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CANADIAN GEMS AND PRECIOUS STONES.

By C. W. WILLIMOTT.

(Read January 29th, 1891.)

The subject of this paper is Canadian Gems and Precious Stones ; and although I shall touch briefly on such materials, available for the purposes of the Lapidary, as have come under my observation during the past nineteen years, I cannot hope to accomplish anything more than a general outline of their distribution, together with some of their most important characters. Before I begin the enumeration of the various minerals, I had better first of all define what a gem really is.

For the sake of convenience I shall divide the various minerals into two classes—1st, Gem material ; 2nd, Semi-Gem material. Now it sometimes happens that the conventional value put upon a gem of the second class, through richness of colour, transparency, etc., is much higher than belongs to a gem of the first class ; hence to draw a line between these two classes may often be attended by some difficulty. The real gems are represented by the Diamond, Sapphire varieties, Chrysoberyl, Spinel, Beryl, Topaz, Zircon, Garnet, Tourmaline, Iolite. Quartz and Chrysolite. All others are considered as semi-precious stones.

The origin of the taste for gems is lost in the most remote ages ; it is very evident that the gems mentioned in the scriptures, and other early accounts, do not correspond with ours of to-day. Pliny describes a Sapphire as a stone spotted with gold ; this is thought by some authors to be the mineral we call Lapis-Lazuli.

The ancients must have included a number of minerals under the same name. Carbuncle, for instance, included all gems of a red colour, such as the Hyacinth, Ruby, Garnet, etc. Much superstition has existed in all ages regarding the various gems. The following extracts from Emanuel's "Book of Gems" may be interesting :—
 "Serapius," he says, "ascribes to the Diamond the power of making men courageous ; also, if this gem is placed in contact with a loadstone, it nullifies its power. According to Boetius the Ruby is a sovereign remedy against the plague and poison ; it also drives away evil spirits and bad dreams. The Jacinth procures sleep and brings riches, honour and wisdom. The Amethyst dispels drunkenness and sharpens

the wit. The Balais Ruby is a protector against lightning. The Chrysolite was said to cool boiling water and assuage the thirst, and if placed in contact with poison it lost its brilliancy until removed."

It was not until chemistry began to be fairly understood that the system of classifying all stones of one colour under the same name was abandoned, and although science has made rapid strides and much light has been thrown on this subject, yet the investigators of the near future may look upon our labours and theories with the same doubtful appreciation as we now entertain of those of our forefathers. I have been diverted somewhat from my original intention, in pointing out the superstitions of the ancients regarding certain gems, but in so doing we are enabled to see the existing link still unbroken, with the superstition of the present day. Concerning the Opal you will find that not two ladies out of six will wear this stone, because they say it is unlucky.

The present time may be considered an age of artificial gems, owing, no doubt, to their insignificant value and bright colours, which frequently almost equal those of real gems, and thanks also to the skill of the artificer, whose designs have been immortalized by the appreciation they have received. I know of no more unpleasant business than to be called upon to give an opinion of an old family heirloom, perhaps a ring or a brooch, from the age or make-up of which one could infer without much doubt that the setting once contained a costly gem; years of wear had, however, weakened the delicate claws, and it was then handed to a workman for repair, so as to avoid its loss; but alas, too often some unscrupulous person had abstracted the jewel and replaced it with one of glass. The imposition may remain unnoticed for a great many years, and at last, when the fact is known, it is then too late to recover the gem. The workman that was guilty of such fraud had either left for other parts of the world or was dead--(personal experience).

Another way in which the unsuspecting public can be defrauded is known to the trade as "Growing a Diamond." This consists of abstracting a Diamond from a piece of jewellery that has been left for repair and replacing it with a smaller stone. Another fraud which is very prevalent, is the substitution of a "doublet" for a real gem. In

this instance the top of the stone is genuine and the under part glass, joined together neatly by transparent cement, or in other cases the top may be Sapphire and the bottom a less expensive gem, such as the Garnet. In these cases, when set, they are difficult to detect, and often deceive the most experienced. Doublets are sold by the Cingalese to Europeans, and even plain blue glass is cut into facets, and sent there from Birmingham and Paris, and palmed off for the real stones.

In throwing out these hints I am convinced that to no jeweller in this city can these prove prejudicial, but on the contrary, as the public are enabled to test for themselves the truth of statements made to them, so also are they able to appreciate the genuine gems. We must not forget to mention the coloured glass, or "pastes" as they are usually termed, which are made to do duty for all the different gems, and which vary in brilliancy according to their mode of production. Some are merely moulded and their angles sharpened on the wheel of the Lapidary; others are cut direct from blocks of crystal glass, which are sometimes very brilliant, termed "Rhine Stones," etc. You will, perhaps, say, how are we to know a real gem from the artificial, we cannot submit it to the chemist, who must break it up before he can pronounce on its nature; it is true he can take its specific gravity, but in this he may fail to identify the mineral after all. Dr. Feutchwanger says he took the specific gravity of an artificial Topaz and found it fully corresponded with the Brazilian Topaz. He, however, found that by employing the simple breath test he was enabled to pronounce on its true character. If an artificial and a real gem be breathed upon at the same time, it will be found that the genuine will become clear much sooner than the false. Having drawn your attention to the dangers of a gem I will now pass on to Nature's store-house where the original or crude minerals lie hidden, ready to be fashioned into the coveted jewel.

We shall first of all consider such minerals as constitute, when cut, gems (proper).

Sapphire.—In the Geology of Canada is mentioned the occurrence of light rose-red Ruby and blue Sapphire in grains, on lot two of the ninth range of Burgess. I should imagine, however, that the quantity is not very considerable, as I examined the rocks myself on two different occasions without finding a trace.

Beryl.—This mineral has been noticed at a few places in Canada, more particularly in the County of Berthier, where crystals several inches in length occur in a granite vein, and although these are often of a good colour (various shades of green), they are not transparent enough for cutting, except, perhaps, in small portions of a crystal which will sometimes cut into small gems. The pale bluish-green transparent varieties of this mineral are called Aqua-Marine; the emerald-green, Emerald. Sometimes the name Aqua-Marine Chrysolite is applied to the yellowish-green varieties. The Emerald and the Aquamarine are sometimes introduced as oriental, which, of course, enhances their value considerably, and, if genuine, are really the green and the light bluish-green Sapphire.

Tourmaline is another gem of some importance, and although its name is seldom heard from the jewellers, it is nevertheless often sold under various names. The yellow transparent variety is often sold in Ceylon for the Topaz. The blue variety is sometimes sold for the Brazilian Sapphire, the green variety as the Brazilian Emerald, and the greenish-yellow as the Ceylon Chrysolite. The carmine or hyacinth-red variety (Rubellite), which is, perhaps, the most valuable, retains the name of Tourmaline.

This mineral is widely distributed in the Laurentian rocks either in crystals or crystalline masses; its predominating colour is black, although such colours as hair-brown, various shades of green, light rose-red and yellow also occur. The black crystals from the Township of Bathurst will cut into fine mourning gems. Small stones of one to two carats, of transparent green of various shades, sometimes a bright emerald, also a yellow and a yellowish-green variety, have been cut from the Tourmaline of Wakefield. The crystals at this locality are seldom more than a quarter of an inch across, but often many inches in length, aggregating together in large masses. I have seen bunches of these slender crystals that would measure eighteen inches in length, exhibiting such colours as black, red, green, yellow and colourless in the same crystal, and graduating from opaque to transparent. Light yellowish-green crystals of Tourmaline are met with in the Township of Chatham in a vein of quartz, but these are opaque and too small for cutting.

Some of the brown varieties found at Lachute, Calumet Island, and other places, might contribute small gems.

Zircon is of frequent occurrence in Ontario and Quebec, and constitutes such gems as the Hyacinth, Jacinth, and the Jargoon. The latter variety has not been met with in Canada. It comes principally from Ceylon, it is perfectly transparent and almost colourless, and on account of its peculiar smoky hue is sometimes passed off for a Diamond. At the Colonial and Indian Exhibition in London specimens were shewn under the name of Ceylon or Matara Diamonds.

In the Counties of Renfrew, in Ontario, and Ottawa, in Quebec, magnificent crystals of the brownish-red variety have been found from time to time, but with the exception of a few very small hyacinth coloured crystals from Sebastopol, not fit for cutting.

Independent of the cutting qualities of this mineral, and partly on account of its crystallographic forms, single and twinned, it has been greatly sought after by mineralogists. Forty dollars has been paid for a single crystal from the Township of Brudenell. Small crystals of an inch and under have no value, but large and well-defined crystals command a good price.

Spinel is thought to have been included under Carbuncle by the ancients, and even to-day it is often sold in Ceylon for the Ruby. This mineral is known to jewellers and others under various names, such as Spinel Ruby, when of shades of red; Balais Ruby, when pale red or rose-pink; Almandine Ruby, when red bordering on shades of blue; Sapphirine, when blue, and Pleonast, when black.

In the Township of Wakefield large cubical crystals of a dark green and purplish colour occur in a vein of Calcite, and at times afford small dark green and blue transparent gems. In the same neighbourhood octahedral and cubical crystals of pink Spinel (Balais Ruby) occur sparingly, sometimes three-quarters of an inch across, and although marred with numerous cleavages, afford small pieces from which fair transparent gems may be cut. The blue variety is said to occur in limestone in the Seigniorship of Daillebout. Black octahedral crystals, often grouped together, are mentioned in the Geology of Canada as occurring in Burgess in flesh-red limestone.

Garnet, which is introduced to us under various names by jewellers

and others, is of frequent occurrence in Canada, distributed through the Laurentian rocks in crystals and lamellar pieces, as well as constituting veins and bedded masses of some magnitude. Garnet, however, as a mineral, is one thing, and Garnet, as a gem, is another. Many persons are, perhaps, not aware that this mineral, owing to its various colours, is often made to represent such minerals as the Ruby, Topaz, Chrysolite, Amethyst, or, in fact, any gem that its shade of colour happens to imitate. This imposition is generally confined to closed settings. Independent of the several gems it may be said to represent, it is itself known under various names in the trade according to its colour.

The brownish-red variety known as Almandine is found at several places in Canada, and will at times afford gems. On the river Rouge this mineral occurs in a highly feldspathic rock, in light pinkish-red cleavable masses or imperfect crystals. At Bay St. Paul it occurs of a good colour in mica schist, and in the neighbourhood of Ottawa the red Garnet that is frequently met with in the gneissic rocks probably belongs to this variety. This is the Syrian, also the Oriental or Precious Garnet of the jewellers.

The blood-red Pyrope, Bohemian or Ceylonese Garnet, has not yet been, to my knowledge, found in Canada.

The variety Essonite, or Cinnamon Stone, and at one time called Hyacinth, occurs in the Township of Wakefield of a yellowish and brownish-red colour, from which small gems might be cut. This mineral is mentioned in the Geology of Canada as occurring in the Township of Orford, but is not of gem quality. Another lime Garnet, in well-defined crystals, occurs in limestone in the Township of Wakefield, the crystals of which are sometimes two to three inches across, and vary in colour from colourless through various shades of yellow and green, pieces of which, perfectly free from cleavage joints, will often cut into two carat stones, which are exceedingly brilliant, and might often be mistaken for the Topaz or Chrysolite.

The variety known as Spessartite, a manganesian Garnet, occurs in Muscovite, in flattened brownish-red transparent crystals, in the Township of Villeneuve, and may yet possibly contribute a handsome gem.

Chrome Garnet, which occurs in large aggregated masses of minute emerald-green crystals in the Township of Orford, has not yet presented specimens large enough for cutting. In the Township of Wakefield, however, this mineral presents more promising prospects from a gem point of view. During the past summer preliminary preparations were made with a view of developing a property in this township for gem material.

If crystals of a large size were found, I think it doubtful if they would be cut, as the demand for fine mineralogical specimens of this mineral is very great, and they would realize a greater price than the cut stones, although, if this mineral is perfectly transparent, it would surpass the Emerald in value.

The largest crystal obtained last summer would be about a quarter of an inch, but translucent, yet some of the smaller ones were perfectly transparent.

Chrysolite.—This mineral is mentioned in the Geology of Canada as occurring in well-defined yellowish-green crystals in Basalt, in Rougemont. This is the Peridote of jewellers and lapidaries.

The yellowish grains mentioned in the same work as occurring in the Dolorites of Montarville and Montreal are the Chrysolite proper, although jewellers will persist in confining that name to Chrysoberyl.

No gems have thus far been cut from either of these varieties.

Mr. A. F. Low mentions the occurrence of a yellowish-grey opaque variety in rock masses in the Shickshock Mountains, but this is of no value as an ornamental stone.

Quartz.—Several varieties of this mineral suitable for cutting are found in different parts of Canada, foremost of which is the Quartz Asteria, found in the neighbourhood of the Gatineau. It occurs as a constituent of a granitic vein, in pieces the size of a pea to that of a pigeon's egg, together with other translucent quartz. The quantity of the gem material to the quartzose mass would not be more than one per cent., and even with the available material much of it is marred by inclusions of web-like markings, which often escape observation until after the stone is cut. This stone is perfectly transparent, and by transmitted or reflected light exhibits a star of six rays. This may also be seen in a first-class stone in ordinary light.

The name *Asteria* applied by me to a certain variety of Quartz, will require some explanation, as individual opinions are somewhat diversified on this point. I will endeavour to give my reasons for adhering to this name. I have been informed by one scientist that I could call these gems *Asteriated Quartz*, but not *Quartz Asteria*, which certainly seems to me a distinction without a difference.

Pliny described the Star Sapphire under the name "*Asteria*." This latter name is still retained to designate varieties of *Asteriated Corundum*, such as the *Sapphire Asteria*, *Ruby Asteria*, *Topaz Asteria*, etc. I think we may safely infer that the word *Asteria* was used to particularize a variety depending on physical properties, which were then known to occur only in the corundum mineral, and as *Cats-eyes* are described under Quartz by many authors, when the real stone is *Chrysoberyl*, *Asteria* applied to Quartz would be no more misleading. Emmanuel says the Quartz *Cats-eyes* are frequently confounded by jewellers with the true or *Chrysoberyl Cats-eye*, which they persist in calling the *Chrysolite Cats-eye*. The *Corundum Asterias* or star stones are peculiar to Ceylon. By skilful cutting the natives produce a star of six rays, which by sunlight or artificial light is vividly shown. A top light is best to judge them by. Fine stones command a high price.

Dr. Feuchtwanger says that certain translucent varieties of *Sapphire*, when cut convex, and when the principal axis of the crystal stands perpendicular to the base of the convex cut stone a white light running in six rays, resembling three white planes or stripes crossing one another at one point is seen.

We feel assured as the properties of the Canadian *Asteria* become better known to jewellers and others, and the prejudice against its being Canadian is overlooked we shall have more admirers of this handsome gem. It compares in some way with the Ceylonese *Moonstone*, but is much harder and will retain its polish much longer, and on the other hand the *Moonstone* does not come within the category of true gems.

Probably if these stones had been introduced by some organized ring as new Ceylonese gems and high prices asked for them, they would have been held in higher estimation by some persons. Take for instance the *Moonstone*, above referred to, which material is far more plentiful, and more easily cut and polished and cheap enough in its

own country, and yet for a two-carat stone and not perfect at that, I was asked the moderate sum of \$7 by a prominent jeweller in Montreal. This stone would be worth in Ceylon about twenty five cents.

You will perhaps rely more on the weight of my statement if I read you an abstract from the Hand-book of Exhibits of Ceylon at the Colonial Exhibition: "Moonstones were credited to other countries in past ages, besides Ceylon, and were known to the ancients, who associated the moonlike lustre with the phases of the moon. These stones are found in large numbers in several places and are not of any considerable value; indeed the large quantities found prevent their commanding a high price." I do not mention this to throw any more reflection on the Moonstone, but merely as a comparison between the intrinsic value of it and the Quartz Asteria.

The taste for the one has been acquired; for the other it has yet to be acquired. You will say, if the stone with its attractive qualities is what you claim for it, why is it not more in demand? To which I would reply, that vendors of precious stones are not generally mineralogists, they therefore decline handling gems that are not known in the market until the demand on the part of the public forces them to do so; and again, the introduction of a new stone may perhaps seriously retard the sale of a large stock of gems on hand, not to mention the many vexatious questions that might be put by customers concerning its durability, etc.

Besides the above variety, the colourless transparent crystals of Quartz found in many parts of Canada will afford at times clear gems.

The brilliant crystals found in the neighbourhood of Quebec and known as Quebec Diamonds look well when mounted in their natural state, and when cut as brilliants are exceedingly bright.

The rose and smoky varieties of Quartz are occasionally met with, and according to Prof. Howe, some years ago, large crystals of the latter kind could be found in the stone heaps of the fields in the neighbourhood of Paradise Village, N.S. I have also seen some fine crystals of this variety from British Columbia, fit for cutting.

Rose Quartz although occurring at a number of places in Canada, has not yet to my knowledge been met with as a gem material.

The perfectly transparent variety, Rock crystal, referred to above

as occurring at several places in Canada. has not, however, been found sufficiently large, I think, for the needs of the optician, who designates this mineral pebble, and who prefers it to glass on account of its superior hardness and coolness to the touch.

I shall here call your attention to some erroneous ideas concerning different coloured Quartz.

The Cairngorm (named from the Cairngorm Mountain in Scotland) is a smoky variety of Quartz--although this name is often applied to the same mineral of other tints. Such names as the Brazilian Topaz Mexican Topaz, Spanish Topaz, False Topaz, Citrine, Smoke Stone Cairngorm, etc., are all applied in turn to coloured Quartz by jewellers and others, who appear to have a name always ready, according to the shade of gem in demand. If this loose nomenclature were confined to varieties of Quartz it would not be of so much consequence, but regardless of their composition, they call all stones of a pale green colour Aquamarine, and all pale yellow ones Topaz.

Amethyst is another variety of Quartz, found principally at Lake Superior and Nova Scotia, although at the former locality it is much more abundant and is found lining cavities in groups of large crystals that are often coated with Jasper, Pyrite, Fluorite, etc. Its colour is of various shades of purple in blotched markings, which prevents their use to any extent as gems, owing to the difficulty of getting an evenly coloured stone. On the Bay of Fundy a more uniformly coloured stone is met with, although comparatively rare, which will at times cut into a costly jewel.

Amethyst is valued according to the depth, richness and uniformity of colour, and its transparency. "This stone like most gems appears less brilliant at night, but when surrounded with pearls it appears at all times to its best advantage." In 1652 Emmanuel says that an Amethyst was worth as much as a Diamond of equal weight.

Cats-Eye Quartz is reported to have been found on the Bay of Fundy. Sometime ago I was shown a rolled specimen from Partridge Island, N.S., which the owner prized very much, but which I was convinced was nothing but a pebble of Heulandite. However, notwithstanding this single mistake, we are informed on good authority that the

real mineral does exist on Partridge Island. But no specimen of it, as yet, has come before our notice.

Opal has been found by Dr. G. M. Dawson in British Columbia in small faintly iridescent pieces in Trachyte. They, however, were too small for cutting. But possibly if this locality were examined more closely for gem material the result might prove more favourable. The same gentleman found the variety Hyalite in small globular aggregations also in British Columbia.

Kyanite.—This mineral has been noticed at two or three places in Canada. In the Sudbury district it occurs in light sky blue crystals in a triclinic felspar, and would cut into handsome gems if found transparent.

Topaz.—According to the late Prof. Howe, of Nova Scotia specimens of this stone were exhibited in London in 1862, both rough and cut, by Mr. McDonald—the locality given was Cape Breton, and the cutting is said to have been done in Pictou. The cut stone was rather more than half an inch in length, its colour yellow.

Having come to the end of the gems proper, we will now refer to those minerals which constitute Semi-precious stones, and which form a much larger proportion of our gem material than the former.

We will first notice the siliceous varieties.

Quartz.—This mineral has been referred to as a real gem ; we shall now consider it in connection with other minerals, such as—

Gold Quartz.—When native gold is dispersed through a white translucent quartz it makes a very pretty gem.

Thousands of dollars worth of this material have been cut up in the United States during the last few years. We have not as yet been fortunate enough to see much of our Canadian gold quartz fit for the purpose, although, no doubt, suitable specimens are often consigned to the crushers. It is not the scarcity of gold in our Canadian specimens that makes this material hard to obtain ; they are too rich if anything, but it is due to the rusty coloured nature of the quartz. A few stones have been cut, with small nuggets attached, from the Nova Scotia quartz.

Silver Quartz will often afford good material for cutting when the base is evenly coloured.

Thetis Hair Stone.—I noticed this mineral some years ago filling a vein in the Township of Hull. In the rough state it is not a very prepossessing mineral, but when cut tolerably thin it displays its peculiar hair-like markings, floating in a greasy transparent quartz. These inclusions are filaments of Actinolite, and when sparingly distributed and less defined they would assist in producing Catseye Quartz.

Chalcedony.—Under this heading we must include a number of minerals that differ only in their translucency and colour, such as Agates, Onyx, Sardonyx, Hornstone, Chrysoprase, Plasma, Prase, Jasper, Bloodstone and Cachelony, which will be described separately.

Chalcedony includes those clear, translucent varieties of bright red, yellow and white, often called *Carnelian*; when of brownish red it is called *Sard*.

These varieties may frequently be found in rolled pebbles on the shores of the Bay of Fundy, Baie des Chaleurs and Lake Superior, also at a few places in British Columbia.

Hornstone is improperly applied to a cellular cherty mineral from Grenville, of no value for cutting; but in the neighbourhood of Two Islands, Nova Scotia, a beautiful white translucent variety occurs, which, owing to its extreme toughness and its susceptibility to a high polish, is well suited for Signet rings, etc.

Agate.—A description of this mineral alone would fill a good-sized volume were we to make any attempt to elaborate on its varieties and occurrence. The three principal localities where it is obtained are Nova Scotia, Lake Superior region in Ontario, and British Columbia.

From Two Islands, in Minas Bay, to Cape Chignecto, in the Bay of Fundy, and from Digby Gut to Blomidon, on the south side of the Bay, may be called the home of the Agates, occurring at intervals in veins and pebbles, the latter being generally the finest. The varieties mostly met with on the Bay are the variegated and brecciated Agates, although the Fortification and Moss Agates are frequently found, the latter both yellow and green.

In the neighbourhood of Lake Superior the Fortification Agates predominate, although pretty Moss Agates are often found. In British Columbia the Agates are also of the Fortification type, but generally

light coloured or white; not unfrequently stalactitic markings may be seen in a transparent base.

It is a pity that our Agates, which have been so lavishly distributed over the Dominion, beautiful in their natural colours, should be ignored for the more spurious and gaudy articles imported, and pained off on tourists and others at the Lake Superior and Niagara resorts as Canadian. These Agates come principally from Brazil and India, and, according to some authors, may be recognized from the German by being water worn, whereas the German are generally coated externally with delissite. They are, however, all cut in Germany, and after being polished are steeped in oil, and finally boiled in sulphuric acid, by which process they are often converted from the pure white Fortification Agate to the black Onyx with its white concentric rings. This is caused by the oil entering the more porous portions of the stone and then being carbonized by the sulphuric acid.

Onyx.—This variety is found occasionally at the Agate localities before mentioned, and differs only from that mineral by its colours being arranged in parallel layers, which are either black, brown, red, yellow, etc., striped so as to exhibit alternate colours, arranged like a sandwich, it is then termed Sardonyx. However, rarely more than two colours are seen in the imported stones. It is on this particular mineral that some of the finest masterpieces of art are still preserved in some of the European museums. A marvellously fine antique Sardonyx Cameo of five strata, representing the bust of Faustina, was said to have been sold at the sale of the effects of the Marquis of Dree for 7,000 francs.

We often hear from jewellers and others of the "Oriental Onyx." This name enhances its value considerably, and yet these are identical with the German stones, and as there is every reason to suppose that the same process coloured the stones from India as those from Germany, their quality and translucency is identical, and more particularly as no lapidary or jeweller can tell one from the other, why should there be any difference?

Some fine Onyx pebbles were brought from Queen Charlotte Island, B.C., by the Marquis of Lorne. They were of a pale yellowish colour striped with white. But perhaps the finest specimens of this

variety have lately been found by Dr. G. M. Dawson in British Columbia. These are made up of several strata, and as these layers are exceedingly thin, of different colours, conspicuous among which is a bright green, they would cut into handsome Sardonyx gems.

Chrysoptase occurs of various shades of green, and is translucent. Its colour is due to the presence of a little nickel. This stone was formerly greatly esteemed in Europe, but now is almost valueless. This may be owing to the fact that its colour gradually fades in the course of time. The mineral was found by Dr. Bell, of the Geological Survey, in the Hudson Bay Territory.

Prase has been noticed by Dr. Dawson, in British Columbia, of a dark green colour. It would contribute a curious gem, but although it takes a good polish, it is said to become spotted by long exposure to the air.

Jasper.--Another mineral of the many varieties of Quartz, may be said to be quite common in Canada, and indeed only a few miles from our doors, a band of variegated Jasper occurs, from bright red to various shades of brown and yellow, with often the three colours intermingled. Ribbon Jasper is of frequent occurrence in the Bay of Fundy, often of a brownish base with yellow bands. At Two Islands, Minas Basin, in Nova Scotia, a peculiar white porcelainous looking Jasper, interspersed with rose coloured markings, occurs in veins of Basalt. It takes a high polish and some specimens resemble hand-painted Porcelain. Jasper of various colours may be found almost anywhere on the Bay of Fundy, either in loose pebbles among the debris of the shore or in veins intersecting the Basalt.

The occurrence of this mineral at Sherbrooke and Rivière Ouelle in the Eastern Townships in beds and veins is mentioned in the Geology of Canada. This is, however, very uncertain in its polish at the former locality, where this mineral is of various shades of red. Specular Iron ore, together with numerous small holes, render it entirely useless as an ornamental stone. The Rivière Ouelle specimens, which are often beautifully variegated, will occasionally take a good polish. The so-called "Gaspé Pebbles" are generally Jasper. In the Lake Superior district, in Ontario, Jasper of different colours is found, both in veins and pebbles, the latter enclosed in a translucent quartzite, forms large

beds, and were it not for its vesicular nature would make a handsome ornamental stone. However, small pieces, sufficiently compact, may be obtained which work up into a curious and pretty gem.

In British Columbia, Jasper is often found of a green colour, constituting Heliotrope; also at the Lake Superior district and Two Islands in Nova Scotia a similar mineral occurs, sometimes interspersed with thin seams and dots of red Jasper, called Bloodstone.

Silicified Wood is merely wood that has been saturated with Silica, either in the form of Quartz or Opal, and some varieties of which are very handsome. It is frequently found in the Tertiary and Cretaceous rocks of the North-West and British Columbia in large pieces.

Cachelony is a hydrous variety of Quartz or Opal occurring at several places on the Bay of Fundy, associated with Agate. This stone would cut into small gems of a white translucent colour.

Chiasolite.—This mineral is worthy of a place among the gem materials; if its sombre colour does not introduce it as a general favourite, its quaint dark coloured cross, which is revealed when the crystals are cut at right angles to the longer axis, would obtain for it some admirers as a curious gem. This mineral, according to the Geology of Canada, is found on Lake St. Francis, and boulders of a schistose rock of some hundreds of pounds in weight, thickly studded with these crystals, were observed by Dr. Ellis in the Eastern Townships.

Staurolite, is another mineral that may be mentioned in this connection as it is sufficiently hard and takes a good polish, and when of a reddish-brown colour and translucent, will make rather a pretty gem. Crystals of this mineral occur at Moore's Mills in New Brunswick, and it has also been observed in Nova Scotia and the Eastern Townships, but judging from specimens I have seen, none of gem quality.

Feldspar, is made to include a number of minerals such as Orthoclase, including Adularia, (Moonstone) and Porphyry; Microcline, including Amazon Stone and Perthite; Albite, including Moonstone and Peristerite; Oligoclase, including Sunstone and Moonstone; Labradorite and Obsidian. You will therefore see that the Moonstone may consist of three different feldspars. The transparent variety from Ceylon is Oligoclase. The milky variety from St. Gothard is Ortho-

class, and the similar Canadian variety is Albite, although some of our Orthoclase is quite luminous when cut.

Orthoclase occurs in Canada of different colours the more conspicuous of which are pinkish, white and brown, the latter variety often beautifully crystallized in the Townships of Sebastopol and Ross, and sometimes the crystals when cut parallel with certain planes are quite luminous. They at the same time, reveal minute spangles of a glistening yellow colour, thus combining the properties of the Moonstone and Aventurine. This constitutes a neat and pretty gem, and it is a pity that prejudice should prevent these stones from taking the place of the gaudy imitation trash that is at present glutting our market.

It is stated in the Geology of Canada that a reddish-brown Orthoclase with cleavages of half an inch across, which exhibits golden-bronze reflections of great beauty, was brought from the coast of Labrador. Another Aventurine variety was noticed by Dr. Bigsby on the north east shore of Lake Huron, twenty miles east of the French River.

Porphyry, more properly is a rock mass, composed of two or more minerals. This material of various colored bases, interspersed with white, rose red, and greenish spots is found at many places in Canada. A rock of this description covers a number of acres in Grenville and Chatham, and could be utilized for ornamental purposes, and also, as a gem stone, portions of it being as pretty as a Bloodstone.

Felsite. I should here mention another rock that occurs at Chamcook, N.B., under the name of Felsite. It is thoroughly homogenous and takes a high polish. Its colour is of various shades of brown, sometimes veined with lighter or darker shades, giving to the mass the aspect of rosewood.

Microcline or "Amazon Stone," is found in the Townships of Hull, Wakefield, Sebastopol and in the neighbourhood of Paul's Island, Labrador, of various shades of green, often verging on blue. This stone from the neighbourhood of Wakefield when cut convexly often reveals a bright, silvery lustre and in artificial light has a pretty effect.

Pertlite, is the name given by Dr. Thompson to a variety of Feldspar from the Township of Burgess, and according to Bauerman, is made up of different laminæ of Albite, Orthoclase and Microcline, the latter being rendered iridescent by inclusions of Specular Iron. This

compound mineral together with Quartz forms a granite vein, which covers a large area, although the proportion of the Perthite to the rock mass would not be very great. Its colour varies from a light flesh-red to a dark brown and it will at times cut into very handsome gem stones, the surfaces of which are brilliant with golden reflections. Mr. George F. Kunz the author of "Precious Stones in America," says: "Perthite forms a very curious and rich coloured gem, with its bright Aventurine reflections." This mineral has not been observed at any other locality than that given above.

Albite has been found at several places in Canada, but there is reason to suppose it has a much wider distribution than we are aware of at present. In the townships of Wakefield, Hull and Villeneuve, in Quebec, and Drummond and Bathurst in Ontario, this mineral occurs with broad and striated cleavages, the surfaces of which are beautifully chatoyant with such colours as blue, green and yellow and will rarely cut into fine Moonstones with pearly and bluish reflections, and first-class stones will compare with those from St. Gothard.

Presterite is a name given to the opalescent Albite at Bathurst, where it occurs associated with Quartz. The mineral from this locality although pretty with its bluish reflections is nevertheless marred by being generally stained by the oxidation of the Pyrites that is associated with it.

Oligoclase—This mineral constitutes the Ceylon Moonstone, and although a vein of this material occurs in the Township of Hull it has not proved to be of gem quality.

Sunstone, possibly Oligoclase associated with Titaniferous Iron Ore, was brought in by a farmer from the Gaineau region.

Labradorite—Although abundant throughout Northeastern Canada, as a constituent of the Anorthosite rocks, and at times affording large cleavages, is nevertheless devoid of those bright coloured reflections which so characterize these specimens brought from Paul's Island, Labrador. Some specimens from the neighbourhood of Perth, gave fiery red reflections, but not so vividly as those from Labrador, which at times are entirely blue, at others green, sometimes the two colours are interblended with the addition of purple and bronze, but the rarest

colour is the coppery or fiery red, and in cut stones, with convex surfaces, this mineral will vie with the Fire Opal.

Obsidian is a volcanic glass, often beautifully mottled with various colours. The Canadian varieties, however, are usually dark. It is found in British Columbia and Nova Scotia, at the latter place in small rounded pebbles, coated with a blue mineral embedded in Amygdaloid. These when cut take a brilliant lustre and are jet black, sometimes bordering on blue.

Chrome Pyroxene, which is found associated with the Chrome Garnet in the Township of Orford, is occasionally of an emerald green tint and semi-transparent and might afford small gems. In the Township of Wakefield, at the other Chrome Garnet locality, a massive sea-green variety interspersed with emerald green dots occurs. It takes a high polish and could be utilized for ornamental purposes.

Scapolite. This mineral is found widely distributed in the Laurentian, of various colours, such as pink, lilac, bluish, yellow and white, and when sufficiently clear from cleavages, cracks and foreign minerals, takes a good polish, making rather a neat and pretty gem stone.

Wilsonite, which is mentioned as a material suitable for gems, is occasionally found of a pink colour, associated with Scapolite and from which, according to some authors, it has resulted. The difficulty with this mineral, is to get it sufficiently free from foreign inclusions, which are generally of a harder nature, and consequently after being polished, stand out in relief. I have also noticed that its colour after exposure to the air for some time becomes much paler. This mineral is of frequent occurrence in the Apatite deposits of Ottawa County, the best specimens however, come from the Township of Bathurst.

Hypersthene as a gem material was introduced some time ago by the French jewellers. It is said to take a high polish, with an iridescence of copper, red, bright brown, gold yellow, and greenish shades. Dr. Feuchtwanger says he saw a stone of this nature, twelve lines long and six broad, sold in Paris for 120 francs.

This mineral is of frequent occurrence in the Anorthosite rocks of Canada.

Idocrase, or *Vesuvianite* is cut occasionally at Naples, and there sold under the name of Italian Chrysolite, where it occurs in transparent green and brown crystals. The Canadian Idocrase, observed in

the Townships of Grenville, Wakefield, Templeton and the Calumet Islands, is usually in hair-brown crystals, except in the first named Township the colour is a yellow, all of which are translucent only on their edges, except in the case of some very small crystals from Wakefield, which were semi-transparent. No gem material of this mineral has yet been met with in Canada.

Lazulite.—This mineral was found by Dr. R. Bell on the Churchill River of a cobalt-blue colour. This material is sometimes employed as a substitute for Lapis-lazuli, which it resembles somewhat in colour.

Sodalite is another blue mineral, which occurs associated with granite on the Rocky Mountains in British Columbia. It varies in colours from light to dark blue, from translucent to opaque. From a large number of specimens examined I should think that fair-sized blocks of the Granite, interspersed with veins and patches of Sodalite, could be obtained which would make a very handsome ornamental stone. As a gem material it compares with the Lapis-lazuli, is the same hardness, and takes a higher polish. The largest stone of this material, free from any adhering rock, that has been cut in Canada, would be about one and half inches by three-quarters, and three-quarters of an inch thick.

Chlorastrolite was thought, until recently, to be confined to Isle Royal, but has lately been found in a place I believe on the Canadian side. In the neighbourhood of Lake Superior they are often called Turtle Agates, owing to the markings of the stone, resembling the grotesque designs often seen on some species of turtles. They occur in rounded pebbles of various sizes, of dark green colours mottled and veined with white; they are perfectly opaque, and a stone of a good colour and marking makes a very pretty gem.

Prehnite, of which the former Chlorastrolite is supposed to be a variety, occurs at several places in the Lake Superior district, also at the Baie des Chaleurs in New Brunswick, and at the Bay of Fundy in Nova Scotia. In the first named area, independent of the important veins of this mineral which sometimes form the gangue of rich native Copper deposits, pebbles of various colours, sometimes radiating, are found among the debris of the shore, generally enclosing scales of the same mineral. The pale greenish variety of the Baie des Chaleurs, and

the somewhat darker shade from Nova Scotia, also afford material for cutting. This stone, when translucent and prettily mottled, will cut into curious and pretty gems.

Jade or Nephrite is a tough compact translucent mineral graduating from a greyish white to dark shades of green. It takes a high polish, having a somewhat greasy lustre. This is not much known in this country, but is very popular in Asia. It is found in Corisca, China, Egypt and New Zealand, in the latter country it is called Greenstone.

In British Columbia numerous implements and tools, fashioned by the Indians out of a beautiful translucent variety of this mineral equal to that from New Zealand, are often found, but no occurrence of this mineral in situ has yet been observed.

Epidote, when in translucent crystals and of a good colour will sometimes cut into a very curious gem. Our Canadian mineral is generally of a hue of greenish or yellowish colour; some small crystals, however, from Wakefield are translucent, but not of gem quality. The massive variety although widely distributed in the Pre-Cambrian rocks is rarely met with in large pieces, but as an accessory to the Gneissic rocks it sometimes lends a pleasing tint when these are polished. Fine slabs of a reddish colour, veined or clouded with light green Epidote, might be cut from the Gneiss of Ramsay. Epidosite from the Shick-Shock Mountains will also cut into fair stones of a pale yellowish green colour somewhat resembling Chrysoprase. According to the Geology of Canada this mineral is also of frequent occurrence in the Silurian rocks.

Rutile is mentioned as a gem material, sometimes cutting into Ruby red stones, and others of a black colour, more closely resembling the Black Diamond than any other known gem. Some of the lighter coloured ones cut into gems closely resembling the common Garnet.

This mineral occurs in Canada in Ruby red grains distributed through the Ilmenite at Bay St. Paul, but I have not heard of any pieces being found large enough for cutting. It also occurs in geniculated crystals of a reddish colour in a mixed bed of Barite and Calcite at Templeton, but not of gem quality.

Chondrodite occurs of various shades of yellow to hyacinth red, also green and brown in massive varieties. In Canada the only occur-

rence of this mineral I am aware of is in the Township of South Crosby where it is found as yellowish grains dispersed through a crystalline limestone, but not large enough for cutting.

Pyrite, which is occasionally cut abroad, and was formerly much used in jewellery, is of very common occurrence in Canada. But material suitable for cutting is much more limited although sufficient quantity is available to supply the demand for some time to come. The Townships of Wakefield and Elizabethown probably afford the best material for this.

Hematite and certain varieties of Limonite will at times cut into curious and pretty gems. At the Iron mining districts of Michigan large quantities of these stones are sold to tourists and others as souvenirs of the locality, but it is said that they are cut abroad from foreign material. Some of the Limonite from Londonderry, N.S., will cut into curious stones of brown colour with concentric markings of yellow and a metallic lustre. They also take a high polish.

Titanite, which is found in Tyrol and the United States, in transparent yellowish and greenish crystals, will at times cut into fine gems, and although Canada has probably afforded the finest twin and single crystals of this mineral found in any part of the world, the sales of which in the United States have netted the various dealers thousands of dollars, even to day good crystals of this mineral command a high price but small and inferior crystals are of little value. Their colour is usually hair brown to black, and from translucent to opaque, with, occasionally, aventurine reflections on their planes. The Townships of Sebastopol, Grattan and Ross, have probably afforded the best specimens, although it is also quite common in many of the Apatite deposits, in single crystals. No material fit for the Lapidary's use has yet been observed from any of the above localities.

Natrolite occurs in the Amygdaloids of Nova Scotia and may be met with, in some form or other, almost anywhere on the Bay of Fundy, where this rock is found. At one remarkable locality on Stronach Mountain, near Margaretville, large masses of this mineral in radiating acicular crystals, may often be found piled up with the stones of the field. The largest individual crystal that I have seen is about one-fourth of an inch across, and translucent, but not fit for cutting. A

more compact fibrous variety, often zoned with pink, found at Cape Split and elsewhere on the Bay, will sometimes cut into neat and pretty gems.

Thomsonite is reported to have been found on the Bay of Fundy, in N.S., but these specimens are considered by some authors to be a variety of Mesotype. The pretty little pebbles of Thomsonite that are brought from Lake Superior, are really from the State of Minnesota, at a place called Grand Marais. They occur as pebbles in the Amygdaloid, and are often beautifully variegated with such colours as flesh red, zoned and mottled with green, red, brown and white, and when perfectly free from holes, make very handsome gems.

Apatite, which is destined to become the backbone of the Ottawa Valley, cannot be left altogether out of this category. If we have not yet found any material from which gems or ornaments may be cut; and though we have seen during the past few years so many different varieties developed, we may still look forward to better results in the future, and possibly some of them may yet yield a more compact variety suitable for this purpose. I have seen both yellow and blue transparent crystals, but too small for cutting, from the Township of Wakefield.

Since writing the above, some fine olive green transparent gems have been cut from this mineral from Portland.

Apophyllite, sometimes called Fish-eye Stone, (this name is also applied occasionally to Adularia,) is met with at several places on the Bay of Fundy, the more noticeable of which, for gem purposes, is on the Blomidon shore, where it occurs in greenish-white, semi-transparent to translucent crystals often an inch across. On the other side of the Bay, at Cape D'Or, large modified white crystals, two inches in diameter are found. These are however, perfectly opaque and unfit for cutting. This mineral also occurs at Lake Superior, of a reddish colour, but of no value as a gem.

Fluor.—Derbyshire Spar, or Blue John, as it is sometimes called, has been employed extensively in England for the last century, and even to-day there are more manufactories of this material in Derby than anywhere else, engaged in making such ornaments as vases, cups, plates, candlesticks, etc. The variety from which the above articles are made occurs in compact and granular masses of some shades of blue,

often banded or zoned with lighter or darker tints. This mineral, like the Agate, seems to offer facilities for the introduction of the skill of the artificer, as the manufactured articles often seen are not of natural hue, but are brought to that state of perfection by subjecting them to a certain degree of heat before polishing.

Crystals of this mineral are often found of large size and richly coloured, and have been employed in making rings, stones, etc., known in the trade as False Amethyst, False Emerald, False Ruby, False Topaz, etc., according to the colour. This mineral is much too soft for any purposes of jewellery.

At Lake Superior large cubical crystals of a dingy green colour are often found associated with Amethyst. Emerald green and purple cleavable varieties are often met with in the brecciated veins that are now being worked for Silver in the Port Arthur district. In the Township of Ross, in Ontario, a beautiful purplish-red granular variety occurs, with a more compact semi-transparent whitish fluor. In the Township of Hull a single crystal of semi-transparent green colour, and which must have been four cubic inches, was found by a farmer in developing an Apatite deposit, who, being of a liberal disposition, broke up the crystal to give pieces of it to his friends, thereby robbing the scientific world of one of the finest crystals ever found in Canada.

A portion of this crystal is in the Geological Museum.

Several other localities in this and the neighbouring Townships afford this mineral.

Aragonite, *Satin Spar* and *Alabaster*, are minerals used to a large extent abroad for making fancy ornaments, and as the two latter are often represented by various minerals, it may be as well to point out their difference.

Satin Spar, or fibrous limestone, is found largely in the coal formations of Cumberland and Derbyshire; it is also found in Hungary, United States and Canada. I have seen several specimens from the Lake Superior district that would cut into beads and other ornaments. Beads of this mineral were, some years ago, in great favour in England, but owing to the introduction of an imitation, made from hollow glass globes, filled with fish scales, which very nearly resembled the originals, they have of late years gone out of fashion.

Satin Gypsum, sometimes called *Satin Spar*, which bears a strong resemblance to the former, is much softer, and consequently not so often used.

Fine specimens of this material are found at various places on Minas Basin, more particularly at Cape Blomidon, Cape Sharp and Swan Creek.

Alabaster is represented by Limestone (carbonate of lime), and Gypsum (sulphate of lime). The purest material used in Italy, and from which source many of the ornaments of this mineral come, is derived from a bed 200 feet deep at Castelino, in Tuscany. One of the principal manufactories of Alabaster ornaments is at Valterra, thirty miles from Leghorn, where about 5,000 persons are dependent upon this industry. This variety of Limestone has not yet been observed in Canada.

Gypsum Alabaster is found at Hillsborough, N.B., and is susceptible of a good polish. Large blocks, hundreds of pounds in weight, are often taken out, consisting of translucent white anhydrite, which are generally veined with Gypsum; the latter mineral, being softer, wears away faster in the polishing, leaving a somewhat uneven surface. This, however, should not be sufficient to detract from its value as an ornamental stone, as the effect produced by the sunken veins is often very grotesque.

Malachite.—This beautiful carbonate of copper which comes to us from Australia, Hungary, Tyrol and Siberia is also met with sparingly in Canada associated with other ores of copper. In the County of Hastings nodules of this mineral as large as a cricket ball are said to be found occasionally in the loose soil. From some of the copper mines of the Eastern Townships and New Brunswick, but some small specimens are sometimes met with and would contribute small gems.

Serpentine.—This mineral with its rich colour has always been an attractive ornamental stone. In Saxony several hundred people are employed making boxes, trinkets and other ornaments out of this material. Our Canadian Serpentine, more particularly those occurring in the Laurentian, are often of rich yellowish and greenish colours and might be utilized for all purposes of interior decoration. Some years ago an enterprising machinist established himself in the vicinity of the

Grenville Serpentine, where he turned by a foot-lathe a number of very pretty ornaments such as vases, doork-nobs, etc., but owing to his method of cutting up the stone with a hand-saw we need hardly mention that this enterprise was not attended with much success.

Calumet Island, Wakefield, Templeton, Bowman and Grenville probably afford the best translucent variety, although it is largely distributed over other parts of Canada, especially the Eastern Townships.

Amber is occasionally found in rounded pieces in the lignites of the cretaceous and may possibly afford material suitable for beads, etc. The North-West Territory and British Columbia have both contributed small specimens.

Jet is a variety of cannel coal, not yet observed at any Canadian locality, and judging from the many so-called imported Jet ornaments that I have seen lately, if the Whitby mineral is much used, black enamel and glass constitute the Jet of the present time.

I have now called your attention to the various minerals available for gems and semi-gems scattered over the Dominion and given the localities of the more important material, and at the same time have drawn comparisons with those of other countries. Some persons have an idea that our crude material has no value before cutting and that it might be sold by the ton or hundredweight instead of by the carat, as most European or Oriental gems are. Now this vague idea might lead some persons to infer that our gems in Canada are comparatively worthless, owing to the great abundance of cutting material, and only after being polished are they of any value. Certainly several of our semi-gems, such as Agate, Jasper, Amazon Stone, &c., might be obtained by the ton, and consequently are of little value, and even after being cut are quite inexpensive. But before we begin to gauge our material for gem cutting, we must provide ourselves with certain facts, respecting its uniformity of colour and transparency, and its freedom from flaws and cavities; then when blocks of six inch cube of such material can be obtained, we may talk of selling it by the ton. It is true of certain minerals, that large masses often occur, and perhaps one per cent. of this might be utilized, but then this large percentage only applies to a very few of our semi-gem minerals. And, on the other hand, the uncertainty of some minerals makes it almos-

impossible to tell what sort of gems they will produce, and consequently only about twenty-five per cent of the cut stones may be considered fair samples. This therefore raises the price of manufacture one hundred per cent. Neither does it follow, that the few selected stones are equal in value, as one, through richness of colour, transparency, &c., may realize more than ten of the others. This system of valuation will serve to illustrate the low prices of certain gem. in the market; and those who are in the habit of buying these grades of stones, and at the same time are unaware that the low prices, are caused by the sale of a few called No. 1 at fancy prices, should understand that the price of production of each stone is often greatly in excess of the prices paid by them for this class of gems.

In mentioning the word Oriental, many persons, I presume, would infer that it signifies gems from the east. Many authors, however, apply this appellation to the Corundum species, such as Blue Sapphire, (Oriental Sapphire,) Green Sapphire, (Oriental Emerald,) Yellow Sapphire, (Oriental Topaz,) Red Sapphire, (Oriental Ruby.) &c., and others apply the word Oriental to the Emeralds from Peru, which are neither Corundum species, nor yet from the east, and as the word Oriental as applied to certain gems, is somewhat ambiguous, it should not be considered in purchasing a gem, except from very reliable dealers.

As to our crude material being of no value, this must depend entirely on the collector, who should be the best judge of the requisite material available. Now, as some of our local stones are sold by the carat on account of their scarcity, you will understand why the erroneous idea, that they may be obtained by the ton, should be pointed out. I can assure you we have not yet arrived at that stage when we can build our houses of Tourmaline, Moonstone or Quartz Asteria.



SUMMARY

— OF —

Canadian Mining Regulations.

NOTICE.

THE following is a summary of the Regulations with respect to the manner of recording claims for *Mineral Lands*, other than Coal Lands, and the conditions governing the purchase of the same.

Any person may explore vacant Dominion Lands not appropriated or reserved by Government for other purposes, and may search therein, either by surface or subterranean prospecting, for mineral deposits, with a view to obtaining a mining location for the same, but no mining location shall be granted until actual discovery has been made of the vein, lode or deposit of mineral or metal within the limits of the location of claim.

A location for mining, except for *Iron* or *Petroleum*, shall not be more than 1500 feet in length, nor more than 600 feet in breadth. A location for mining *Iron* or *Petroleum* shall not exceed 160 acres in area.

On discovering a mineral deposit any person may obtain a mining location, upon marking out his location on the ground, in accordance with the regulations in that behalf, and filing with the Agent of Dominion Lands for the district, within sixty days from discovery, an affidavit in form prescribed by Mining Regulations, and paying at the same time an office fee of five dollars, which will entitle the person so recording his claim to enter into possession of the location applied for.

At any time before the expiration of five years from the date of recording his claim, the claimant may, upon filing proof with the Local Agent that he has expended \$500.00 in actual mining operations on the claim, by paying to the Local Agent therefor \$5 per acre cash and a further sum of \$50 to cover the cost of survey, obtain a patent for said claim as provided in the said Mining Regulations.

Copies of the Regulations may be obtained upon application to the Department of the Interior.

A. M. BURGESS,

Deputy of the Minister of the Interior.

DEPARTMENT OF THE INTERIOR, }
Ottawa, Canada, December 19th, 1887. }

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