

1

D. Bigby Esq on the  
Island of Montreal

Annals of the 1824

Montreal Hill, overlooking on the southeast the rugged Isle of St Helen and the town to which it gives name, is placed on the south side of the island, fourteen miles from its lower end, and about a mile from the St. Lawrence. It stands alone, in an extensive and highly cultivated plain, intersected by large bodies of water, and terminated on the north and south by mountains of fine features, but in no other directions stretching unobstructed into Upper Canada, and into the eastern townships of Lower



1  
D. Rogers 1891 in the  
Journal of Agriculture

Albany, N.Y. 1894

Montreal still overlook  
up on the southwest the  
shipped side of St. John  
and the town to which it  
gives name, is placed on the  
east side of the island.  
fourteen miles from its  
lower end, and about a  
mile from the St. Lawrence  
It stands above, upon ex-  
tensive and highly culti-  
vated plain, intersected  
by large bodies of water and  
terminated on the north  
and south by mountains  
of fine features, but in no  
other directions interesting  
uninterrupted into Upper  
Canada, and into the east  
on towards the river.



Canada. The aspect of this hill is rendered striking by its massiveness, as well as by its position. It dips on the east and southeast precipitously from a rounded summit of scantily wooded rock, and elsewhere presents rugged hummocks, or steep declivities, clothed with birch, poplar, and maple. Its base, and part of its sides, are occupied by orchards, farms, and gentlemen's seats: excepting the level space immediately on the northeast, employed as a race-course. It is a long oval, extending from northeast to southwest for nearly three miles, and having a comparatively small breadth; now and then, however, increased by lateral projections on the north, enclosing little vallies. It is separated into two un-



bank. The aspect of this  
hill is rendered striking  
by its position. It rises  
on the east and southeast  
precipitously from a wooded  
summit of recently wooded  
rocks, and the dense forest  
suggested by the name, is  
characteristic, dotted with  
poplar, and maple. The base  
and part of its sides are  
covered by orchards, farms,  
and gentle slopes. Except  
the level space immediately  
to the northeast, occupied  
by a large house. It is a large  
oval extending from northeast  
to southwest for nearly three  
miles, and having a circumference  
thirty small localities; now  
and then however, increased  
by lateral projections on the  
north and leaving little doubt  
it is separated into two



equal portions by a broad fissure, now used as the west road to the interesting village of St. Catherine's. The western of these divisions is frequently called Mount Trafalgar. I am not certain which is the highest. The surveyor-general of lower Canada states the greatest elevation of the hill to be five hundred and fifty feet above the contiguous river; \* the measurement having been directed, I believe, to the flagstaff on the northeast end of the hill; on the southeast declivity, below which which flagstaff, it may be mentioned for the sake of reference hereafter, there is an elegant monument in memory of Mr. McYavish, one of the founders of the Northwest Company of Fur Traders.

\* New measurements will be taken this winter



equal portions by a brood.  
fascine, now used as the main  
road to the interesting village  
of St. Catherine. The western  
of these divisions is frequently  
called Mount Chapoyon. I am  
not certain which is the high-  
est. The surveyor-general  
of Lower Canada states the  
greatest elevation of the  
hill to be five hundred and  
fifty feet above the coast of  
the river; \* the measurement  
having been directed, I believe, to  
the flagstaff on the northeast end  
of the hill; on the southwest side  
of the hill, which is the flagstaff  
may be mentioned for the  
sake of reference hereafter  
there is an elegant monument  
in memory of Mr. W. J. Smith,  
one of the founders of the  
Northwest Company of fur-  
traders.

\* This measurement will be taken this winter.



A ridge, or bank, of sand and other rolled materials, rests on the base of the hill on the south and east: somewhat closely near the village of St. Henry; but in general there intervenes a varying breadth of flat, marshy, or stony ground. Its height is greatest at the above-mentioned village, where it is ascended by the Lachine turnpike. It is scarped there, and may be one hundred and forty feet high. Near Montreal it is called "Coteau St. Pierre" and ~~spot~~ slopes to a lower level, about twelve feet above the St. Lawrence, from an elevation of less than one hundred feet. This bank is scarcely apparent on the north side of the hill, but extends from it, east and west, to the ends of the island, at a small ~~hill~~ interval from its



The highest point of land  
and other natural  
rest on the base of the hill  
on the south and east is  
what closely near the village  
of St. Mary. But in general  
the mountain is a rising land  
of flat marshy or swampy ground  
this light is greatest at the  
above mentioned village, where  
it is surrounded by the sea  
turf. It is a sharp rise  
and may be one hundred  
feet high. Near Mountain  
it is called "The Green Hill"  
and extends to a lower  
level, about twelve feet  
above the sea. The mountain  
an elevation of less than an  
hundred feet. The bank is  
scarcely apparent on the west  
side of the hill, but extends  
from it east and west to  
the ends of the island, at a  
small distance from it.



shore. It is every where smooth and rounded, furrowed by streamlets, and somewhat lowered, except at Chateau Brillant, on the lake of the Two Mountains. The vicinity of the Rivière des Prairies is sandy in spots, and undulating; but on the whole, low.

The fixed rocks of this district may be enumerated as follows:— A very compound trap constitutes the largest part of Montreal Hill, and appears in great quantity in the plains on its south. Besides emerging in the route of the Lachine Canal, a rapid visit enabled me to detect it in unstratified rock masses, which just escape above the herbage, in the common of Laprairie, a quarter of a mile west of the village, (six miles from Montreal) a mile south of the



It is very interesting to see the  
mountains and mountains, and  
the great lakes, and the  
of the two mountains. The  
proximity of the two  
is nearly in a line, and  
but on the whole  
low.

The fixed rocks of this  
district may be enumerated  
as follows. A very common  
trap constitutes the largest  
part of Montreal Hill, and  
appears in great quantity in  
the plains on its south. Be-  
sides emerging in the north of  
the lake is a small, a rapid  
embankment to detect it in the  
stratified rock masses, which  
first escape above the bridge  
in the common of the  
a quarter of a mile west of  
the village, (a mile from  
Montreal) on the south of the



parish church of Longueuil,  
(3 miles east of Montreal) and  
on the banks of the St. Law-  
rence, west of, and near the  
same church. It occurs in a  
similar manner on the River  
Richelieu, (12 miles south-east of  
Montreal) for one or two miles  
about Col. de Salaberry's  
Mills. Rolled fragments of  
this rock abound everywhere  
in the large area included by  
the towns of Montreal, Cham-  
bly, and St. John's, and extend  
southward at least twenty  
miles above the foot of Lake  
Champlain, even to the Genesee  
country, in a southwest direction,  
and up the St. Lawrence nearly  
as far as Prescott, in Upper  
Canada. At the lower end  
of the Dandrevil ferry, on  
the Lake of the Two Mountains,  
the fragments of trap are so  
plentiful and angular, (1819)  
that I suspect it occurs in  
in a place not far from thence.



in those not far from there  
that I suspect it occurs in  
plentiful and regular (1879)  
the fragments of trap are in  
the lake of the Blue Mountain  
of the Barabecille pass, on  
Barabecille. At the lower end  
as far as Prescott, in Upper  
and up the St. Lawrence valley  
country, in a southeast direction  
Champlain, even to the French  
miles above the foot of Lake  
Ontonagon at least twenty  
by and St. John's, and extend  
the towers of Montreal, where  
in the large area included by  
this rock shows everywhere  
Mills. Rolled fragments of  
about 1/2 to 1/4 of a mile  
Montreal) for one or two miles  
Richelieu, 12 miles south-east of  
similar manner on the River  
some church. It occurs in a  
lower, west of, and near the  
on the banks of the St. Lawrence  
3 miles east of Montreal) and  
between corners of map.



Near Montreal, the trap supports, and traverses in direct contact, a conchiferous limestone, which floors nearly the whole island, as well as can be ascertained, through its plentiful soil; and its best brought into view about that town, and at the rapids of the Recolet, and other portions of the Rivière des Prairies. At a distance from the hill, it probably rests on quartzose conglomerate, or sandstone; as on the former, are based some of the islets in the Lake of the Two Mountains, and the Isle of St. Helens. Quartz sandstone discovers itself at the Cascades, St. Amé, and in the bed of the Lachine Canal.

The trap may be said to consist chiefly of crystalline hornblende, largely mixed with quartz, feldspar, mica, and augite. The accidental minerals are those characterising



near March, the trap suffered  
and traverses in direct contact,  
a considerable distance, which  
flows nearly the whole island,  
as well as could be ascertained,  
though its plentiful soil; and  
its best brought into view  
about that town, and at the  
top of the Peak, and  
other portions of the River  
the Prairie. At a distance  
from the hill it probably  
rests on granite, or  
metamorphic, or sandstone; as on  
the former are based some  
of the beds in the lake of  
the two mountains, and  
the beds of St. Albans. In the  
sandstone discovery itself at  
the base of St. Albans, and in  
the bed of the Lake of St. Albans  
the trap may be said  
to consist chiefly of crystalline  
sandstone, largely mixed  
with quartz, felspar, mica,  
and quartz. The crystalline  
minerals are those characteristic



and order of rocks, as gneiss,  
&c. Except where it assumes  
the form of dykes or veins,  
as ~~is~~ common in the plain  
about the hill, it is massive,  
and usually much weath-  
ered. On the summit of the  
hill, and sometimes else-  
where, it rises above the  
vegetation in naked flattish  
mounds, closely compacted,  
and seldom exceeding five  
yards in diameter. In the  
small ruinous ledges and  
cliffs, it is fissured perpendi-  
cularly, and rent by cold, into  
large cuboid blocks. When  
quartz enters into the com-  
position of the trap in quant-  
ity, it becomes schistose, but  
I have never observed real  
stratification.

The varieties are very  
numerous, but may all be de-  
rived from four principal  
forms, running into each other  
without apparent order, and



...a few of the ...  
...except where it assumes  
the form of ...  
...as is common in the plain  
about the hill, it is massive  
and usually much ...  
...On the summit of the  
hill, and sometimes else-  
where, it rises above the  
vegetation in naked flatish  
mounds, closely compacted,  
and seldom exceeding five  
yards in diameter. In the  
small ... ledges and  
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cularly, and rent by cold, into  
large cuboid blocks. When  
greatly ... into the con-  
formation of the trap in great  
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I have never observed real  
stratification.  
The ... are very  
numerous, but may all be de-  
rived from four principal  
forms, running into each other  
without ...



occupying indiscriminately all levels. They do not only furnish a convenient mode of classification, but also represent the kinds predominating. Of the four, the two forms placed first in the following sketch are perhaps the most plentiful. The magnet is not affected by any, except when iron is visibly present.

The first form consists of promiscuously aggregated, shining, black prisms of hornblende, from half an inch to three inches long, sometimes pure; and so mutually compressed as almost to disappear; but more frequently white or ferruginous masses of glassy feldspar and quartz, mixed in various proportions are interposed, so as to give the whole a strong resemblance to sienite. This white compound, disintegrating



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the most plentiful. The one  
set is not affected by any ex-  
cept when it is visibly  
present.

The first form con-  
sists of provisionally  
aggregated, shining, black  
of lamellae, from half an  
inch to three inches long, some-  
times pure, and as usually  
compressed as almost to dis-  
appear; but more frequently  
white or ferruginous masses  
of glassy filaments and quartz  
mixed in various proportions  
are interposed, so as to give  
the whole a strong resin-  
blanc to white. This white  
conformity, however, is



by the weather, falls out, and renders the crust of the rock vesicular. Copper-coloured mica, in single scales, or in nests, is common in this variety, and now and then, though rarely, in great quantity. Small druses often form in the interstices of the hornblende crystals, lined with small crystals of feldspar, (white or colourless, transparent, hexahedral, tables) quartz, pale green epidote, (granular or in stellular, radiating, acicular crystals, terminally superimposed) and rarely a small weathered rhomb or chabasite. Cubic iron pyrites is common and spicular iron ore in confused ~~etc~~ crystallization, as a coating. This form is met with on the summit of the east division of the hill, above



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McYavish's Tomb, on the<sup>2</sup>  
of its north and west flanks,  
and the greater part of  
Mount Trafalgar, especially  
the lower. On the north  
east declivity of Mount Tra-  
falgar, and on a cleared  
hummock on the east  
division, near the west road  
to St. Catherine, the crystals  
of hornblende arrange them-  
selves in continuous lines  
or bands, from a sixth to  
half an~~not~~ inch thick, and  
sometimes several feet long;  
with occasional cross rents.  
They are parted by the mixture  
of quartz and feldspar above-  
mentioned: forming, of course,  
similar bands, but white.  
I have seen this curious struct-  
ure in short spaces only,  
and am thence unable  
to state its extent or direction.  
It is more remarkable, as  
occurring among rocks in  
which anything like order



seems studiously avoided. It would appear to indicate that the mass has consolidated during motion. This kind affects the magnet.

The second form exists in most parts of the hill, and in the route of the Lachine Canal, and is well marked in the low cliff above McYavist's Tomb. It is black, or brownish black, opaque, homogeneous, rather fine-grained, with blunt edges. It yields a gray streak readily to steel. Its specific gravity is that of trap rocks generally. The specimens taken from near the west road to St. Catherine, and in other places near calcareous strata, effervesce slightly, though distinctly, on exposure to acids. It is differently sometimes dotted with crystals of ~~iron~~



of its north and west flanks  
and the greater part of  
Mount Chapoyan, especially  
the lower. On the north  
east declivity of Mount La  
fajon, and on a cleared  
savanna on the east  
division near the west road  
to St. Catherine, the crystals  
of lamellaris arrange them  
selves in continuous lines  
or bands, from a sixth to  
half an inch thick, and  
sometimes several feet long;  
with occasional cross joints.  
They are parted by the mixture  
of quartz and felspar above  
mentioned; forming, of course,  
similar bands, but white.  
I have seen this curious structure  
in about a dozen only  
and am therefore unable  
to state its extent or distribution.  
It is more remarkable, as  
occupying an area of  
which only a few



above a dark greyish greenish  
It would appear to indicate  
that the mass has covered  
dated during winter. This  
kind affects the magnet.  
The second specimen  
in west part of the hill and  
in the north of the building  
canal, and is well marked  
in the low cliff above  
the building. It is  
black or brownish black  
opaque, has a greenish rather  
fine grained, with blunt  
edges. It yields a gray  
to red, readily to steel. The  
specific gravity is that of  
trap rocks generally. The  
specimens taken from near  
the west road to St. John's  
me and in other places  
show a similar appearance  
slightly, though distinctly  
on exposure to acid. It is  
differently sometimes  
dotted with crystals of iron



white glassy feldspar, which having increased to a good size in one case converted into a mass of porphyry.

The third kind prevails as well on the hill, as in the veins of the vicinity soon to be noticed. It is on some occasions scarcely to be distinguished from the black trap of the Sabine country, near Rome, containing solitary crystals of augite, which I have seen in the collection of Mr. Greenhough of London. It is the last described from crowded (but sometimes only studded) like a porphyry with crystals of greenish black augite, alone, or interspersed with basaltic hornblende; both of large size, and well characterised



white glassy felspar  
which having increased  
to a good size in one case  
converted into a mass of  
paraphry. The third kind  
phenocris as well as the  
hills as in the veins of the  
mineral seem to be watered.  
It is of some occurrence  
seemingly to be distinguished  
from the black top of the  
labrador country, some of them  
containing solitary crystals  
of quartz, which I have  
seen in the collection of Mr  
Greenough of New York.  
It is the last described from  
Canada but sometimes only  
etched like a paraphry with  
crystals of greenish black quartz  
above or interspersed with  
basaltic laminae; both of large  
size, and well characterized



and well characterized\*  
and in weathered masses  
often showing their ter-  
minations. Among other  
localities, this form  
occurs on the declivity over-  
looking the race-course,  
where it is chequered  
with spots of granular  
epidote and white quartz.

On Laprairie common  
these augitic crystals  
are almost acicular, in a  
brownish trap; and also  
on the Lachine Canal, where  
the rock assumes a peculiar  
and very handsome appear-  
ance. It is to be found in  
great quantity near the

\* The augite belonging to the A.  
trivinitaire, of Haüy, as I learn from  
Dr. Proost, whose skill in pract-  
ical chemistry and crystallography has  
laid me under frequent and pleasing  
obligations.



and the black water of the  
and in the water of the  
after showing the  
minerals. Among other  
localities, this form  
occurs on the hillside  
looking the same course  
where it is exposed  
with spots of granular  
epidote and white quartz.  
On the opposite corner  
these vesicular crystals  
are almost everywhere  
found in traps; and also  
on the declivity of sand where  
the rock assumes a peculiar  
angular sandstone appearance.  
It is to be found in  
great quantity near the

the water belonging to the  
territory of the, and from  
the coast, whose skill in  
locality and topography  
has been a matter of great  
importance.



country-seat of Edward  
Gregory Esq. but cannot  
now be examined, in situ,  
as it is covered by water.  
The large fragments  
strewn around however  
show it to be amorphous.  
It may be described  
as a confused assemblage  
of short needle-shaped black  
crystals, cemented together  
to use a convenient phrase  
by a fine mixture of pink  
feldspar and white quartz.  
It is in parts, interspersed  
with numerous round druses,  
averaging half an inch in  
diameter, lined with octo-  
hedral iron pyrites, rhom-  
bic and pyramidal calcspar  
and green epidote in many  
but very small crystals.  
Mingling with these druses  
without regularity of situa-  
tion and in considerable num-  
bers (though commonly distinct)



country east of London  
I regret to say that cannot  
now be examined in situ  
as it is covered by water.  
The large fragments  
strewn around however  
show it to be composed  
of a very fine crystalline  
as a confused assembly  
of small crystals of  
crystals cemented together  
to use a convenient phrase  
by a fine mixture of pink  
chalcophane and white quartz.  
It is in parts interpermeated  
with numerous round bluish  
crystals half an inch in  
diameter, lined with octa-  
hedral iron pyrites, rhombo-  
hedral iron pyrites, calcite  
and green epidote in many  
but very small crystals.  
Principally with these green  
without regularity of arrange-  
ment and in considerable quan-  
tity though common in the



are spherical knots of pink feldspar, nearly pure, minutely crystallized, and filled with the acicular hornblende or augite of the general mass. The feldspar, it will be observed, is here pink. I met with a detached mass on the north side of the homogeneous trap, traversed by a vein two inches thick, of red feldspar.

Judging of the quantity of the trap met with in the excavation of the Lachine Canal, by what is thrown out, it is very considerable. It is principally of the second, or compact kind and is massive; rarely in veins, when it might be visible in the sides of the Canal, as in fact it is not far from the bridge at the west end, and at about three miles from the same end. The third



use of several boats of kind  
felled on, nearly full, and  
with the exception of a few  
boats on a side of the general  
mass. The felled on, it will  
be observed, is less fine.  
Boat with a detached mass  
on the north side of the lower  
general trap, traversed by  
a river two inches thick of  
red feldspar.  
folding of the quantity  
of the trap, but with in the  
excavation of the bottom  
showing what is the same  
out, it is very considerable.  
It is principally of the  
red, or compact kind  
and is massive; rarely in  
small, but might be  
visible in the sides of the  
bank, as in fact it is  
not far from the bridge  
at the west end, and at  
about three miles from  
the same end. The third



form, when penetrating the limestone, ~~at the~~ in veins, effervesces slightly with acids, and even contains well preserved terebratulæ, covered with a ferruginous crust and surrounded by crystals of basaltic horn-blende.

The fourth form abounds most near the limestone, at the sides of the eastern division of the hill, and on the higher parts of the ~~very rough~~ very rough north-east flank of Mount Trafalgar; where it graduates in passing downwards through the homogeneous into crystalline black form. It can, indeed scarcely be called a trap; although forming part of the same deposition with the other portions of the hill. It cannot be distinguished, in carefully selected hand



limestone, ~~at the~~ in being  
limestone slightly with  
beds, and even containing  
well preserved fossiliferous  
covered with a ferruginous  
rust and surrounded by  
crystals of baritic bar-  
blende.

The fourth form  
abounds most near the  
limestone at the sides of  
the eastern division of the  
hill and on the higher parts  
of the ~~limestone~~ very rough north  
east flank of Mount No-  
folgor; where it graduates  
in passing downwards  
through the same genera  
into crystalline black form  
at con. marked recently be  
called a trap; although  
forming part of the same  
deposition with the other  
parties of the hill. It can  
not be distinguished, in  
carefully selected bands



specimens, from the sien-  
ite of the summit of  
Peek Island, in Lake  
Superior; and with  
some difficulty from a  
amphibolic granite, from  
the near Rice River, in the  
Lake of the Woods. It is  
a mixture, occasionally  
fine, of white transparent  
feldspar, white crystalline  
quartz, and a little copper-  
coloured mica, often in nests.  
In this granite-like rock,  
prisms of hornblende are  
scattered at random, some-  
times mere dots, or acicular;  
but, at others, one or more  
inches long, and of corre-  
sponding breadth. As has  
been mentioned above,  
this form, by an augmen-  
tation of ~~the~~ its hornblende  
passes into perfect trap,  
and, on the other hand, as fre-  
quently, wholly loses the im-  
bedded crystals in question.



specimens, from the rim  
of the summit of  
Peak Island, in Lake  
Superior; and with  
have difficulty from a  
amphibolic granite, from  
the near Big River, in the  
lake of the Woods. It is  
a mixture, occasionally  
fine, of white transparent  
feldspar, white crystalline  
quartz, and a little copper  
coloured mica, often in nests.  
In this granitic-like rock,  
prisms of boulders are  
scattered at random, some  
times more flat, or angular,  
but at others, one or more  
inches long, and of con-  
spicuous length. As has  
been mentioned above,  
this form, by an accumu-  
lation of the its boulders  
passes into perfect trap,  
and on the other hand, as for  
quartz, which loses the im-  
bedded crystals in question.



The white cement often contains carbonate of lime. When the black and white ingredients are distributed with some uniformity, and in equal quantity, their strongly contrasting shades give great beauty. It often traverses the other forms of trap, in broad and straight, tapering bands, which issue from large irregular masses, whose precise relation to the surrounding rocks happens to be hid by vegetation or debris.

The four forms of trap now sketched together with their numerous gradations, occur in the veins or dykes which form so singular a feature in the geology of the environs of Montreal. The second, or homogeneous kind, is



The white cement of the  
contains carbonate of lime,  
When the black and white  
ingredients are distributed  
with some uniformity,  
and in equal quantity,  
their strength contrasting  
character gives great beauty  
to the surface. However,  
the other forms of trap  
in board and straight  
tapering bands, which  
issue from large ir-  
regular masses, in those  
precise relation to the  
surrounding rocks  
appears to be due to veget-  
ation or debris.  
The four forms of  
trap now referred to -  
gather with their numerous  
varieties occur in the same  
localities which form so  
important a feature in the  
geology of the country of  
Massachusetts. The second  
in importance is the



most abundant, but it is here projected from the elements by a ferruginous crust, and breaks into thick oblong slabs, with sharp, rhomboidal edges. I do not recollect the 4<sup>th</sup> form to exist as a dyke. Near the north end of a limestone quarry, a few hundred yards north of the race-course, there is a dyke of a composition I have not observed on the hill. It consists of a soft, passing into powdery, cement, white and green, (each colour predominating in patches) which contains numerous finely marked crystals of basaltic hornblende, distributed confusedly, but equally, and not often confluent. The cement is principally calcareous; the remainder being green earth, which frequently contains the crystals.



most abundant, but it is  
here projected from the  
element by a ferruginous  
crust, and breaks into  
thin oblong slabs with  
sharp, sharp-edged edges.  
It does not reflect the light  
from to exist as a crystal.  
Near the north end of a  
limestone quarry, a few  
hundred yards north of  
the bar-cour, there is  
a dip of a composition  
I have not observed on the  
hill. It consists of a soft  
passing into powder, ce-  
ment, white and greenish  
colour predominating in  
patches) which contains  
numerous finely marked  
crystals of barite the bar-  
ite distributed con-  
sistently, but equally, and not often  
concentrated. The cement is principally  
chlorine; the remainder being  
greenish white quartz, and small



These dykes are derived from the hill. The presence of vegetation and of soil, prevents our tracing them throughout to their source but their origin is betrayed by the identity of their materials with those of the rock of the hill, by the course of the majority and by their being detected in several instances issuing thence, and from its immediate neighbourhood.

Mr. Macculloch, in his account of the group of trap islands off the west coast of Scotland, describes several large accumulations, dépôts, as it were, of amphibolic rocks, from whence veins proceed in all directions for several miles into the adjacent strata. The form and position of ramification now under consideration, may



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and position of these  
now under consideration



be understood from the following observations.

Horizontal shell limestone, floors, as has been already stated, the plains surrounding the hill; and without the least derangement \* invests its trap masses, to a variable distance, from the summit of ~~ca~~ 150 to 350 feet, the lowest of these elevations being on the north, and the highest on the south flank of the east division.

From the hill, as from a centre, these pass in all directions into limestone, with a remarkably straight, unchanging course, a great number of dykes, arms, or veins, of the composition stated above;

\* Except near a deserted house on the west road to St. Catherine where it is turned up edgeways in places: but perhaps not by the trap



\* Excavated a section of the  
west road to St. John's where it turned  
upwards in the hill, but perhaps not by  
the trap

the composition stated above  
of higher, some, or even, of  
ing coarse, a great number  
a remarkably straight, unknay  
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a centre, these pass in all

from the hill, as from  
flank of the east division.  
and the highest on the south  
eastward being on the north  
to 350 feet, the lowest of these  
from the summit of 150  
as to a possible distance,

ment \* insects its trap was  
without the least change  
encompassing the hill, and  
already stated, the plain  
stone, floor, as has been

hardly a shell line  
following a section  
be understood from the



and perpendicularly, or nearly so. They have been traced northeastwardly, for a mile and a half. Those at Lachine may originate in the trap contiguous to them. In the race-course which is a level piece of ground, full of old and new quarries of limestone, no less than fourteen of these veins have counted. They are best seen about the middle, and near the hill, from whence they advance just above the grass, like the base of long, ruined, walls. The most common direction on the race-course is east; the deviations being usually trifling. They dip north, at a very high angle. At the northeast corner of the course two veins cross, but the place of intersection is hid by soil.



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nearly so. They have been  
traced northwards for  
a mile and a half. These  
at last many specimens  
in the trap containing  
to them. In the case of  
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high angle. At the north-  
east corner of the course  
two rooms cross, but the plan  
of the section is not by any



A little to the south of the stand a vein runs north north east. In the quarry north of the course, two contiguous dykes\* also run north north east, that direction leading to the hill. The same is the case with another vein, in a pine wood, two thirds of a mile north of the course; and a second vein, close at hand in the same wood, passes north by east. Of these in William's limestone quarry (about a mile and a half north east of the hill) that at the back of the house runs north, and another in front, north east. They are compact highly ferruginous, but occasionally in their route (as is common) assume the porphyritic form described third. In one

\*The composition of one of these dykes has been given.



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case the hornblende prisms<sup>3</sup>  
are low and oblique, four-  
sided, and at the same time  
few and small. The paste  
here is brown; the whole  
mass strongly resembling  
the trap on parts of the  
river Richelieu.

These veins have par-  
allel sides, and are from  
one to three feet in thickness  
but near Lachine, there is one  
14 feet thick, it is visible,  
however, for so short a  
distance, that its dimensions  
cannot be given precisely.  
They do not thin off, at  
least very sensibly. In  
fact, we cannot at present  
trace the same individual  
further than four hun-  
dred yards. Sometimes,  
as at the southeast angle  
of the race-course, they  
seem to meet with an ob-



one the least likely persons  
are four and at three, four  
sided, and at the same time  
four and small. The parts  
here is brown; the whole  
mass strongly resembling  
the top or parts of the  
river Nicholson.

These veins have four  
alike, and are from  
one to three feet in thickness  
but near bottom, there were  
14 feet thick, it is visible,  
however, for as short a  
distance, that its dimensions  
cannot be given precisely.  
They do not thin off, at  
least very sensibly. In  
fact, we cannot at present  
trace the same individuals  
further than four hun-  
dred yards. Sometimes,  
as at the northeast angle  
of the race-course, they  
seem to meet with one of



stack, and collect into an irregular knot, from 10 to 30 feet broad, which again projects a number of tortuous ramifications; the straight course having been abandoned. These veins frequently subdivide and again unite, enclosing lenticular masses of conchiferous limestone and sometimes of large size; in all cases adhering to the trap, with the utmost firmness, and although the division is marked by a fine clear line, the carbonate of lime is detected in the vein by application to acids. These insulted fragments suffer no change except being a little harder, and contain terebratae, encrinites, &c. whose state of preservation



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irregular knot, from 10 to  
50 feet broad, which again  
projects a number of  
loose and insignificant  
the straight coarse having  
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a fine clear line the con-  
sistence of lime is detected  
in the thin by application  
to acids. These are called  
fragments to suffer no  
change except being a  
little harder, and contain  
the same elements, &c.  
whose state of preservation



does not differ from that of the shells imbedded at a distance from the trap, even the naacre remains in some cases. These divisions are sometimes quite minute, and separate the limestone for short into thin ribbon-like laminae, parallel to each other and perpendicular. Sometimes the trap has insinuated itself, horizontally in sheets, between the layers of limestone. ~~for short~~ This is beautifully exemplified in an imbedded bank on the south side of the racecourse at the base of the hill. Here the upper stratum is horizontal trap of parallel sides, nearly two feet thick and covered with earth. It rests on the limestone in its usual position, pushing through it.



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a vertical and very thin sheet of trap. A drawing, made very soon after meeting with this appearance, does not represent any displacement of the calcareous strata; and I well remember, that the union between the two layers or veins of trap is perfect.

In the quarry five-hundred yards north of the race-course, there is a vein eighteen inches thick, which is nearly horizontal. It is only seen for a few feet. Dr. Lyons, Surgeon to the British forces, an acute observer, to whom I am much indebted, met with a horizontal vein, on the south flank of Mount Trafalgar, overlooking the priests' house. The west and northwest parts of the base and sides of Montreal Hill, have not yet been



a vertical and very thin sheet of  
trap. It shows, made very  
soon after setting with this  
appearance, does not represent  
any displacement of the caliche  
concretions; and I will remark  
here, that the union between the  
two layers or veins of trap  
is perfect.

In the quarry five  
hundred yards west of the  
one above, there is a vein  
eighteen inches thick, which  
is nearly horizontal. It is  
only seen for a few feet.  
Mr. Dixon suggests to the  
British forces, an attempt  
should be made to remove some much  
injected, met with a large  
apical vein, on the south  
flank of Mount Chapala  
overlooking the Pacific.  
hence. The west and  
northern parts of the  
base and sides of Mount  
still have not been



sufficiently examined;  
but I do not look for  
much information  
from thence, as they  
are employed in til-  
lage, and as far as I  
know, have not been  
excavated for quarries.

I shall now proceed  
to give some account  
of the limestone over-  
lying this trap, and re-  
ceiving its ramifications.  
It is a portion of the great  
basin of secondary rocks  
of North America, whose  
outlines have been ably  
traced by Dr. Graced, in  
his account of the expedi-  
tion to the Rocky Moun-  
tains, under Major Long.  
A more detailed description  
of its line of junction with  
the elder and inclined rocks  
of the dividing ridge of the  
vallies of Hudson's Bay,



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but I do not look for  
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known, have not been  
excavated for gravels.  
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to give some account  
of the limestone over-  
lying this trap, and re-  
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his account of the exhibit  
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tains, under Major Long.  
A more detailed description  
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the older and inclined rocks  
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valleys of the Pacific has



and the St. Lawrence, may be found in Volume VIII p. 77 of the American Journal of Science. The particular form occurring in Montreal Island, and overspreading nearly the whole of it, extends into Lake Champlain and on the Richelieu on the south; and north-eastwards, down the St. Lawrence, as far as Cape Tourment, thirty miles below Quebec. Its south-east boundaries have not been examined. We only know of the country south of the St. Lawrence, below Montreal, that it abounds in greywacke and clay slate, superincumbent on granite and gneiss. Westerly and southwesterly, it unites with the limestone of the Lakes, with which, if we are to judge by imbedded



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of the American Journal of  
Science. The particular  
form occurring in Mount  
Beland, and overlying  
nearly the whole of it, ex-  
tends into Lake Champlain  
and on the Richfield  
in the south; and north-  
eastwards, above the St.  
Lawrence, as far as Lake  
Lamont, thirty miles  
below Quebec. The south-  
east boundaries have  
not been examined. We  
only know of the country  
south of the St. Lawrence,  
below Montreal, that it  
abounds in gneiss and  
granite, and chlorite, and  
quartz. Westward  
with the limestone of  
the lakes, with which, if  
we are to judge by the



minerals, organic remains  
and geological position  
it is contemporaneous.

The compact form is not  
to be distinguished from  
that of the north east  
end of Lake Ontario;  
serving as substratum  
for the adjacent parts  
parts of the State of New  
York and Upper Canada.

The limestone of  
Montreal Hill is bluish black  
or bluish brown, without lus-  
tre, fine-grained passing into  
compact, easily scratched by  
~~steel~~ steel, and of conchoidal  
fracture when free from shells.  
When exposed to the weather,  
it is divided into horizontal  
layers, from 6 to 24 inches  
thick, some of them contain-  
ing silica in chemical com-  
bination (with increased  
hardness); and others cherty  
in horizontal bands. How



minerals, organic remains  
and geological position  
it is certainly  
the compact form is not  
to be distinguished from  
that of the north east  
end of Lake Ontario;  
occurring as a subatum  
for the adjacent parts  
parts of the State of New  
York and Upper Canada  
The limestone of  
Hartford Hill is bluish black  
or bluish brown, without in-  
ter, fine-grained passing into  
coarse, irregularly bedded by  
at the end of considerable  
fracture when free from shell  
When exposed to the weather,  
it is divided into horizontal  
layers, from 2 to 4 inches  
thick, some of them contain-  
ing either in chemical com-  
position, or with increased  
darkness; and other chert  
in horizontal bands. These



thick the strata are, at some depth beneath the surface, is very doubtful. This form of the limestone is well seen at McIlvish's Tomb, on the west road to St. Catherine's, and on the north of the hill at the base: every where full of the organic remains ~~at~~ of the level country. The limestone of the race-course, so traversed by dykes, is in all respects similar to that of the hill.

The small quarries scattered over a field north east of the race-course, and often alluded to already, are nearly on the same level with those of the latter spot: but are perhaps 2 feet lower. They are only opened to the depth of nine feet of rock. Of this, the upper



the surface is very beautiful  
this form of the limestone  
is well seen at Macmillan  
Point, on the west coast  
to St. Lawrence, and on  
the north of the hill at  
the base: every where full  
of the organic remains  
of the lower country. The  
limestone of the lower  
course, as traversed by  
Chippewa, is in all respects  
similar to that of the hill  
The small quarries  
scattered over a field north  
east of the race course, and  
often alluded to already, are  
rich in the same kind  
with those of the latter  
spot: but are perhaps a few  
feet lower. They are only open  
to the depth of nine feet  
of rock. Of this the upper



third is a brown, knotty, disintegrated, calcareous shale, greatly charged with iron in the brown carburet and pyritic forms. The lower two thirds, by rapid, but not ~~abrupt~~ abrupt transition, consist of layers of bluish gray and grayish brown limestone from eight to thirty inches thick. These are highly crystalline, in shining rhomboidal facettes, which average one-sixth of an inch in diameter, and display no trace of organization. William's Quarries present the same appearances as these.

The limestone on the north of the island, in the quarries and broken platforms along the Rivière des Prairies, is nearly the same as the crystalline



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average one-sixth of an

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present the same appear-

ances as these.

The limestone on the

west of the island, in the

quarries and broken

platforms along the River

the same as the crystalline



species of the quarry adjacent to the race-course. The organic remains are the same but where I observed it there was a tendency to the granular form. Some of it is shaly. The difference in level must be very small.

The calcareous rock, which has been cut through in forming the canal between Montreal and Lachine is only the  $3\frac{1}{2}$  or ~~for~~ 4 miles nearest the west end. It is about on the same plane with the St. Lawrence. The ragged edges of the upper and northern strata, above described, are concealed by the large alluvial bank girding the hill. The limestone of this locality varies in its external appearance. In the eastern



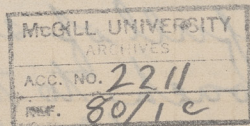
species of the quarry edge  
went to the race course. The  
organic remains are the  
same but where I observed  
it there was a tendency  
to the granular form.  
Some of it is sandy. The  
difference in level must  
be very small.  
The calcareous rock  
which has been cut through  
in forming the canal be-  
tween Portland and  
is only the 5/8 or 4 miles  
west of the west end. It is  
about on the same plane  
with the St. Lawrence. The  
ragged edges of the upper  
and northern strata, when  
described, are concealed  
by the large alluvial  
banks graving the hill.  
The limestone of this locality  
varies in its external  
appearance. In the eastern



part of the above distance, it is pale, gritty and deficient in shells. I suspect the presence of quartz, but an accident has deprived me of the opportunity of testing it.

Proceeding westward, the limestone becomes bluish black, and softer; a pale brown granular variety then intermixing with it, by a sort of alternation; both containing large druses of very splendid crystals of dog-tooth, nail-head, lenticular and curved rhomboidal calc spar. Their organic remains are the same. These pale and dark layers are in firm union, by a wavy, but still horizontal line, the black one being usually on the surface, and often azoophytic, while the inner brown parts are full of shells, and approach to the crystalline state. The limestone at the







west end of the canal is all dark and shaly, but is unchanged in other respects.

Very fine fibrous arragonite has been brought from hence, but I suspect from the trap. It is in veins an inch thick, consisting of two closely connected table of equal size, one of which is white, with some degree of translucency: the other is hyaline, and almost transparent.

These limestones cannot now be examined, in situ, as they are covered by the water in the canal, and by the earth forming its sides; but the fragments lying around, may be sufficient for obtaining a pretty correct idea of their nature. These materials indicate, that in certain parts at least, it here rest upon an indurated quartz rock, of very fine grain, black and brown.



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with some degree of translucence.

Every: the other is opaque

and almost translucent.

These limestone cannot

now be examined, in situ, as

they are covered by the water

in the canal, and by the earth

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fragments lying around may

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destruction, that in certain parts

at least, it has been used for an

indurated quartz rock, of

very fine grain, black and brown



in alternate stripes, (the former shade being derived from carbon) and sprinkled with dots of iron pyrites. The dark variety predominates and runs into shale; but of what kind I have not yet ascertained. This rock occurs near St. Henry's, and seems to be supported <sup>or</sup> by the porphyritic trap with the handsome druses about of calcspar and epidote. The island of St Helen, which bears about north north east from the place where this quartz occurs, is based on a modification of greywacke, an extremely compact and hard conglomerate of granular quartz masses, both angular and rounded, green, gray, brown and black; and, varying in size from two inches in diameter to microscopic. The cement is green, and in sparing quantity. It



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over shade being derived from  
carbon) and sprinkled with  
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into shale; but of what kind  
I have not yet ascertained.  
This rock occurs near St.  
Albans, and seems to be con-  
sidered by the porphyritic trap  
with the lamprophyre dikes  
about of color and texture.  
The island of St. Helen, which  
lies about 100 miles east  
from the place where this  
quartz occurs, is covered on a  
modification of gneiss with  
an extremely compact and  
hard conglomerate of gneiss  
and quartz masses, both  
angular and rounded, green  
gray, brown and black, and  
varying in size from two  
inches in diameter to six  
feet. The cement is green  
and in some places



concrures, disseminated, and  
pyrites, and some copper-coloured mica, the latter being so plentiful in some of the fragments. I observed in it one mass of colourless feldspar. This rock shows itself in a naked bluff, a few feet above the St. Lawrence, on the north east of the Barracks of the Artillery. I am informed, that it is either massive or divided into thick strata.

I may place here the facts which have come to my knowledge respecting the sandstone of St. Anne. It presents itself on the shore of Lake St. Louis for 2 miles below that village, and at the rapids of the same name, on the northeast of Isle Perrault, in thick horizontal slabs of light brown quartz sandstone, with ferruginous clouds and spots. It is hard



pyrites, and some copper-  
ed mica, the latter being  
plentiful in some of the  
fragments. I observed in it  
one mass of carbonaceous  
spar. This rock shows it-  
self in a marked degree  
few feet above the St. Louis  
river, on the west coast of the  
Barrens of the Territory. I  
am informed, that it is in  
the massive or chert-like  
thick strata.  
I may place beneath  
facts which have come to  
my knowledge respecting  
the sandstone of St. Louis.  
It presents itself on the  
shore of Lake St. Louis for a  
mile below that village,  
and at the top of the same  
name, on the west coast of Lake  
Perrault, in thick horizontal  
beds of light brown quartz  
sandstone, with ferruginous  
beds and shales. It is



fine-grained for the most part and seems to have little or no cement. It appears in large quantity at the Cascades, on the opposite side of this body of water; but as far as I am aware, it is not seen in ascending the St. Lawrence, until we reach the neighbourhood of St. Regis (50 miles south west) as we learn from a printed report of Mr. Raymond, a surveyor, who found it underlying much of the St. Lawrence county, in the State of New York. I have seen it, in the Thousand Islands, resting on gneiss, directly and unconformably. From these and other circumstances, I deduce <sup>a probability</sup> ~~the~~ limestone of Montreal Island - a rock whose ~~I deduce a probability~~ that the sandstone of St. Anne is below the limestone of Montreal Island - a rock whose organic remains and accidental



five grains for the most part  
and seems to have little or no  
cement. It appears in large  
quantity at the base of the  
on the opposite side of this  
body of water; but as far as  
I am aware, it is not seen in  
ascending the St. Lawrence  
until we reach the neighborhood  
head of St. Regis or some south  
west) as we learn from a printed  
report of Mr. Payson, a surveyor,  
or, who found it underlying  
much of the St. Lawrence  
county, in the State of New York.  
I have seen it, in the Massena  
Islands, resting on gneiss,  
directly and nearly horizontally.  
From these and other circum-  
stances, I believe the limestone  
of Montreal Island - or rocks  
there - I believe a probability  
that the sandstone of St. Lawrence  
is below the limestone of  
Montreal Island - a rock which  
you are now on and ascending

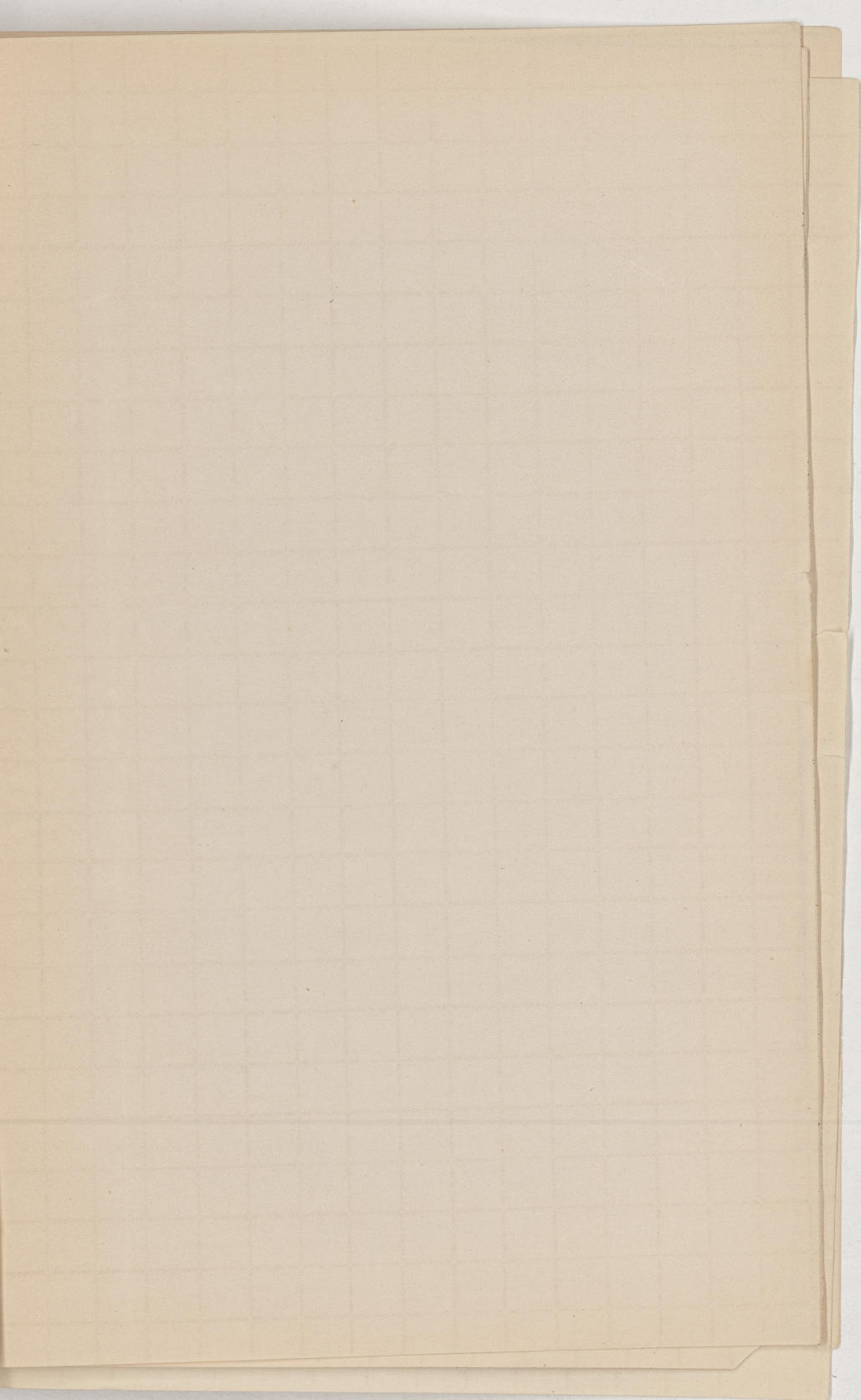


minerals are yet to be stated.



minerals are yet to be studied.

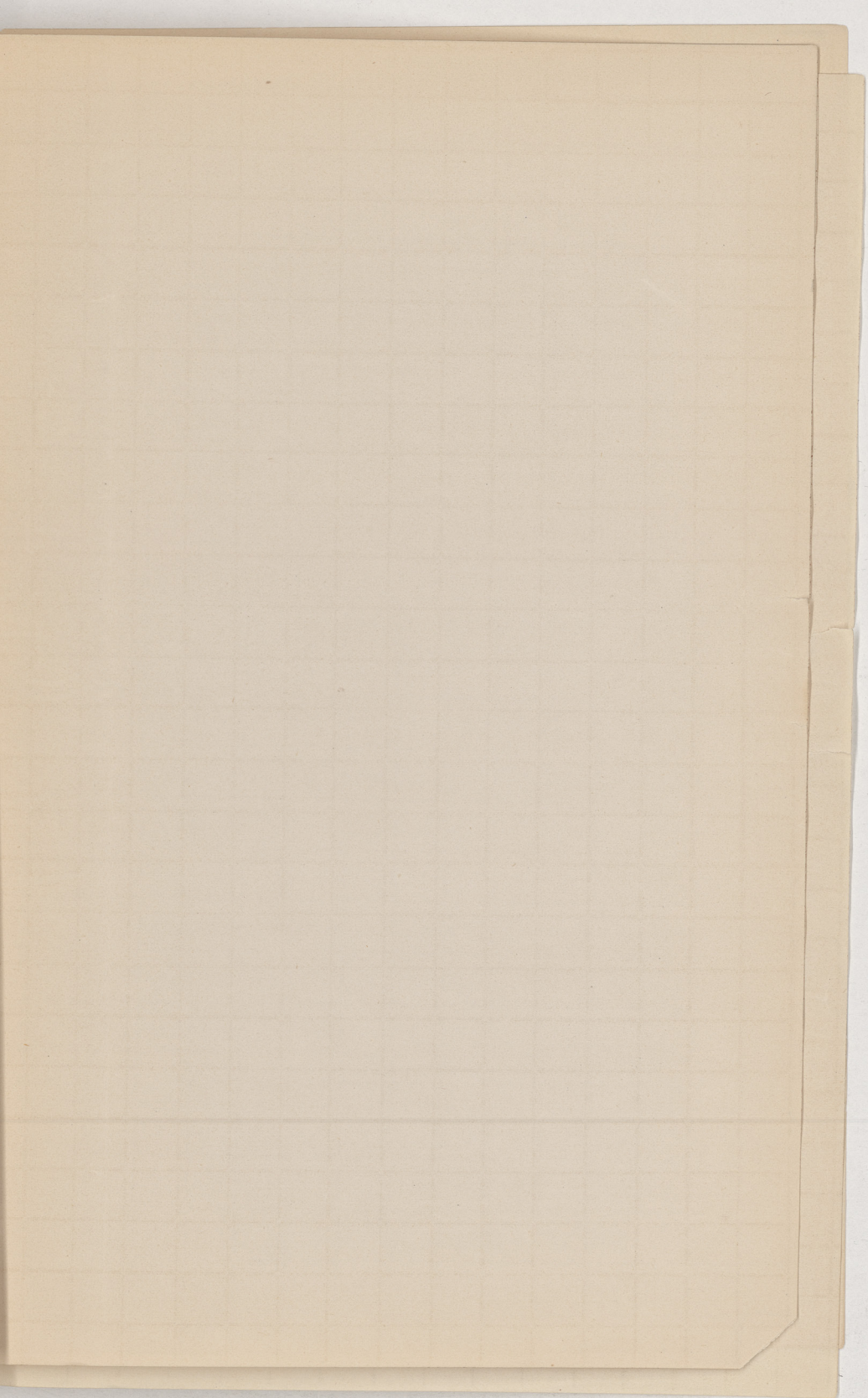




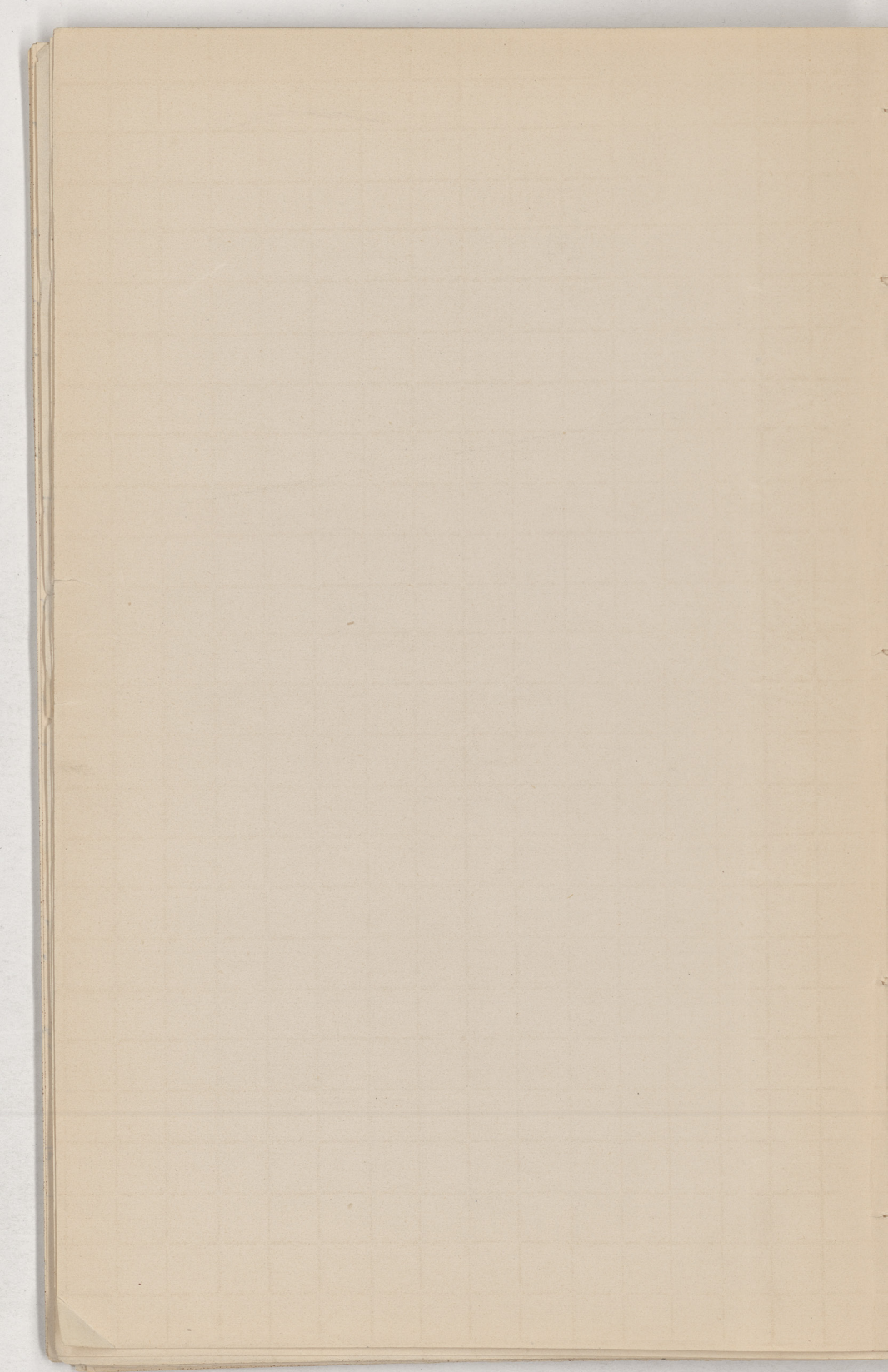




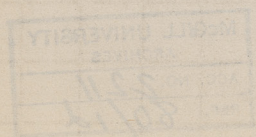














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