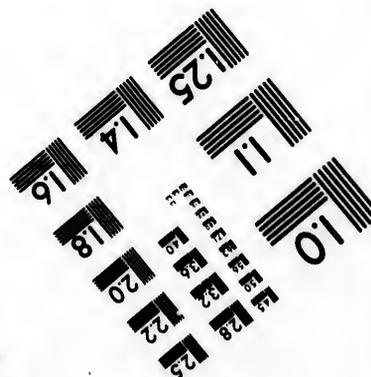
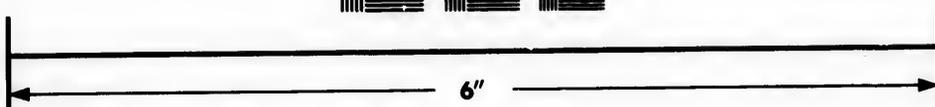
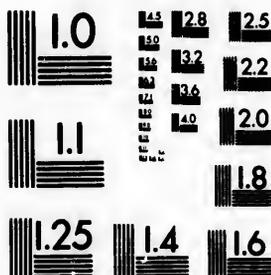


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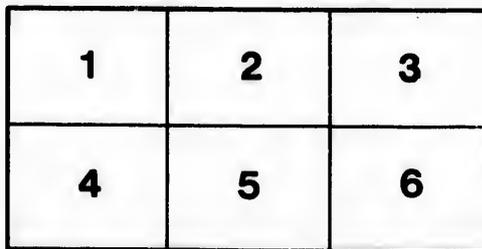
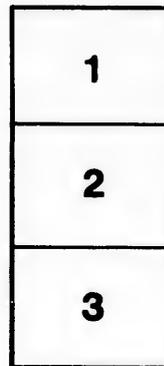
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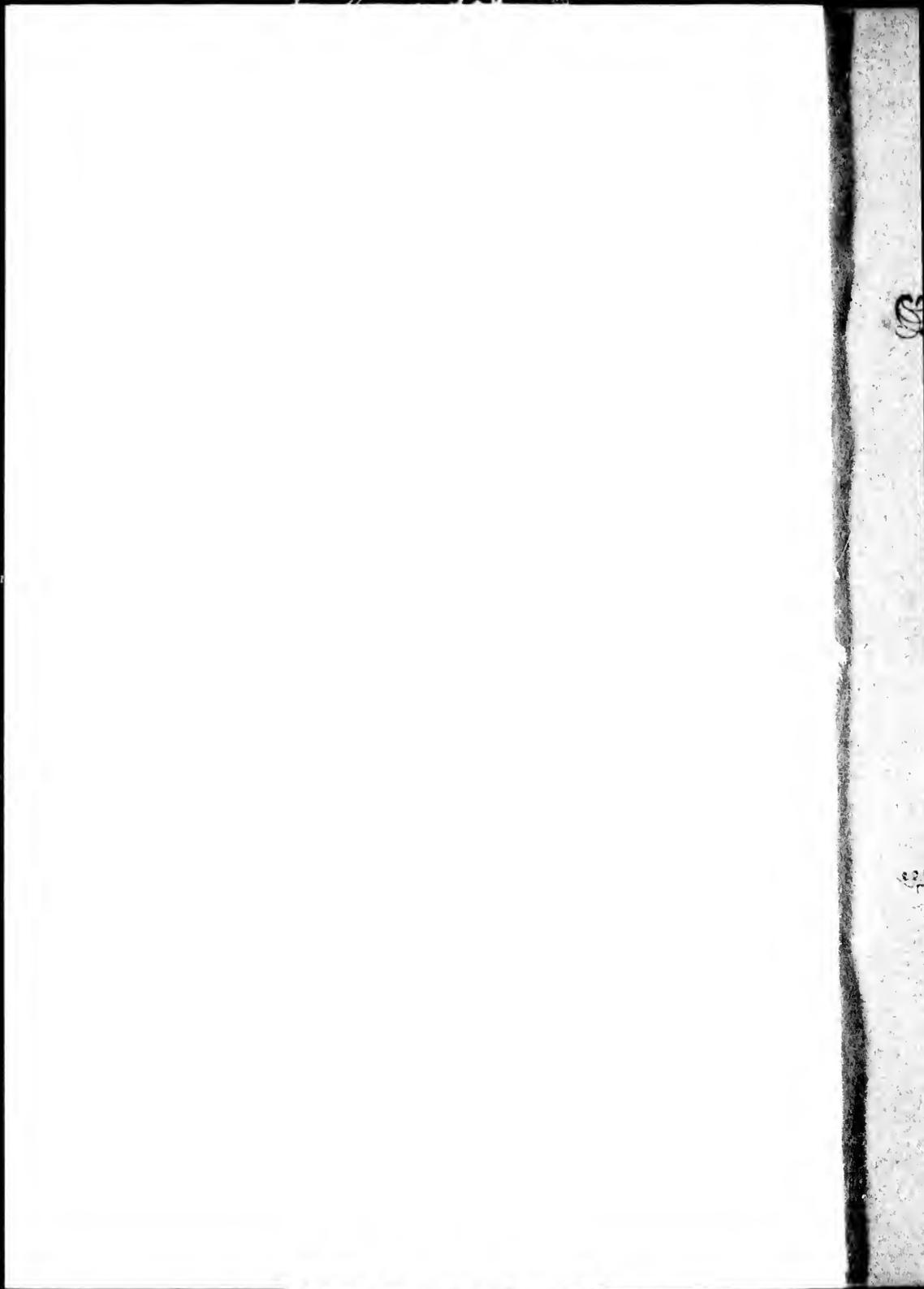
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OBSERVATIONS
ON THE
BUILDING STONE

OF THE

OTTAWA COUNTRY.



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OBSERVATIONS
ON THE
BUILDING STONE

OF THE
OTTAWA COUNTRY;

BEING THE ABRIDGMENT OF

A LECTURE

DELIVERED BEFORE THE OTTAWA SILURIAN SOCIETY,

The 15th November, 1859

By **EDWARD VAN CORTLANDT,**
HONORARY MEMBER OF THE LITERARY AND HISTORICAL SOCIETY OF QUEBEC, LATE CONSULTING
PHYSICIAN TO THE OTTAWA GENERAL HOSPITAL, AND CONSULTING PHYSICIAN
TO THE COUNTY OF CARLTON PROTESTANT HOSPITAL.

PUBLISHED UNDER THE AUSPICES OF THE OTTAWA SILURIAN SOCIETY, AND
BY ORDER OF THE CITY COUNCIL.

PRINTED AT THE OTTAWA "CITIZEN" STEAM PRINTING ESTABLISHMENT.

1860.

OBSERVATIONS

OF THE

BUILDING STONE

OTTAWA COUNTRY

1860

(21)

A PRACTICAL

MANUAL FOR THE ARCHITECT AND BUILDING TRADES

BY HENRY W. CLARKE

BY ORDER OF THE CITY COUNCIL

1860

REVISED EDITION
OF
OTTAWA

37208

PREFACE.

THE OTTAWA SILURIAN SOCIETY owes its origin to the suggestion of a few parties who felt an interest in the Scientific advancement of the Ottawa. The following are the purposes for which it was established :—

1st.—For the information of the Members in Geology.

2nd.—For the collection of Specimens of ROCKS, ORES, MINERALS, MARBLES, BUILDING STONES, and FOSSILS of the Ottawa Country.

3rd.—To prepare these Specimens by dressing, carving or polishing, so as to exhibit their fitness for economical, ornamental, or scientific purposes to the best advantage.

4th.—To have these Specimens examined, arranged, and labelled with the name of each, and the locality from whence procured, so that when opportunities occur the whole collection can be exhibited in such a manner as to convey full information concerning the extent of the Mineral resources of the Ottawa Country.

This is the first of a series of Lectures which have been deemed necessary for the attainment of the above objects.

37208

INTRODUCTION.

As to our sorrow and our cost we have so many indexes of the perishable nature of some of the stone which has been used in the construction, both of the public and private edifices in this city, it was considered expedient (particularly as we are about to build up a structure which is intended to serve as an enduring monument of man's handiwork) to collect as much information as possible in relation to the building material of the Ottawa Valley, with the especial view of surmounting the evils incidental to an injudicious selection.

In the short space of very little more than a quarter of a century we find that the sepulchral tablets of our departed kinsmen and friends, and the boldest relievo carvings which, at the time of being executed were expected and intended to endure for ages, and to serve us the lasting re-

ords of a quondam generation, already crumbled into dust, and it may be serving in a measure to fertilize the unhallowed soil of some neighbouring cabbage garden.

Lest it should seem that this picture is overdrawn let any of my hearers the next time they pass the southern parapet of the *Sappers Bridge* examine all that remains of the large slab commemorative of the erection of that really handsome arch, and in its entire disintegration and delapidation they will find a melancholy instance of its truthfulness. Whilst, therefore, this state of things is patent to everybody, it behoves us to set about remedying the glaring defect on at once, and using our utmost endeavors to obviate the criticism of posterity on what with too much justice may be most aptly styled "PERISHABLE MONUMENTS OF IGNORANCE."

BUILDING STONES OF THE OTTAWA.

"Tis ever what's within our ken,
Owl-like we blink at, and direct
Our search to Furtherest Ind in
Quest of novelties. Whilst here
At home upon our very thresholds
Ten Thousand objects hustle into
View, of interest wonderful.

—Anon

GRANITE.

Granite—which derives its name from the Latin word *Granum*, a grain, may be described as an unstratified rock of igneous origin, which has been supposed to constitute the earth's crust; it is made up of coarse particles, and whatever may be their size, figure or composition, they invariably consist of an aggregate of quartz, mica and felspar, but according to the comparative ratio in which these different constituents exist does the rock acquire different appellations. Thus it is called *porphyritic granite* when felspar predominates, or when hornblende takes the place of mica it is called *gneiss*. It varies greatly in colour according to the preponderance of different constituents, and is met with dark and light grey, red, white, brown, and green: and up to a recent period was considered to be the most ancient of all known rocks, but from some of the situations in which it has been discovered of late

in relative position to other rocks, and even to stratified rocks, this hypothesis is rendered unquestionable. *

In Canada the great chain of mountains which begin at the embouchure of the river St. Lawrence and extend to Lake Huron, and which are known throughout a portion of their course as the *Laurenceian group*, are of metamorphic character composed of two or more of the granite aggregates, interspersed occasionally by large outcrops of crystalline limestone, also, hitherto represented as belonging to the azoic or unfossiliferous rocks. Except as hypothetically supposed by Sir C. Lyell, that these rocks might be sedimentary deposits in an altered form, it was always asserted without fear of contradiction, even by Sir R. Murchison, who, when alluding to them says † that no traces of organic remains could be found in rocks of this class.—Yet a self-made man of the Ottawa, Mr. JOHN MACMULLEN, has been the fortunate discoverer of a coral allied to the order *Stromatocentrum* in the Laurencian formation before allu-

* Vide Canadian Naturalist, Vol. 4, page 298.

† Vide Siluria, p. 20.

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ded to. When very recently this disclosure was made to the American Scientific Association, I need scarcely say that it created great interest, and it will necessarily open a new field for geological research. In this instance Mr. MACMULLEN deserves the more credit, because, as I before stated, the rocks in question are of igneous origin, consequently any organic remains proper to them would either be effaced by crystallization or at least have their places supplied by a foreign body in the form of a different mineral substance.

Granite may therefore be safely looked upon in many instances as a Rock formed at different periods and to be consequently of different ages. Felspar is one of the largest constituents of Granite and although very beautiful to look at is not adapted for building purposes, since, being composed of potash and soda, both of which are soluble in water, it undergoes decomposition from atmospheric influence alone, hence when it evinces a dull red colour, constituting what the Germans call Diseased Granite, and preponderates greatly, the stone should be rejected. Granite exists in thicker masses than any other known rock. It has been found in a solid mass more than 15,500 feet above the level of the sea at Mont Blanc, and Monsieur Sanssouere who ascended the mountain in 1786 and 1787 and afterwards published an account of his adventure conceived that what now forms the summit of the mountain was at some former period more than two leagues below the surface.

Some of the varieties of granite in which the particles exist in due proportions, and are not too large, constitute, as is well known, a very handsome and enduring material, and is often employed for different building purposes. The City of Aberdeen in Scotland, and St. Petersburg in Russia, are more or less entirely built of granite, and from the quarries of Dartmoor, and from those of Derbyshire and other parts of England, is very largely shipped.

The ancient Egyptians, as is well known, were in the habit of using it very extensively, and many antiquities composed of *Syenite* or *Egyptian Granite* are as perfect after the lapse of thousands of years as when they left the hands of the sculptor.

Syenite is so called because it was obtained from the *Island of Syene*. It may be easily re-

cognized by the lamellar character of its crystals, and its susceptibility of cleavage. It abounds at various places on the *Ottawa*—is almost invariably of a *red or brown color*, from which circumstance the tributary of our river opposite L'Original has obtained the appellation of *La Riviere Rouge*.

The astonishing patience and endurance evinced by the ancient Egyptian workers in Granite is almost incredible; and when I tell you that at the Polytechnic Institution in London there is a table composed of Granite only *five feet ten inches in diameter*, which it took *five men seven years to finish*, you will not be much aided in your endeavors to estimate the time it required to construct the innumerable huge Palaces, Temples, Obelisks and other relics of Egyptian art, "of which the very ruins are tremendous" and which have come down to us unscathed by the hand of time, although dating back to the *most primeval ages*.

Of late years granite works have been established in different parts of Europe. At Aberdeen, for instance, there is a large establishment for the construction of various useful and ornamental objects. The tardy progress of the work is such that it occupies an entire day to cut a groove two-thirds of an inch deep in a granite slab. At the present time Sweden manufactures and exports a greater number of *articles of Virtue*, composed of this material, than any other European nation; and since the exhibition of some exquisitely beautiful specimens composed of granite, in the shape of *Bracelets*, by the Messrs. Rettie & Sons, of Aberdeen, at the Palace of Industry in 1851, and the execution of which must have required the most untiring patience and delicacy of workmanship, similar ornaments have become a fashionable but most expensive portion of female decoration.

In Canada, where so many other and more available materials can be easily procured, unless for the construction of *Public Works* and *Funereal Monuments*, it does not seem that granite will ever be in great demand. When placed in opposition to its all enduring qualities, the extreme difficulty in working it, and the high price of labor would constitute insurmountable objections to its general use. *The Red Syenite*, however, which abounds on some parts of the *Ottawa*, might be turned to account for building purposes where good Limestone or Freestone was not at hand.

It is readily cleavable, breaking in irregular cubical blocks, and would make a very agreeable, warm-looking building,—whilst from its susceptibility of a *high polish*, it might be used for columns and some other *internal decorations*. In allusion to granite as a building material for the *New Houses of Parliament* in London, the Commissioners reported thus: "We have not considered it necessary to extend our enquiry to *Granites, Porphyries*, and other stones of similar character, on account of the enormous expense of converting them to building purposes in decorated edifices, and from a conviction that an equally durable, and, in other respects, more eligible material, could be obtained for the object in view among the *Limestones* and *Sandstones* of the KINGDOM."

LOWER SILURIAN ROCKS.

SANDSTONES.

Any stone which is made up of separate particles of sand agglutinated together by pressure and heat, whether it is Calcareous or Siliceous, may be called Sand Stone. The chief ingredient of Sand itself, however, is either Quartz or Flint (Silic.)

Sandstones owe their origin to the disintegration of a great variety of rocks as Trap, Basalt, Syenite, Gneiss and a variety of others. They are frequently much deteriorated and often entirely disintegrated by the presence of Sulphuret of Iron, better known as Iron Pyrites, which, when brought to the surface, generally becomes converted either into a sulphate of iron (the Green Copperas of Commerce,) or changes by oxidation into Iron Rust. This is not invariably the case, however, since some of the rocks containing Cubical Pyrites, especially the Granitic rocks, constitute not unfrequently superior and very enduring building stones.

Sometimes, though less frequently we find sandstone greatly altered and deteriorated by the presence of iron under another form, the Carburet, better known as Black Lead. The chemical changes here produced are referable to the iron becoming oxidized, and then from the silic of the stone being partially dissolved, and, combining with the Carbonate of Iron, produces a Silicate of Iron which coats the exterior of the stone, and effectually keeps it from further disintegra-

tion. It is a curious circumstance that a similar coating is always found encasing Iron of Meteoric Origin. Sandstones, from their being occasionally subject to have Argillaceous compounds in connection with them, are more prone to Parasitic Vegetation than Limestones, and when the spongioles thereof absorb moisture and increase, they form a never-failing source of destruction. The particles, composing sandstones, are sometimes so very minute as scarcely to be visible to the naked eye; in other cases again, as in the coarse conglomerate sandstones and Breccias, they are often as large as a walnut. The cement which binds the pure particles of sandstones together, may be calcareous constituting Calcareous Sand Rock or Siliceous, when the sandstone resembles Quartz.

Sandstones differ much in texture and may be very close and compact or loose and of easy disintegration.

In colour they vary from pure white and light grey to red and brown.

In general Sandstone is distinctly stratified, but the direction of the strata may be either inclined, perpendicular or horizontal, generally the latter. Next a stone from the Western coast of India called *Laterite*, which, when first dug, is very soft, but hardens greatly on exposure, and which is the only stone known that is entirely unaffected by moisture. Sandstone when pure is generally considered to be the best material for building purposes. It is found to absorb a very small quantity of moisture. It is very slightly acted on by atmosphere, except when the latter is impregnated with *marine salts*. It is almost always unchangeable in colour, and when any alteration does take place in this respect, it is to become *whiter*, and when of that degree of hardness which constitutes *Free-stone*, it is the least objectionable of all others. But it has one melancholy drawback, inasmuch as in the course of a very short time it leads to the inevitable death of all those who are steadily engaged in working it. We here quote what is said concerning the Masons' trouble, as it is significantly called, by the workmen themselves in Scotland, and which has been so graphically described by Dr. George Wilson of Edinburgh: "I have fallen in," he says, "with the foreman of the Masons who built the Scott monument, who gave me the following

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particulars: The mortality among stone hewers from affections of the Lungs is notorious in the trade. It is very rare to see a hewer who has reached the age of 50, and not uncommon on the other hand to see men who begin to hew at 16 dead at 24. Many die about 35. The disease of the lungs which is so mortal, is called by the sufferers themselves, emphatically the *Masons' trouble*, which means simply the *Masons' disease*. The word *trouble* being constantly used in homely Scotch as equivalent to disease. It begins with efforts to clear the throat and a short unfrequent cough. Difficulty of breathing soon follows—much expectoration—frequently spitting of blood, and in the end hopeless pulmonary consumption. Some linger for 18 months—or more after being laid aside from work—most of them reach the grave more quickly. Seventy men were employed in the construction of the Scott monument, and during the four years which its building occupied, 18 men died of the *Masons' trouble*. So coolly do Masons contemplate their fate that when one of their number is compelled, by the mortal disorder, to give up work, they speak of him as having *gone to grass*, and when he dies they raffle his tools at one of the Freemasons' Lodges for the benefit of his widow."

Sandstones of several different descriptions are to be met with in various situations on the Ottawa. Some of them in inexhaustible quantities. First, the Pottsdam Sandstone, so called from the town of that name in the State of New York. This Sandstone in a less pure form is first met with at Isle Perrot near where the River Ottawa empties into the St. Lawrence and there seems to be no doubt that it is a continuation of the parent bed, being of a siliceous character it is well adapted when free from stains for the manufacture of glass. A factory for this purpose was erected some years since at Vandruel, but the proprietors not being able to compete with the glass making establishments of Europe and America had necessarily to abandon the project. Except in small quantities the Pottsdam Sandstone of the Ottawa has not yet been found of such a degree of softness as to constitute what is fully expressed by the word *Freestone*, that is a stone capable of being freely worked, as we now get it, it is so extremely dense that no tool can be tempered sufficiently to

work it. Whether the lower beds of it will prove to be softer and less intractable remains to be seen. As the Pottsdam Sandstone when *in situ* is considered to be about 300 feet thick and as its upper crust presents in many instances unquestionable evidence of having been more or less vitrified and converted into quartz by igneous action, it is just possible that the elements may have had something to do in giving this material its characteristic hardness. Pottsdam Sandstone shews very slight traces of organic remains. Its characteristic fossil the *Scolithus Linearis* has been supposed by some Geologists to have been a marine worm, by others it is considered to have been a sea weed, whilst still others not being satisfied with either of those conjectures have attempted to account for the appearances evinced by the presence of this fossil to the action of rain. If we may judge from the size of the *Scolithus* as it is often found we must necessarily infer that if the last doctrine is correct nature in those days was very bountiful both in the weight of her showers and in the magnitude of her pluvial globules. Some years since Sir Wm. Logan called the attention of the scientific world to the fact of the Pottsdam Sandstone bearing footmarks it frequently bears distinct and unmistakable ripple marks. This stone exists on both sides of the Ottawa in Templeton, Stony Swamp and various other situations in inexhaustible quantities, and in some instances advantageously stratified.

CALUMET SANDSTONE.

Another most beautiful pure white variety of Sandstone partially silicified, is found at the Calumet in large quantities but as a building stone open to the same objection as the last being far too dense and intractible to admit of being worked. It might however be used for outside door-steps with great advantage and good effect, as it would be proof to any amount of wear and tear whilst the alternations of weather could not effect it in any way. It is to be much regretted that so truly beautiful a material could not be turned to some good purpose, but as in the case of Granite it would be a ruinously expensive material to build with, it is one of the very best materials which could be found for glass making.

A variety of Sandstone of much looser texture

s to be met with at several points along the line of the Rideau Canal, and although it is quite true that it has stood the effects of the vicissitudes of heat and cold, and moisture and drought for some 30 years withal, however much I may feel disposed to eulogize the natural productions of the Ottawa. I regret that I cannot say much in favor of this material. Since it abounds in Iron stains the destructive agency of the compounds of which metal I have already pointed out. It would answer very well for the interior of perfectly dry buildings but for nothing else that was intended for durability.

CHAZY SANDSTONE.

At Morrison's Island near Pembroke on the Ottawa River we have a very beautiful variety of compact Sandstone known by Geologists as the Chazy which is admirably adapted for external Building purposes and internal decorations. From the information I received regarding it a short time since, when on a trip to the Upper Ottawa, I find it is proof to all the effects of climate, and when worked immediately after its removal from the Quarry it admits of being cut with great ease and possesses the great good quality not only of hardening afterwards but of retaining a sharp clean edge and is susceptible of beautiful tooling. Mr. Supple has used it for the Rustic Corners, Lintels and pediments of his house, as well as for the door steps, and finds no fault with it. The relief it gives to the limestone is of a strikingly pleasing character. It does not seem to be unlike the Sandstone used in the construction of some of the old Cathedrals of England, and which even, in that corroding atmosphere, have stood unchanged for centuries.

The objections to its use are, that from the minute particles given off in working, the mason's disease could scarcely be avoided, and until facilities are afforded by railway or canal navigation it would be almost impossible to transport it down the river.

CALCIFEROUS SAND ROCK.

The rock which is described by Geologists as next in succession upwards to the Pottsdam Sandstone is known by the name of Calciferous Sandrock. It is a compound of Sandstone and Limestone, and exists in many places as a separate and distinct formation, but assumes various aspects. Thus in some cases it is so slightly

calciferous that we can only detect the presence of lime through the intervention of a test with mineral acid, in other cases the component parts are more nearly equal. Whilst again we find it made up of a Surplus of Lime, when with more propriety it should be called Arenaceous Lime stone, in the latter case it is not unfrequently used for building purposes, in the second seldom if ever. In this impure state it is found forming the cliff, which begins in the vicinity of M'Kay's Bay, and after extending down the stream for a little distance, is lost in the alluvial soil which then forms the bank of the river; its proneness to attract parasitic vegetation may be proved by examining the summit and face of the cliff at the Gattineau Ferry, both of which will be found very thickly and densely covered with a most beautiful verdant carpet made up of lichens and other similar attractive, but destructive saxifragous, or stone-destroying plants. The same description of Calciferous Sandrock is met with at Aylmer—extending down the edge of the river until it is lost some distance above the Chaudiere. The river bed of the Long Sault is entirely composed of it, and wherever it is met with in this form it may be looked upon as an absolutely useless material. When it is found as described in the first instance that is containing a most minute quantity of calcareous matter, however, it constitutes a very fair building stone, as may be seen in the first locks at the Grenville Canal, where it has withstood the effect of wear and tear incidental to all similar works, and the effects of lime and weather for nearly thirty years. The wall surrounding Mr. Wm. Thompson's garden, on the Richmond Road, is composed of stone of this description, and is of a light blue color.

There is a quarry at Hawkesbury, belonging to the Hon. P. McGill, of very superior quality, of a lightish green slate color, and susceptible of a very high finish. It would compete favorably with most of the stone in this neighborhood, and I feel satisfied if it was better known, that it would be in considerable demand.

The Calciferous Sandrock contains only a few unimportant fossils; the characteristic one is called *Pleurotomaria Scalithes*. Its depth is about 300 feet

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LIMESTONES.

Pure crystalline limestone is found variously dispersed throughout the Metamorphic and older Transition Rocks. In its Primitive form it is called Marble. Most of the older and, at least, one modern geologist supposed that all limestones were the product of organized bodies. Hitherto all the Primitive limestones were looked upon as unfossiliferous; they are older than the Transition rocks, and whatever may be their color or appearance, they invariably consist of 57 parts of lime and 43 of carbonic acid; in different cases they contain Magnesia Aluminum, Silica or Iron. Their hardness is not very great, they may be all scratched with the blade of a pocket knife, and they are infusible before the blow pipe. The grand characteristic of limestone, and that which distinguishes it from all other minerals and metals, is the circumstance of its effervescing with mineral acids. Muriatic and Nitric acids dissolve it entirely. Carbonic acid gas being evolved during the process, all marbles are susceptible of polish, and admit of being worked on all sides and in all directions, the whiter the marble and the smaller its granular component parts, the more valuable it becomes. In the purest statuary marble no crystals are visible to the naked eye,—when calcined, pure marble makes the best lime. Parian Marble (so called from its being obtained from Paros, near Athens) was that held in most esteem by the ancients, and was most in demand for statuary. In our times the best marble is obtained from Carara in Italy. The Pantheon at Rome is built of it; an interesting account of the history and manufacture of this marble is given in the Cyclopaedia of useful arts, under the head of Marble. No part of Canada, or, perhaps, of North America, is so rich in the varieties of marble as the Ottawa Valley. We meet with it on either side of the river, and at every point of the compass. In the townships of Macomb, Ross, Bristol, Litchfield, Grenville, Portland, Wakefield, Pakenham and various other places on the Ottawa, marble is found, in many cases of unsurpassable beauty and purity, and in inexhaustible quantities. The only prerequisites for the due working of it are capital enterprise and taste.

ANCIEN MARBLE.

At Anciprior, the property of Mr. McLachlin; marble is found of a dark grey colour, irregularly traversed with white and black streaks. The compactness of its structure and its susceptibi-

lity of an exquisitely fine polish, together with its proximity to the steamboat wharf renders it an article of great commercial importance, and has induced Mr. McLachlin to erect a mill for the purpose of sawing it into blocks and slabs. An enterprising party has commenced manufacturing it on the spot. And the public monument about to be erected to the memory of the late John Egan is to be amongst the first-fruits of this spirited undertaking.

For monumental purposes this marble cannot be surpassed, and it is a source of satisfaction to us of the Ottawa to know that this material is to be largely used, both externally and internally in the new public buildings about to be erected here. A chimney-piece composed of it attracted great attention, and was deservedly much admired at the late Provincial Exhibition. The first Prize and Diploma was moreover awarded thereat for this Marble.

GRENVILLE MARBLE.

About 50 miles below this city the beautiful material known as the Grenville marble exists in inexhaustible quantities. It consists of white Crystalline Limestone, irregularly studded with green serpentine. Some years since a mill was erected on the spot, Lot 16, 3rd Range, Grenville, by Mr. Charlebois, and the manufacture of the marble began with. The speculation, however, did not prove remunerative, and the works were abandoned and suffered to fall into decay. We understand the property now has passed into the hands of the Messrs. Hamilton, of Hawkesbury, and that it is thought the marble will be used for some parts of the projected Public Buildings.

PORTAGE DU FORT MARBLE.

A limestone of primitive crystalline character and of a pure white colour is met with on the river edge at Portage du Fort, on the Ottawa, where a neat pyramid composed of it has been erected, and which bears the following inscription:

To commemorate
The visit of Lady Head, who made
The tour of the Upper Ottawa,
In a bark canoe,
In September, 1856.

This marble, when chiselled and hammer-dressed, looks remarkably clean and handsome, and answers very well for ordinary buildings; but the structure of it is too coarse to warrant its being recommended as a durable stone. I now speak of the superior beds, a short time since the expediency of working deeper in the bed was sug-

gested to Mr. Osborne the proprietor, who tried the experiment, and the result is a stone of much greater compactness. There is little doubt that ere long this material will be in considerable demand.

PAKENHAM MARBLE.

Marble of a uniform dark-snuif color and susceptible of a fine polish is met with at Pakenham Mills, on the property of Mr. Andrew Dickson. Slabs of it were sent to the different exhibitions held at London, New York and Paris, and at all of them this stone was much admired. This marble alternated with the white material from Portage du Fort, would have a good effect in vestibules or hall entrances; it is of easy access, and very abundant.

Statuary marble of the purest description is to be found in the township of Ross, but I do not yet know the exact spot, having obtained my specimen through an indirect party.

TRANSITION LIMESTONES.

The Limestones belonging to the Transition Rocks comprise the Chazy and Black River, and the Trenton. These rocks characterize a great portion of the Ottawa Valley. They are all fossiliferous, belonging, as you know, to the lower Silurian system, and from their usefulness and Geological importance have led to the formation of the Society in aid of which I have the honor of appearing here this evening.

From its Lithological character it is easier to tell where Limestone comes from than in the case of any other rock.

Compact Limestone is a hard, smooth, fine grained rock, generally of a bluish grey colour, but not necessarily, since it may be black, red, brown, yellow, white or mottled. It takes a good polish, and may be used as marble; in short, the only difference between them lies in the size of the crystals. Limestones may be hard, soft, compact, concretionary or crystalline, and may contain *Silica*, or another ingredient nearly synonymous, called *Chert*, *Alumina* and *Iron*.

The Chazy and Black River Limestones lie very often in immediate juxtaposition to each other; divested as they are of shaly deposits, and being of compact structure, they, especially the latter, may be looked upon as superior building stone. The Chats Canal, which is now in a state of quiet and undisturbed slumber, it was intended should be built of Black River Limestone, which abounds in the neighborhood. The Black River Limestone does not contain many Fossils, its characteristic one being a beautiful coral cal-

led *Columnaria Alveolata*, and when stone containing this coral is discovered, you may in all safety count upon it as useful for building purposes or for making Lime.

TRENTON LIMESTONE.

The Trenton Limestone, and that with which we have most to do, must be too well known to all to require a description. It is so perfectly typical of this section of the country that Geologists were not wanting to recommend *Trenton* as the most apposite name for our city. When found under its most favorable aspect, the Trenton Limestone of this district is of a pleasing light blue or grayish slate color, very compact, ringing clearly under the hammer, chiselling with ease, and finishing very clean. It changes very little in color, may be said to be exempt from Parasitic vegetation and makes superior Lime.

The Trenton Limestone, which realizes all these important and valuable qualities, must be looked for, however, nearer the base of the rock, than has been commonly done. The superior beds of it, especially in the immediate vicinity of the city, are unfortunately permeated with Shale either as continuous seams or as detached particles, and which, in a more or less limited space of time, either splits the stone up into a number of laminae, or leads to its corrosion and ultimate entire disintegration and decay. The Sappers' Bridge, the first 8 Locks of the Rideau Canal, the Towers of the Union Suspension Bridge, the City Jail, and a great number of other buildings, are examples of the direful consequences incidental to an entire ignorance, or at best, most imperfect knowledge of Mineralogy and Geology. In our day there is no excuse for such ignorance. Geology and Mineralogy are component parts of an ordinary Scholastic education, and a Geologist, by merely examining the organic remains, may, in comparative safety, hazard an opinion regarding the quality of the rock from which they were obtained, since each separate formation is generally indicated by its own peculiar fossils.

Agassiz settled the Geological position of one of the Alpine Formations by the character of its Fossil Fishes; and Sir R. Murchison predicted with unerring certainty, the existence of Gold in *Australia*, from a simple comparison of the rocks of the country with those of the Ural Mountains. Illustrative of a case in point, nearer our own door, Sir Wm. Logan, when first exploring the Township of Grenville, on the Ottawa, found all the farmers there located going great distances (some of them forty miles) to procure limo for the

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construction of greater or lesser portions of their habitations. He pointed out to them that in the Crystalline Limestone with which they were surrounded, they would find a very accessible and better material for building lime of than that they went so far to obtain, and recommended them at the same time to try the experiment. His advice was taken, and now every farmer in the district has, comparatively speaking, lime at his own door. These are only a few of many instances illustrative of the incalculable advantages which have been derived from a knowledge of those subjects.

Trenton Limestone, independent of the injury it sustains from the presence of Shale, is sometimes deteriorated from the existence of Iron, and when such is the case, and a chance of oxidation is afforded, it leads speedily to the entire destruction of the stone. Trenton Limestone, like the rest of its congeners, also absorbs and exhales moisture both on the exterior and the interior of buildings, and on this account it is customary to stir and lath the inside of edifices composed of it. Of all the Rocks of Canada which compose the Lower Silurian System, none is so rich either in the number or beauty of its organic remains as the Trenton Limestone. A very beautiful Fossil, and which may be considered the characteristic one of this Formation, is that of a *Crustacean*, and is called the *Isotelas Gigas*. Some of the Orthoceras of the Trenton Limestone are of very large size.

The stone of the Quarries of the Messrs. Lang & Robillard, at Gloucester, near this city, is well known. In external appearance, after being worked, it is certainly pleasing to the eye, but indiscriminately used as it has been heretofore, in a very short time the buildings composed of it evidence the most unmistakable symptoms of *Shaley disease*. Recently, Mons. Robillard, acting on the advice given him by parties qualified to judge, opened a new quarry at the base of the old one, and has been deservedly rewarded in finding a more beautiful Limestone than any hitherto seen here. It is of a light grey color and most compact structure, and if culled with care, I have no doubt will be held in general estimation, as one of the very best building stones proper to our noble Valley. At the Hogsback Locks, on the Rideau Canal, we meet with a very

superior Quarry of Trenton Limestone. It has been worked just deep enough to warrant a good description of stone; in short, the Locks at that station are in about the best condition of any on the whole Line of Canal; and as it is now Provincial Property, although it may appear presumptuous, it strikes me that an oversight exists somewhere, in the fact of all the stone belonging to the *Public* having up to this time been overlooked.

In England, when the Westminster Palace was decided upon, a committee was appointed whose especial duty it was to select the proper material from among a great number of specimens. We are not aware that the Board of Works has come to a decision, as to which was the best.—The expression in the specification for the Public Buildings here as far as concern the limestones are "the blue limestone of the district carefully selected."

Limestone of a very superior compact description but of a darker color, is to be found at the base of the Trenton, and there only at the bottom of the Promontory, which juts out into the Ottawa below Mr. Blythe's Cabinet warehouse. It is only to be met with at low water being submerged several feet by the spring freshets. I was the first person who sent a specimen of this stone, together with one of sandstone of a lightest green color, hitherto unnoticed, to the Board of Works, and who called their attention to them. If it is discovered on further examination and investigation to realize my expectations, and is adjudged worthy of consideration as a building stone, and deserves a place in the new Parliamentary buildings, I shall be rewarded amply in knowing that I have been the humble instrument of saving several thousand pounds of public money since this stone is on public property.—One more locality of Trenton limestone, and I conclude. On the island in the middle of the river a stone of a dark brown-snuff color is to be found, which may one day or other be used for mantel pieces—being a fine grained limestone and susceptible of a very high polish, but as it would require the erection of a coffer dam to procure any large quantity of it, it seems useless to enter on any digression relative to its chance of being extensively used in the new Buildings.

F I N I S .

POSTSCRIPT.

Since these pages were sent to press, the author has had the gratification of finding that the most proximately favourable locality pointed out by him, has been selected for procuring a portion of the stone to be used in the new Parliament Buildings, and deems it requisite to call the attention of the proper authorities to the paramount necessity which exists, even in this advantageous situation, for exercising care and caution in the selection of the material. It is a fact well known to geologists, that the Trenton Limestone is frequently rendered more or less objectionable as a building stone, if *indiscriminately selected* from the circumscribed conditions known in scientific nomenclature as *faulty and fissile*. Both of these attributes are clearly illustrated in the stone at the base of the promontory below Mr. Blythe's; and when the stratification is too much multiplied, the stone should be avoided as cautiously as when its imperfections are dependent upon the existence of *shale*. That a great deal of such objectionable stone has been intermixed with the thicker and better portions of the rock already carted off from the Quarry, may be seen on the most superficial inspection. A further examination of the *Island stone* serves additionally to convince me that as now worked, it will not answer for a *building stone* except in very small and unremunerative quantities.

OTTAWA, January 16, 1860.

E. V. C.

ERRATA.

Page 5, line 22, second column—for unquestionable, read, *questionable*.

Page 7, line 26, second column—for next a stone, read, *next to a stone*.

