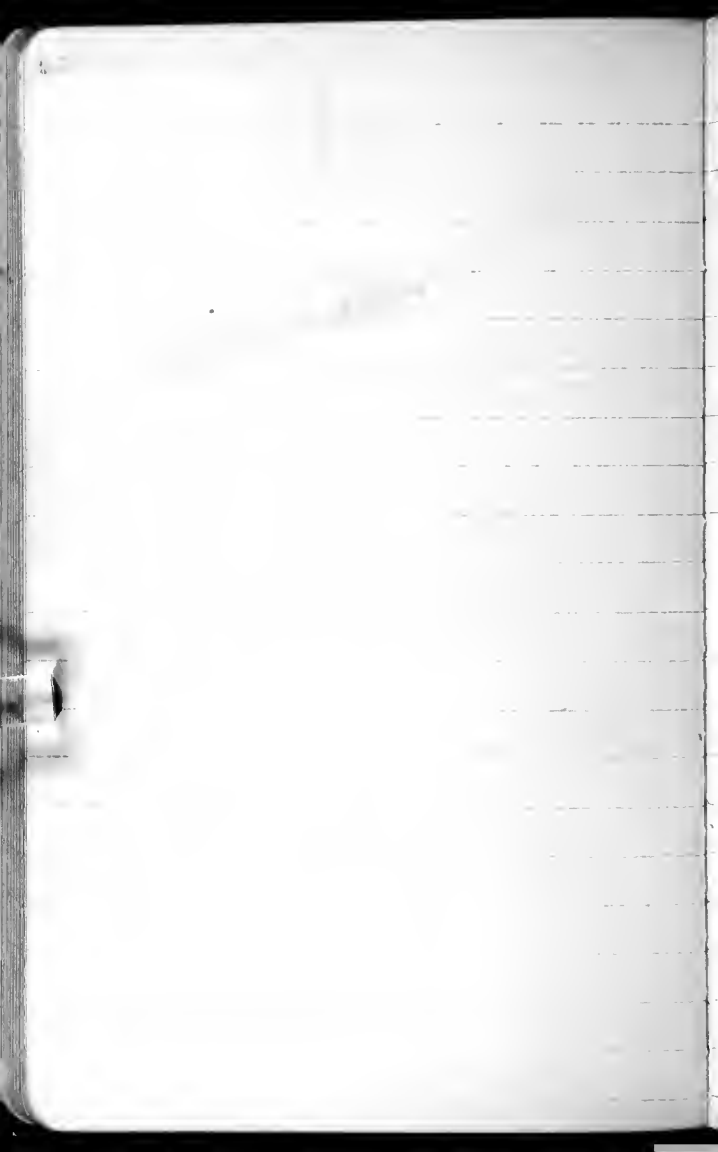


September 27-1924 Saturday.

Shipped a 62 pound box by mail to New Haven, paid \$1.<sup>32</sup>

At 8 A.M. we are off to the Swanton conglomerate to the west of Georgia Center. Collected fossils only the small pieces of the *Mimisauri* limestone. These congl. are what Walcott, in his 10,000 feet of Lower Cambrian section from Parkers Quarry just Georgia Center, called a *Limestone* lentil. See his fossils.

While I collected Dick walked north east along the strike to the next <sup>(=Georgia center)</sup> road where we met him with the car. It was along this road from Georgia Center to the Vermont Central Railroad that we saw *Walcott's* section. When we met Dick he had determined that the rocks lie in a very flat anticline the strata dipping to the west. We then went on to get on the Swanton conglomerate north of the road and then followed across the *Swanton* conglomerate of *fat* (rocks) to the east. It here lies at a low angle and in shallow undulations, being underlain by the thickly banded slates here occurring of the Milton



comes to the surface, either rising in local folds or is pushed through the Highgate into the usual level of the Inverness conglomerate. The Highgate here is the usual sandy dol. with small black spots, and is often with interstratified conglomerates or is actually broken up into a dolomite congl.

Evidence <sup>from the congl.</sup> to the west to Parker Quarry shows no Middle Cambrian. To the east of the Inverness conglomerate are other banded slates, and these go to the east of Georgia Center. Their age is unknown.

In the structure of this region see the attached sheet.

Balcomb in this area completely missed the existence of bedding. Everywhere in the Highgate the bedding is easily seen because of the decided bandings. As for his fault, and repetition of the section he is mistaken because of the assumed position. It is limestone lentils that he sees, an intrusion of material conglomerate is one Inverness overlapping conglomerate. Balcomb completely missed the structural relations, and through the stratigraphic

See the topographic slabs of Grant's camp, I have taken  
for the Peabody Press Exhibition series.

Don't mind as yet now about this as I thought he  
was.

sequence.

The Swanton congl. on the Georgia Center road is the most representative I have seen anywhere. Everywhere the cement is a sandy dol. and in places where the li. pebbles are absent there are lots of sandy dol. that one is apt to mistake for the Milton sticking through the Hittsville. Two in places is undoubtedly the case, but in several places we could trace the li. congl. coming into contact with and underlying dolomite. The pebbles are from  $\frac{3}{4}$  of the Swanton is made up of the bedded Missisquoi, also with pieces of all sizes of the white Hittsville marble, some one block  $15 \times 5 \times 3$  feet thick. Another block was  $18 \times 5$  feet. Another block about 10 feet across looked exactly like the Rockledge block having the same cement and dolomite.

It is now clear that here at least the Swanton overlaps the Hittsville and the Milton. It is a transgressive formation. What the age of the strata above the congl. is not yet determined.

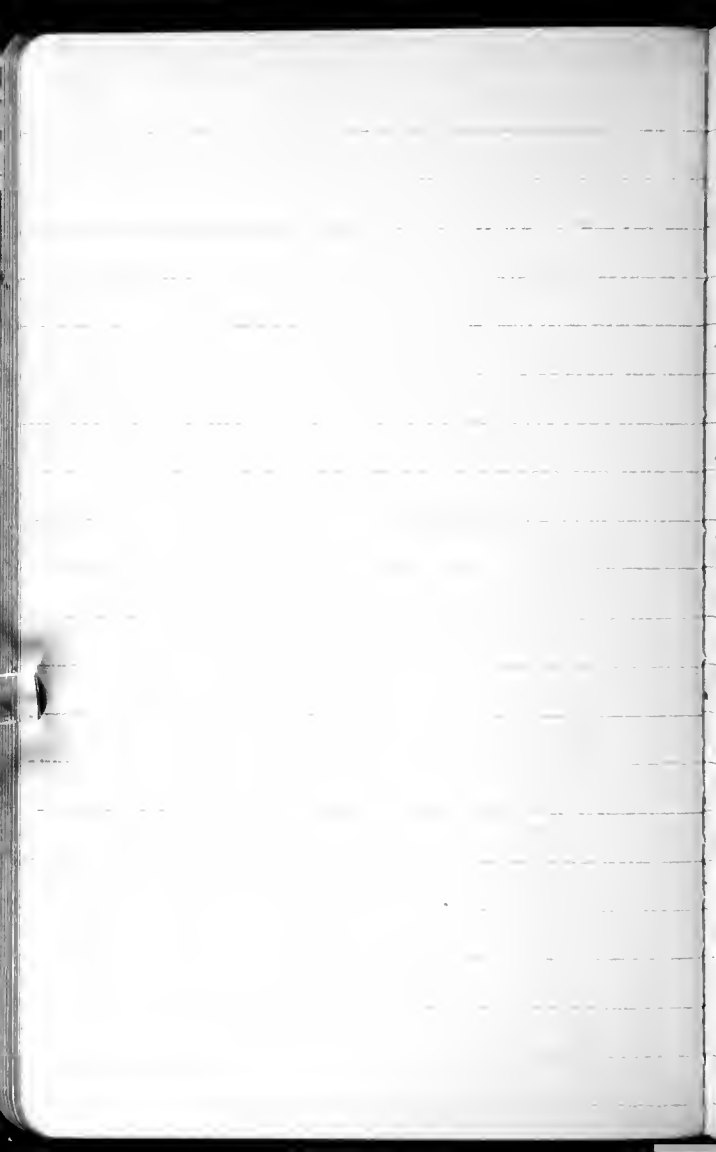




Early Georgia about two miles west. Pre-Cambrian schist and metamorphosed dolomite. Base of the Proterozoic.

It was 1.30 when we left Lenox, in center. Then without thought Milton (base along the road seems to be quartzite), Essex formation, and then along the valley of the Hinesboro through the Green Mt. north of the Camel's Hump to Mount Pelier. All the rocks in the Green Mt. are high metamorphosed Proterozoic. Then on to Barre. The town of greatest granite quarries and granite mills. Other granite <sup>of the great</sup> make the east or core of the Green Mt. north of us is the Kipps Mt. the <sup>highest</sup> <sup>part</sup> of the west of granite axis.

Stopped over night at the good Barre Hotel at Barre.



Sep. 28-1924. Sunday

Left Barre, VT at 9 A.M. The light gray granite here is of Post-Caledonian age since it cuts known Caledonian strata.

At 2 miles S.E. of Barre one stops to look at the highly metamorphosed slate here some furnished Richardson with prophyllite. It is however material so common in slate.

At about 3 miles S.E. of Barre we see one of the thickest piles of boulder clay on record. It is about 100 feet thick down to the streambed.

Keith tells me that the area of the Green and White Mts is a three elevated foreplain, uplifted during the Cenozoic.

Our route yesterday was up the Kinrosski and today it is down the White River. Came out into the Connecticut Valley north of Fairlee where we had lunch. Crossed over the Connecticut at Hammond N. Hampshire. Then through Ferrisville. At 5.30 we left Prindle's winter home at Putnam, and thence into Greenfield where I am stopping with the Keiths.

The Bare granite, White Mt. and the rhyolite  
are all more or less of the same age = Late  
Laramian.

Sep. 29-1924. Monday.  
With the Keiths and visiting.

Sep. 30-1924. Tuesday.

Today Dr. Keith is to celebrate his  
both birthday. The day is a rainy one.

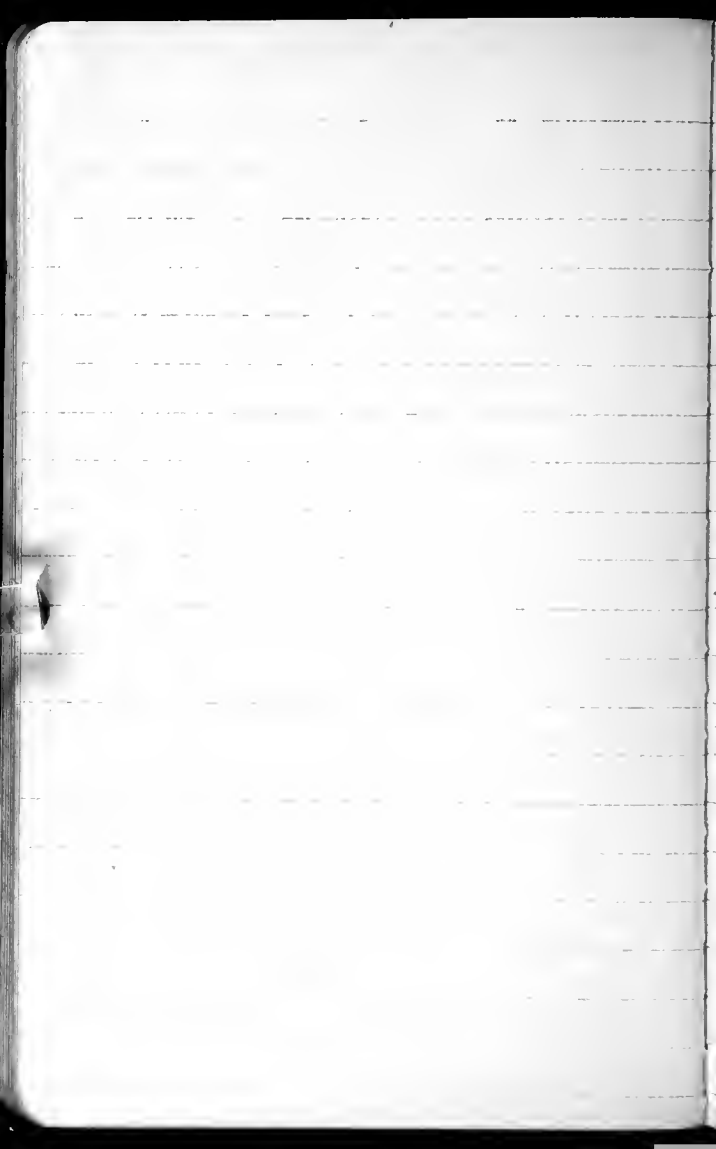
In the afternoon Mrs Keith is taking  
a bath and mulling two quarts of hickory for  
a part this evening with the Boyles and the  
Hickins. In the morning Keith drove  
around in the car to get in the  
preparations for the evening.

Oct 1-1924. Wednesday.

A quiet day.

Keith tells me that the Barre granites cut  
dated Ordovician metamorphosed shales. The same  
granites in the Lakes Umbagog area cut  
and metamorphose Middle Devonian strata. There-  
fore these granites are post Middle Devonian.

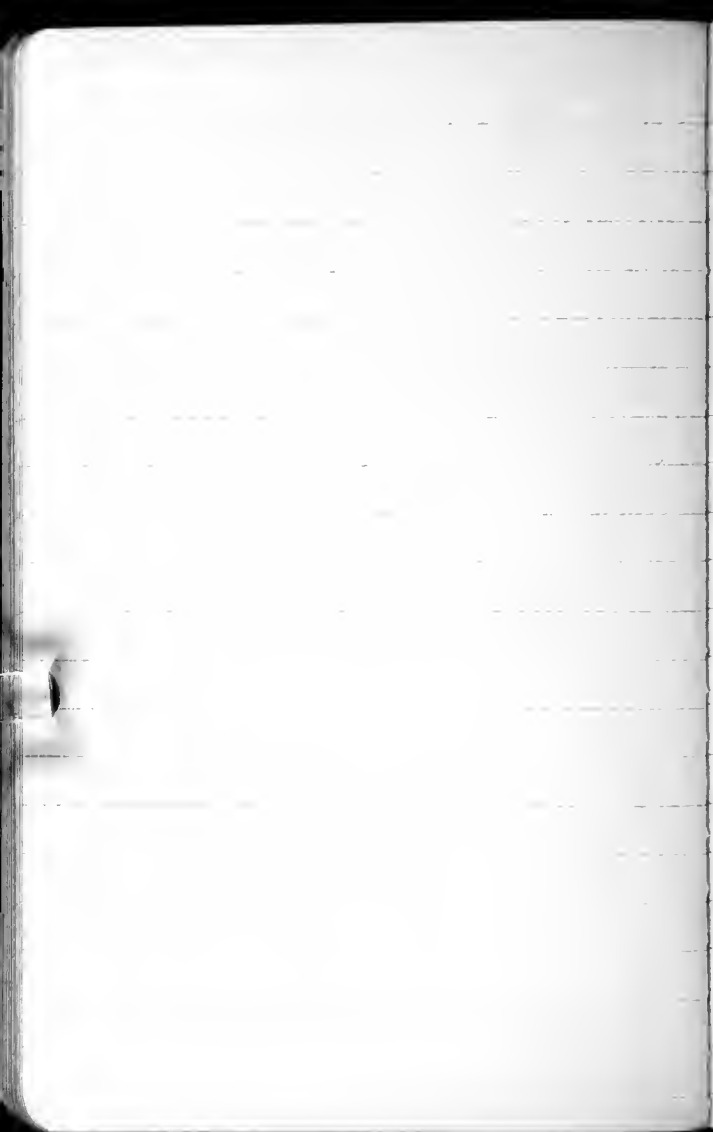
The Pennsylvania strata of <sup>central</sup> western Maine



correct with the oldest one of Worcester, Maine, all  
 are therefore of the same age. These strata in western  
 Maine are cut and metamorphosed by granite  
 that are of Post Penn. time. The <sup>farther east</sup> ~~there are no~~  
 known outcrops of strata across southern Maine  
 until about Mt. Katahdin. The "late Devon"  
 plant beds of Perry Maine are in all probability  
 of Harton time.

The strata on either side of the Green  
 Mts have the schistosity dip through the Mts.  
 - Towards the east on the Lake Umbagog side,  
 and towards the west on the Lake Umbagog side

The Leyden schists of supposed Silurian  
 time or more so. ~~They are also at Lake Umbagog~~  
 in Hampshire. They are also at Lake Umbagog.





Oct 2-1924. Thursday.

A fine day and nothing to do but talk. The autumn colors are now beginning to show up in masses. The reds are most brilliant here than at New Haven.

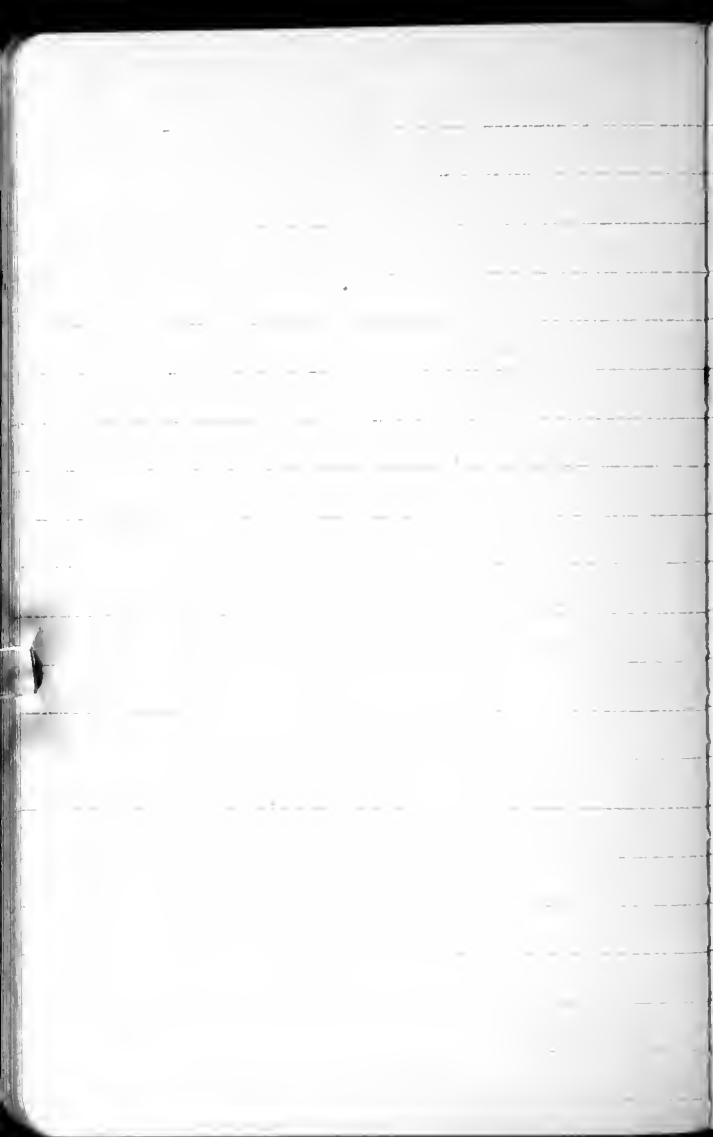
At 3.45 I leave Greenfield and the Keights. On the way the train delayed and instead of getting to Boston at 6.10 it is nearly 7 P.M.

Had a cat take me to the Fenix Hotel.

Oct. 3, 1924. Friday

At 9.30 called on Raymond and talked Vermont until 1.30. At 4.16 came off for New Haven.

Raymond had firmly concluded there is no Middle Cambrian in Vermont, and of course was greatly surprised that I should have gotten the Paradoxids to the S. of N. of the Adams Pasture. After explaining the whole situation



to him Raymond is not satisfied with the  
succession and the correlation.

Raymond thought the Milton might go unhooked  
into the Colchester since he rounded the dolomite  
with Alenids above the Colchester as Milton  
sp. Near Field in the Colchester has  
beds of dolomite, he had no objection in making  
the Milton-Middle E. <sup>Alenids</sup> <sup>Alenids</sup> mapping  
shows a crossing interval between  
and the Milton.

The Swanton and Milton <sup>Alenids</sup> <sup>Alenids</sup> may have  
been made of more base, and might have <sup>Alenids</sup> <sup>Alenids</sup>  
during times of movement of the <sup>Alenids</sup> <sup>Alenids</sup>. Such  
good beds as <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> will be <sup>Alenids</sup> <sup>Alenids</sup>  
of <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>  
in <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>  
that they were <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>  
otherwise I do not see <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>

Raymond also <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>  
in the <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>  
today. Had a good time and saw much country  
but little of <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup> <sup>Alenids</sup>

New Haven

Tuesday, August 11-1925

Started for St. Albans at 10.37 (sum. time).

Will arrive tomorrow morning at 7 A.M.

With Howell, B. F.

Wednesday Aug 12-1925

Worked all morning in the St. Albans shale south west of Rockledge.

In the afternoon walked over in the field the Coburn Pasture succession, and near the house from Middle C.

Thursday August 13-1925

First visit to the rocks south of St. Albans. Part of the Mississippi, the St. Albans shale and Middle C. In this case the rocks to be traced from the Mississippi since they are not to be traced from the St. Albans shale. The shale must be traced from the Mississippi. August 11-14.

Then worked on the fossils of the St. Albans shale, and collected much Missisquoi for Howell.

In the afternoon visited all the places to the N.W. of Highgate Center, and then retraced our steps and went south to first west going road west of Shells Corner. Collected *Colchostoma* fossils at loc. 10.

It rained some off and on during the day and now at 4 P.M. it is raining damn hard and we had to quit.

St. Albans Aug. 14-1975

Started west over the St. Albans highway and then S. toward Corners place and to the farm road over Shells Corner. Here we located the Millstone and going E. from the St. Albans slate, *Imantina* fossils, etc. The slate dips up to the east about 10 li. east. Seems to dip at a low angle 10 to 15 degrees.

Ran west south to about half way and road half-way on the road. On the north side of road in Highgate shale Bay a quartzite local bed about 1 foot thick. Then farther west, just beyond house, same layer of li. (shales of the group). Farther W on north side of road to the one of a farm saw 5 lentils of li. blue together lying in shale. They look like L.C. lentils but appear to be in St. Albans shale. Are 20 feet across and is exactly

Has structure with small blocks of dol.  
like the great block at Rockledge or at loc. 11. Has  
Cornell town rock and we did not go out in  
the afternoon. The day is dark and the ground is wet  
from yesterday.

Saturday Aug 15-1975.

Took the train at 8.30 via a bus line  
for Burlington, where we arrived at 10.30.

Then visited the Univ. of Vermont and the  
Museum. Have a lot of material, geological,  
ethnographic and geologic, but the arrangement  
is poor; the most important is the geologic.

Saw the Chert, slate, a heavy sandy dol.  
with the fossils in high relief = casts. All are weathered  
and ochraceous color. The rocks have not suffered from  
compression. All as far as we could see had only  
chert, heads, and other fragments. No need  
more than 1/2 inches across.

In the late afternoon went by trolley to Lincolnton  
about one mile east of Burlington. Here the  
great quarry exposures about 50 feet of white un-

= Heltyrne mantle

clouded very soft mantle, that all dips east at about 25-degrees. The main, untiled one it runs between 90 and 95 percent carbonate, lime, about 3.5 to 4 magnesium carbonate. One bed about 3 feet thick was met in sand with the grains well rounded and large, an occasional grain 1/16 inch in diameter.

Keith says it is like Milton but the actual contact has not been seen. It is overlain by the Millstone which is Beekmantown. I am wondering if the Heltyrne is not the same mantle that constitutes the lower part of the Beekmantown seen at Phillipsburg. I saw no fossils, but the manager said Phillips had written some. He was right there is a bed of greenish yellow shale, I saw some dark fractured pieces. And that is all seen. The Heltyrne I am certain that none of it is in the Beekmantown. Perhaps all these "Heltyrne" rocks are lentils out of the Cr. section.

History of the Heltyrne Article.

Sunday, August 16 1920

Started on a steamer trip south through  
Lake Champlain and Lake George to Albany.  
Dram day, great crowds and less pleasure.  
Hardly could catch sight seeing when the  
mit is out.

Got to Albany at 7.10 P.M. and wandered  
around among the hotels to find a room. Finally  
got one in a Turkish Bath House = Benson's.

Monday Aug 17 1920

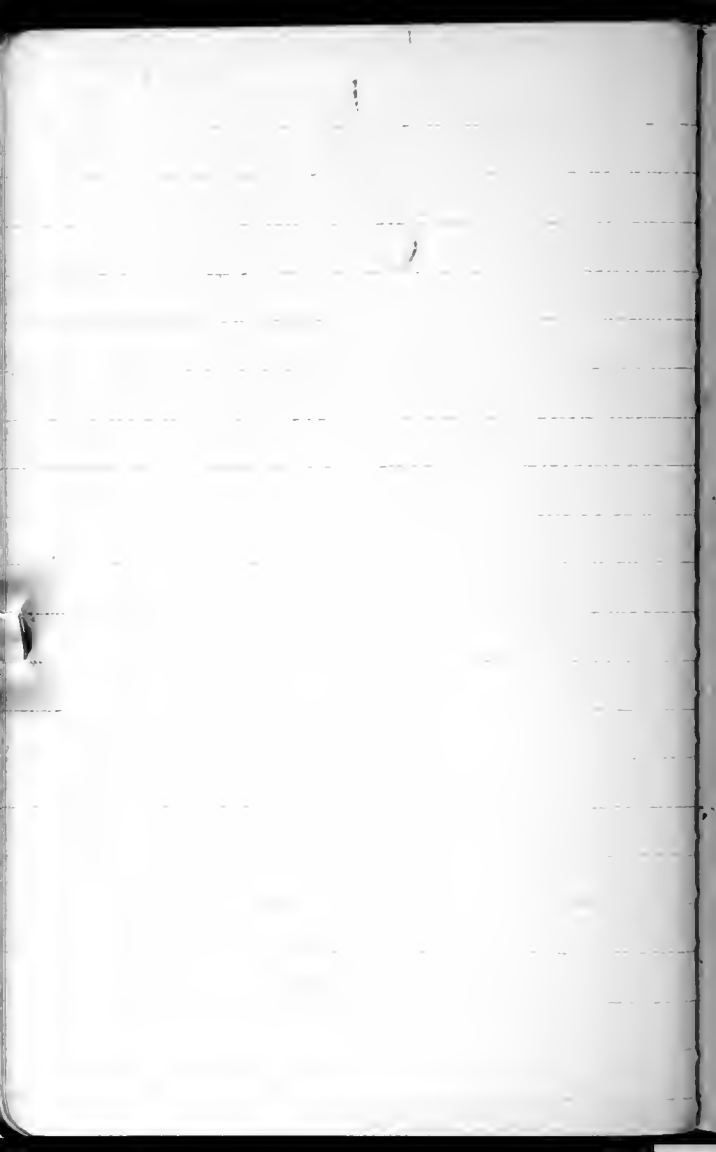
Dram day, but as there is an ex-  
cursion down the Hudson concluded to take the  
train to New York. Left Albany at 8.20 A.M.



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