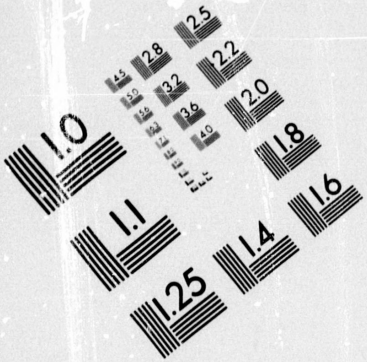


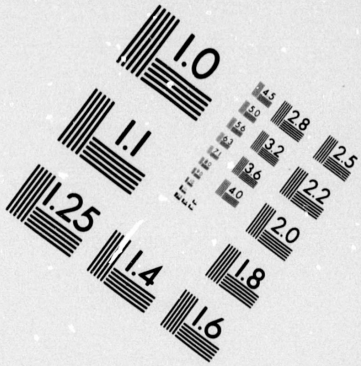
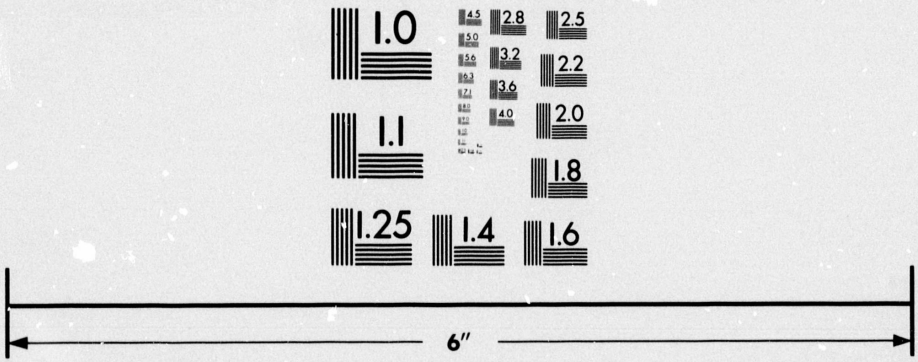
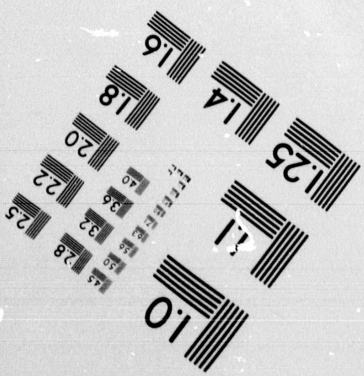
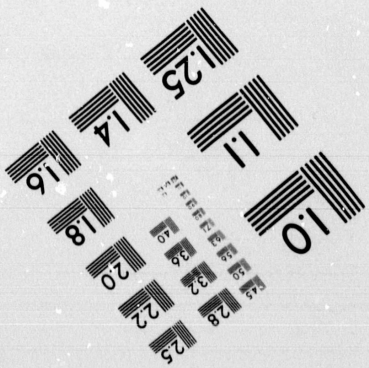


IMAGE EVALUATION TEST TARGET (MT-3)







Photographic Sciences Corporation

23 WEST MAIN STREET
WEBSTER, N.Y. 14580
(716) 872-4503

CIHM/ICMH Microfiche Series.

CIHM/ICMH Collection de microfiches.

Canadian Institute for Historical Microreproductions

Institut canadien de microreproductions historiques

1980

Technical and Bibliographic Notes/Notes techniques et bibliographiques

The Institute has attempted to obtain the best original copy available for filming. Features of this copy which may be bibliographically unique, which may alter any of the images in the reproduction, or which may significantly change the usual method of filming, are checked below.

- ☐ Coloured covers/ Couverture de couleur
- ☐ Covers damaged/ Couverture endommagée
- ☐ Covers restored and/or laminated/ Couverture restaurée et/ou pelliculée
- ☑ Cover title missing/ Le titre de couverture manque
- ☐ Coloured maps/ Cartes géographiques en couleur
- ☐ Coloured ink (i.e. other than blue or black)/ Encre de couleur (i.e. autre que bleue ou noire)
- ☐ Coloured plates and/or illustrations/ Planches et/ou illustrations en couleur
- ☐ Bound with other material/ Relié avec d'autres documents
- ☐ Tight binding may cause shadows or distortion along interior margin/ La reliure serrée peut causer de l'ombre ou de la distortion le long de la marge intérieure
- ☐ Blank leaves added during restoration may appear within the text. Whenever possible, these have been omitted from filming/ Il se peut que certaines pages blanches ajoutées lors d'une restauration apparaissent dans le texte, mais, lorsque cela était possible, ces pages n'ont pas été filmées.
- ☐ Additional comments:/ Commentaires supplémentaires:

L'Institut a microfilmé le meilleur exemplaire qu'il lui a été possible de se procurer. Les détails de cet exemplaire qui sont peut-être uniques du point de vue bibliographique, qui peuvent modifier une image reproduite, ou qui peuvent exiger une modification dans la méthode normale de filmage sont indiqués ci-dessous.

- ☐ Coloured pages/ Pages de couleur
- ☐ Pages damaged/ Pages endommagées
- ☐ Pages restored and/or laminated/ Pages restaurées et/ou pelliculées
- ☐ Pages discoloured, stained or foxed/ Pages décolorées, tachetées ou piquées
- ☐ Pages detached/ Pages détachées
- ☑ Showthrough/ Transparence
- ☐ Quality of print varies/ Qualité inégale de l'impression
- ☐ Includes supplementary material/ Comprend du matériel supplémentaire
- ☐ Only edition available/ Seule édition disponible
- ☐ Pages wholly or partially obscured by errata slips, tissues, etc., have been refilmed to ensure the best possible image/ Les pages totalement ou partiellement obscurcies par un feuillet d'errata, une pelure, etc., ont été filmées à nouveau de façon à obtenir la meilleure image possible.

☐ This item is filmed at the reduction ratio checked below/ Ce document est filmé au taux de réduction indiqué ci-dessous.

10X	12X	14X	16X	18X	20X	22X	24X	26X	28X	30X	32X
					✓						

The copy filmed here has been reproduced thanks to the generosity of:

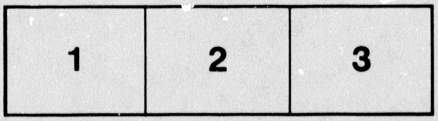
Thomas Fisher Rare Book Library,
University of Toronto Library

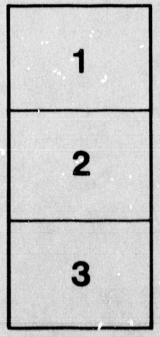
The images appearing here are the best quality possible considering the condition and legibility of the original copy and in keeping with the filming contract specifications.

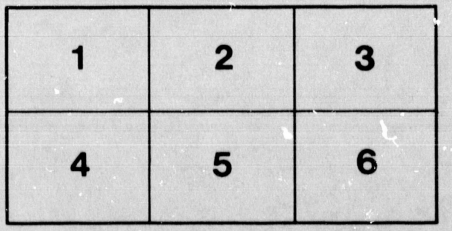
Original copies in printed paper covers are filmed beginning with the front cover and ending on the last page with a printed or illustrated impression, or the back cover when appropriate. All other original copies are filmed beginning on the first page with a printed or illustrated impression, and ending on the last page with a printed or illustrated impression.

The last recorded frame on each microfiche shall contain the symbol → (meaning "CONTINUED"), or the symbol ▽ (meaning "END"), whichever applies.

Maps, plates, charts, etc., may be filmed at different reduction ratios. Those too large to be entirely included in one exposure are filmed beginning in the upper left hand corner, left to right and top to bottom, as many frames as required. The following diagrams illustrate the method:







L'exemplaire filmé fut reproduit grâce à la générosité de:

Thomas Fisher Rare Book Library,
University of Toronto Library

Les images suivantes ont été reproduites avec le plus grand soin, compte tenu de la condition et de la netteté de l'exemplaire filmé, et en conformité avec les conditions du contrat de filmage.

Les exemplaires originaux dont la couverture en papier est imprimée sont filmés en commençant par le premier plat et en terminant soit par la dernière page qui comporte une empreinte d'impression ou d'illustration, soit par le second plat, selon le cas. Tous les autres exemplaires originaux sont filmés en commençant par la première page qui comporte une empreinte d'impression ou d'illustration et en terminant par la dernière page qui comporte une telle empreinte.

Un des symboles suivants apparaîtra sur la dernière image de chaque microfiche, selon le cas: le symbole → signifie "A SUIVRE", le symbole ▽ signifie "FIN".

Les cartes, planches, tableaux, etc., peuvent être filmés à des taux de réduction différents. Lorsque le document est trop grand pour être reproduit en un seul cliché, il est filmé à partir de l'angle supérieur gauche, de gauche à droite, et de haut en bas, en prenant le nombre d'images nécessaire. Les diagrammes suivants illustrent la méthode.

PRELIMINARY REPORT

ON A

GNEISSOID SERIES

UNDERLYING THE GOLD-BEARING ROCKS OF NOVA SCOTIA,

AND SUPPOSED TO BE THE EQUIVALENT

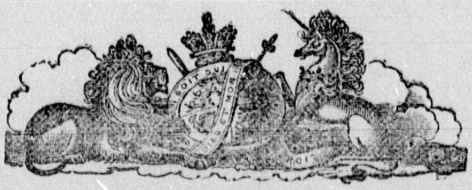
OF THE

LAURENTIAN SYSTEM.

BY

HENRY YOULE HIND, M. A.
(Formerly of Trinity College, Toronto.)

Author of "Reports on the Red River Expedition of 1857," "Reports" and "Narrative of the Assinniboine and Saskatchewan Exploring Expedition of 1858," "Explorations in the Interior of the Labrador Peninsula, 1862," "Preliminary Report on the Geology of New Brunswick, 1865," &c., &c.



HALIFAX, N. S.,
PRINTED BY CHARLES ANNAND,
1870.

Hon. ROBERT ROBERTSON, M. E. C.,

Commissioner of Public Works and Mines.

SIR,—

I have the honor to submit a general description of the Series of Sedimentary Deposits lying below the known gold bearing rocks of Nova Scotia, the discovery of which I communicated to you some time since.

Numerous details respecting the structure and distribution of this series are necessarily reserved for my report on the Sherbrooke Gold District, which, with maps and sections, is in an advanced state of preparation.

Your obedient servant,

HENRY YOULE HIND.

WINDSOR, Jan. 5th, 1870.

CONTENTS.

REPORT.

INTRODUCTORY REMARKS.

The series described in the following pages is supposed to represent a part of the Laurentian system of Sir W. E. Logan, as developed in Nova Scotia.

The discovery in this Province of rocks older than the Lower Silurian, has long been considered highly probable by Geologists, and Dr. Dawson, in the second edition of his "Acadian Geology," hints at the probability of certain beds being older than the position he provisionally assigned to them. On page 620, in describing the "Lower Silurian Period," he says: "Reasoning on these facts, we arrive at the conclusion that the alternations of quartz rock and clay slate constitute one very thick formation, having probably a predominance of quartzite below and slate above; but whether the mica schist and gneiss which occur on the peninsula of Cape Canseau, and also in Queens county and Shelburne, and the chloritic beds of Yarmouth, are to be regarded as continuations of this series, differently changed by metamorphism, or as portions of other members of the Lower Silurian or of *still older deposits*, remains uncertain."

The geographical distribution of the Laurentian in Nova Scotia is roughly indicated on Dr. Dawson's map of Nova Scotia, New Brunswick, and Prince Edward Island, by most of the areas colored pink, numbered 10, and classed in the reference as "Granite, Syenite," &c., with their extension in different directions into the broad area representing the Lower Silurian and numbered 6. Dr. Dawson anticipates in some measure this change, for he says in the beautifully illustrated and descriptive work already referred to: (1)

"The map in this edition, though greatly improved, is still to be regarded as merely a rude approximation to the truth, and the coloring in many places, more especially in the interior, remote from the coast lines, is little more than conjectural." And again—

"In Nova Scotia, also, I have no doubt that whenever a detailed map shall be prepared, showing the courses and

(1) Page xi, Explanations of the Geological Map, Acadian Geology.—By J. W. Dawson, F.R.S., &c., &c.

limits of the quartzite and slate bands, of the gneiss and mica-slate, and of the many irregular dikes and masses of granite and other eruptive rocks, it will present an appearance marvellously intricate and complex, in comparison with the broad coloring of the present map."

In Cape Breton, I think that a large portion of the northern part of the Island, colored as Upper Silurian, will be found to show rocks of the same age as the gold-bearing and underlying gneissoid series. In 1866 I found black corrugated slates, resembling those of our gold-fields, north of Cheticamp; and on the MacKenzie River, about three miles south of Red Cape, a gneissoid series with beds of mica schist.

In New Brunswick, my personal knowledge of the broad belt of "Granite, Syenite," &c., extending from Bathurst, on the Bay of Chaleurs, to the mouth of the Penobscot, in Maine, embraces the country from Bathurst to near the boundary line between New Brunswick and Maine. This belt of rock, on Sir W. E. Logan's map, published in 1865, is colored as "Intrusive Granite, &c.," and in the references (page 15) Sir William Logan states as follows: "For the geology of the adjacent British Provinces we are indebted for New Brunswick to a map by the late Prof. James Robb, and also to the subsequent labors of Profs. Henry Youle Hind and L. W. Bailey, and Messrs. Matthew and Hartt." My "Preliminary Report on the Geology of New Brunswick" was not published until after Sir W. E. Logan's map was printed, and on page 50 of that report I stated with reference to these granites, that "they are indeed to be regarded more as metamorphosed or altered sedimentary strata than as intrusive rocks. They have probably been altered in position and belong to the class named by Prof. Hunt "Indigenous Rocks."

In an incomplete MS. map of New Brunswick now before me, a tracing of a portion of which I sent to Sir W. E. Logan in 1865, no less than eight bands of granite are shown on one section across this great belt of rocks. There are described in my report on New Brunswick, on page 45, under the heading "Numerous granite belts on the Miramichi." (1)

---

(1) The North West Branch of the South West Miramichi.

The following is the order abbreviated from my Report, (page 45,) of a section across the strike of the belt on the North West Branch of the South West Miramichi:

1. Low Granite Domes.
   Micaceous Schists, with Granite Domes occasionally penetrating through them.
2. White Granite, with involved masses of Schist.
   Micaceous Schist and Quartzite Schists.
3. White Granite.
   Ferruginous Schist.
4. Granite, with parallel beds of Schist.

Aided by the information since obtained from a study of the rocks in Nova Scotia, I should now use the terms "Granitoid Gneiss," and "Gneiss conglomerate," for the term "Granite," in a description of the great New Brunswick belt, which I suppose to be of the same age as the Nova Scotian series described in the following pages, and the black slates on the Nipisiquit to be of the same age as the black slates forming the known summit of the gold-bearing rocks of Nova Scotia.

With regard to the ages of the Gold-bearing and Gneissoid series, I have spoken of them, provisionally, as Lower Silurian and Laurentian. Conclusive evidence derived from fossils has not yet been obtained from the gold-bearing slates and quartzites. Since the discovery of the forms resembling the *Palœotrochis* of Emmons, noticed in my report on the Waverley Gold District, I have sent to Mr. Billings slabs containing supposed fossils from the Sherbrooke rocks. Mr. Billings' opinion of these supposed fossils is contained in the following quotations from a letter with which he favored me on the subject:

No. 3. "Casts from beds about 1600 feet above the base."

"These have the form that would be made by an *Orthis*, almost the size of *Orthis pectinella*, Conrad. Some of the cavities have one side flat and the other convex, which would answer very well for the species cited. In one of the cavities there are several radiating ridges, corresponding to the ribs of *O. pectinella*. These appearances are not sufficient to enable me to say positively that the impressions are of organic origin, while, at the same time, they prevent one from asserting the opposite opinion, i. e., that they are *not organic*."

No. 5. "I think this is an *Eospongia*, but as it does not show any minute structure, will not say so positively."

"None of the other specimens exhibit any organic characters whatever. But No. 2 (CHIASTOLITE) appears to me to be important for the reason that it occurs in the gold-bearing beds of Australia. I showed your specimens to Mr. Selwyn, and he says the mineral has exactly the same form as that which occurs in the Australian rocks, holding the Quebec graptolites. It is always found there in the vicinity of the granitic

---

5. Granite belt, 400 yards broad.
   Ferruginous Schist.
6. Granite.
   Siliceous Schist.
7. Granite.
   Quartzites.
8. Granite.
   Quartzites.

or gneissoid rocks. He does not think it to be Chiastolite proper, but whatever it may be, it is in his opinion the same as that of Australia. *Eospongia* occurs in the same horizon in Canada, and thus we have a concurrence (of two facts) which seems to throw some light on the age of the rocks of your district."

THE GOLD-BEARING ROCKS—LOWER SILURIAN.

The known gold-bearing rocks of Nova Scotia consist of quartzites, sandstones, and grits, interstratified with argillaceous slates and thin conformable beds of auriferous quartz. This portion has an ascertained thickness exceeding 9000 feet, and between the base and a vertical distance of about 3000 feet from the summit, the thin quartz beds are found yielding gold, and are worked in the different Gold Districts in the Province, so that a mass of strata having a thickness of six thousand feet, or more than a mile, yields gold from quartz beds of contemporaneous age with the quartzites and slates with which they are interstratified. Another set of leads, which are true veins, cutting the strata, together with gash veins, both of later age than the enclosing rock, also yield gold, and are worked in some Districts. Overlying the beds just described is a thick band of argillaceous slate, blue-black, and black in color, ferruginous, finely corrugated, and containing beds of quartz in which gold has been found near Sherbrooke and at Wine Harbor, but no mining is carried on at present in these deposits. The black ferruginous slates exist in New Brunswick, and are noticed in my report on the geology of that Province.

The thickness of the black slates in Nova Scotia exceeds three thousand feet, so that the gold-bearing rocks of the Province have a known thickness of 12000 feet.

THE GNEISSOID SERIES—LAURENTIAN.

Near the village of Sherbrooke, on the east side of the St. Mary's River, the quartzites are seen to rest unconformably upon a coarse and highly felspathic bed of gneiss.

Here the gneissoid strata are broken by faults, but a quarter of a mile from the English church the gneiss is seen to have a northwest strike, with a southeast dip, while the overlying quartzites have a nearly east and west strike, with a northerly dip.

A bed in the gneissoid series, about eighty feet below the visible summit at Sherbrooke, holds masses of a gritty schist, bearing some resemblance to beds in the overlying and unconformable quartzite series. The masses of schist, some of which are two feet long and six or eight inches thick, are interpenetrated with granitic veins. The bed in which they are found is overlaid by well stratified gneiss, and underlaid by massive beds of gneiss, which forms the material from which the so-called granite of Sherbrooke is quarried.

Four miles on a northerly course from Sherbrooke village, gneiss, distinguished by red felspar, has crushed through the quartzite series, being brought up by a fault, and the junction is visible for a considerable distance near the head of the Indian Harbor Lakes. In close vicinity is found a great area of coarse porphyritic granitoid gneiss, which occupies the country for several miles, its western boundary will be shown on my map of the Sherbrooke District.

The facts observed early last summer at Sherbrooke established the existence there of a sedimentary deposit below the quartzite series, highly metamorphosed, of great thickness, and embracing beds of numerous rock varieties, but they revealed little respecting its structure. These facts were, however, in strict accordance with the views I expressed in a paper read before the Nova Scotian Institute of Natural Science early in 1869, and which is now about being published in the transactions of the Institute for that year. Reference was there made to the gneissoid rocks near Mount Uniacke and near Halifax.

In order to connect and elucidate the facts observed on similar rocks at points so far apart, I made a section across twenty miles of strata, on and near St. Mary's River, from north to south; a section on and near the line of the Halifax and Windsor Railway, from Stillwater to Mount Uniacke, and coupled these with observations on the Ponhook Lake range, and the high range of hills which approach within three miles of Windsor.

Without entering into details, which are necessarily reserved for my report, I will enumerate the general results of these examinations.

A spur of the gneissoid series crosses the Halifax and Windsor Railway close to the forty-seventh telegraph post, south-east of the Stillwater Station. The track follows the junction for a short distance, after which the gneissoid series trends to the east, and the junction with a quartzite series is again crossed near the one hundred and twenty-ninth telegraph post, southeast of Stillwater, and about thirteen hundred yards northwest of Mount Uniacke Station. From near Stillwater the gneiss trends towards the St. Croix River,

which it crosses a short distance below the mills at the outlet of the lower Ponhook Lake, and thence continues to the range of hills south and southwest of Windsor; the gneiss conglomerates being found in position on Butler's mountain. From Mount Uniacke Station its course towards the Atlantic is for some miles about south twenty degrees east, and sweeping round Hammond Plains it appears to connect with the great exposures west of Halifax to the Atlantic at Sambro Cape. Near Halifax it has been brought to the surface by a fault, and contact with a schistose series, which may form a part of the gold-bearing rocks, (Lower Silurian) is visible on the west shore of the North West Arm.

The general strike of this series, where it can be best studied near the Halifax and Windsor line of railway, is north thirty to forty degrees east. The general strike of the overlying quartzite series is north eighty degrees east.

The following beds have been recognized, but I do not vouch for the correctness of the order given below, as there may be repetitions. Neither do I suppose that these beds afford any adequate representation of the magnitude and extent of this series, for it will be seen that in consequence of the strike lying nearly on the course of its northwestern boundary, a section must be made in a southwesterly direction in order to cross all the exposed beds, and the details of the enumeration given below were derived chiefly from the tongue which is crossed by the Halifax and Windsor railway between Stillwater and Mount Uniacke.

PROVISIONAL GROUPING OF THE BEDS—COMMENCING WITH THE LOWEST OBSERVED.

1. Coarse grey gneiss—gneiss conglomerate.
2. Beds of dark grey micaceous schist, very compact and tough.
3. Gneiss conglomerate, coarse grained, holding pebbles of gritty quartzite, water worn quartz pebbles, and slabs of micaceous schist a foot long and five inches in diameter.
4. Beds of fine grained gneiss, schist conglomerate, and true quartzite, with thin beds of gneiss.
5. Gneiss, with masses of schist and water worn boulders of a conglomerate.
6. Highly porphyritic gneiss, the chrystals of white felspar are about an inch long, and thickly distributed through the mass, forming a beautiful rock.

7. Coarse garnetiferous gneiss.
8. Coarse porphyritic gneiss—granitoid gneiss, holding pebbles and masses of micaceous schist.
9. Coarse white gneiss, with patches of red felspar gneiss, passing into beds of red felspar gneiss.

PROBABLE DEVELOPMENT OF THIS SERIES IN CAPE BRETON.

The area occupied by the gneissoid series in Nova Scotia proper is very considerable, but I have also reason for supposing that it embraces a large portion of the northern part of Cape Breton. In 1866 I explored the Gulf coast of that Island, and a mile and a half beyond Red Head, or about five miles north of Cheticamp Island, I observed green and red-weathering ferruginous slates, with finely corrugated black slates. These I considered at the time to be of the age of the Quebec Group, and marked them on my field map as "resembling the Quebec Group." At MacKenzie's River, three-quarters of a mile from Grand Ance, near Red Cape, and some eighteen miles north of Cheticamp, I found a great gneissoid series, as shown on the accompanying plan, consisting of red, grey, banded and micaceous gneiss, with quartzites and mica schist. It is not improbable that these rocks will turn out to be of the same age as the gneissoid series of Nova Scotia proper.

If this supposition be established, a great belt of rocks of the age of the Laurentian series, will be found to be exposed at intervals from Newfoundland, in latitude 51°, to Shelburne in Nova Scotia, in latitude 44°. The parallelism of this great axis, seven hundred miles in length, with that in New Brunswick, two hundred and fifty miles long, referred to in the introductory remarks, exhibits a remarkable symmetry in the structural arrangement of the rocks in the eastern Provinces of British America. They are referred to at some length in my report on New Brunswick, (1865,) page 47 to 49.

ROCKS PROBABLY OLDER THAN THE KNOWN GOLD-BEARING STRATA, ABOVE THE LAURENTIAN.

In the neigborhood of Mount Uniacke, at the foot of Cochran's Hill, eleven miles from Sherbrooke, and near Halifax, I have observed schists, grits, and quartzites, which present an aspect different from the overlying gold-bearing series. As yet the observations which appear to show unconformability with these are incomplete, but certainly tend to produce the

impression that an unconformability exists. They rest on the gneissoid rocks unconformably, and although more highly metamorphosed than the gold-bearing series, yet they hold not only masses, pebbles, but huge *water worn boulders* of the underlying gneiss. These beds are several hundred feet thick, and near the gneiss crystals of andalusite are commonly found in the schists. The occurrence of boulders of gneiss in these strata show that the gneissoid series was metamorphosed before their deposition, and hence, inferentially, before the Silurian period. Granitic dykes are not uncommon in the gneissoid and overlying series. They occur at Cochran's Hill, in the Sherbrooke District, cutting the gold-bearing strata, or in the planes of bedding. Besides dykes, granitic and felspatic veins penetrate both series, but I have not, in rocks of this age, yet observed any intrusive masses of granite in the area described.

AURIFEROUS ZONE IN THE LAURENTIAN.

It is worthy of note that in Ontario and Quebec there is a zone of auriferous rock in the Laurentian series, the distribution of which has not yet been made public by the Geological Commission of Canada. When we bear in mind that the rocks overlying the supposed Laurentian in Nova Scotia, are sediments which have derived the greater portion of their materials from the series on which they rest, it may yet become a legitimate subject of enquiry to endeavor to ascertain the relation which the gold-bearing beds of quartz, distributed through a vertical thickness exceeding six thousand feet of strata, may bear to an auriferous zone, which we may with reason suppose to exist also in the Nova Scotia Laurentian.

THE GNEISSOID SERIES—A GUIDE TO THE SEARCH FOR WORKABLE DEPOSITS OF GOLD.

A glance at the plan showing approximately the outcrop of the gneissoid series, suggests a geographical relation between the worked gold deposits and the lower rocks on which they rest. In the plan of the Sherbrooke Exposure, the gneissoid series forms a great nucleus round which the several mining districts of Wine Harbor, Isaac's Harbor, Upper Isaac's Harbor, Country Harbor, Cochrane's Hill, and Sherbrooke are symmetrically arranged.

From the limited observations I have already made, it seems probable that wherever in Nova Scotia a gneissoid exposure is found surrounded by Lower Silurian rock, near it, and in different degrees, there will be found workable gold deposits, so that a knowledge of the outcrop of these supposed Laurentian rocks, will ultimately form a valuable guide in prospecting a very large portion of Nova Scotia which still remains altogether unexplored and unknown as to its mineral wealth.

THEORY AND PRACTICE AT WAVERLEY.

WINDSOR, Jan. 11th, 1870.

Hon. R. ROBERTSON, M. E. C.,
Commissioner of Public Works and Mines.

SIR,—

I beg to enclose a plan of the works at Waverley Gold District, on the Tudor and North leads, during the year 1869.

You will remember that when I commenced my geological survey of the Waverley District, in the autumn of 1868, the works on the Tudor and North leads had been abandoned in the western part of the district, the Tudor lead having "disappeared" close to the boundary line of areas 201 and 202, about eighty feet from the northern limits of those areas.

In the large plan now in your office, of which a reduced lithographic copy accompanied my report on that district, I have indicated by dotted lines the probable outcrop for some thousand feet of the Tudor lead, the North lead, and a large number of other leads symmetrically arranged.

The indicated outcrop of these leads was based upon:

1st. The manner in which the leads originated. I described them as auriferous beds of quartz of contemporaneous age with the enclosing rock.

2nd. The geological structure of the district, which I showed to consist of an east and west anticlinal tilted over to the north, and again, by subsequent movements, tilted to the west; (the north and south anticlinal). During the latter movements I stated that the strata had been dislocated, squeezed, and subsequently denuded. The position and approximate extent in feet of the main dislocations, are represented in detail and in feet, on the plans referred to.

The theoretical outcrop assigned to the leads at Waverley, was the result of the study and delineation of this complicated structural arrangement. I now beg to call your attention to the degree to which theoretical deductions have been borne

out by practical workings and discoveries during the past year.

The enclosed plan has been kindly furnished by Mr. B. C. Wilson, machinist and mining engineer, who has been extensively occupied at Waverley during the past season.

Operations for the search of the "South Tudor" commenced late in the fall of 1868, near the road marked on the plan, 770 feet from the point where the lead was lost. At the date of Mr. Wilson's letter it had been traced backwards to area 201, through a distance of eleven hundred feet.

The mean difference between the ascertained outcrop of the lead and the theoretical outcrop, given on the plan in your office, is 25 feet 9 inches over a distance of 1100 feet. When both theoretical and actual outcrops are reduced to the same level, the mean difference is considerably less.

The mean difference between the theoretical and actual outcrops of the North lead, over a space of nine hundred feet, is 25 feet 7 inches.

The rocks throughout these distances of 1100 and 900 feet, are deeply covered with boulder drift, and of uneven surface, so that I may reasonably claim a much closer approximation between theory and fact, than a mean difference in outcrop of 25 feet 8 inches over a space of two thousand feet.

The accompanying plan is a copy of a portion of the plan in your office. The black dotted lines represent the probable outcrop I assigned to the leads in October, 1868. The red lines show, according to Mr. Wilson's survey, the actual outcrop discovered up to January, 1870. Enclosed is a copy of Mr. Wilson's letter.

I have the honor to be,

Your obedient servant,

HENRY Y. HIND.

WAVERLEY GOLD FIELDS,
8th January, 1870.

HENRY Y. HIND, Esq.,

Dear Sir,—

In reply to your favor of 27th December, I beg to say that I have examined the formation as developed in Mr. Burkner's workings on the south dip, and around the curve of what is unquestionably the Tudor lode, and accompanying please find a plan which will illustrate the course with the openings thereon.

The developments so far determine—

1st. That the lodes have been traced around the curve of the anticlinal axis, proving indisputably the continuation of the Tudor and other veins, from their east and west course with a northern dip, around in the form of a parabolic curve to a corresponding (east and west) course with a southern dip.

2nd. That the sweep of the curve is much sharper on the northern than on the southern side of the axis.

3rd. That the thickness of the veins and character of the ore in the northern and southern dips are comparatively identical.

4th. That on the south side the lode dips at an angle of about 45 degrees, and near the axis at about 40 degrees.

5th. That the gold streak is from east to west on the south side of the axis, following round the curve till it is from west to east on the northern side.

6th. That on the south side of the anticlinal the Tudor lode grows perceptibly richer and thinner as it goes east, but increases in richness in depth.

7th. That the *North* lode on the southern side is 82 feet from the Tudor, and at 150 feet further comes the *South* lode, so called.

8th. That there is a fault or displacement about 90 feet north of the axis, the movement apparently having been from east to west, the Tudor lode being completely cut asunder, and the two ends shoved past each other about thirty feet; the texture of the intervening rock being completely destroyed.

9th. That the "South" lode (on the eastern side of the axis) 18 inches thick, has two partings in it, forming three distinct veins in one; that the character of the ore is identical with the three lodes (in one belt) lying some 90 feet north of the North lode, on the northern dip; the only difference being that there the veins are separated by some two feet of slates, which on the southern side is represented by a mere seam only.

I am, your obedient servant,

B. C. WILSON.