PROCEEDINGS

OF THE

Nova Scotian Institute of Science.

SESSION OF 1891-2.

ANNUAL BUSINESS MEETING.

Halifax, 9th November, 1891.

PROF. J. G. MACGREGOR, *President, in the chair.*

The minutes of the last annual meeting were read and approved.

The PRESIDENT addressed the Institute as follows :—

Gentlemen,—In opening the proceedings of the present session of the Institute, the thirtieth, by a short review of the events of the year which has just ended, I feel a profound regret, which I know you will all share, in the fact that it is necessary to record the loss of one of our oldest members, Thomas Beamish Akins, D. C. L., who died on the 6th of May, 1891. Dr. Akins was born on the 1st of February, 1809. From 1857 until his death he held the office of Commissioner of Public Records in Nova Scotia, an office which gave him excellent opportunities of research in his favorite subject, Canadian and especially Nova Scotian History. His publications are all historical in character and will doubtless have been referred to and described in the Proceedings of our sister society, the Nova Scotia Historical Society, of which he was one of the most active members. Though he claimed no special knowledge of science, he was always interested in its progress, and having tasted the pleasure of research himself he was especially interested in the encouragement of scientific research among his young fellow countrymen who had scientific tastes. It was that interest doubtless which led him to become a member of our Institute in 1873, and to continue a member during the rest of his life ; and those of you who enjoyed the privilege of his acquaintance, know well the stimulus which was communicated by his cheery words and kindly encouragement.

Although we have met with no other losses either through death or resignation,

our roll of membership has not lengthened to the extent which is desirable. I feel that we ourselves through our lack of enthusiasm are somewhat responsible for the deficiency of our progress in this respect. The Institute is ready to receive as members not only persons who are actively engaged in scientific research, but also all persons who are in any way interested in science; and there must be many such persons in the acquaintance circles of all our members who might be induced to come in and help us if we would only make sufficient effort to inform them of the privileges of membership.

The main reason of the slowness of our growth however, seems to me to be the lamentable smallness of the number of persons in our Province who have even the very little knowledge of science requisite as a basis of interest in its advancement, and to the necessarily greater lack of persons who are able to carry out even the simplest forms of research. That we have less than the usual proportion of such persons among our citizens is shown not only by the difficulty which we experience in securing active and even inactive members, but also by our almost total lack of circle-squarers, discoverers of the perpetual motion and scientific hobby-riders generally. That it is so very rare an occurrence for any of our citizens to claim to possess ability to create energy or to overturn the Newtonian philosophy, may possibly be due to the universal diffuaion of sound education, but it is more probably due to the general prevalence of scientific ignorance which compels the erratic souls among us to turn their energies in other direetions.

For the fact, or what seems to me to be the fact, that our general scientific intelligence is at so low an ebb, we who are engaged in education must, I think, be held to be largely responsible. I have referred in addressing you on a former occasion, to the difficulties which our higher educational system, or want of system, throws in the way of the performance of original work by members of the staffs of our colleges. The present arrangements of our school system similarly make it difficult for our intermediate teachers to acquire scientific knowledge, and still more to acquire scientific power, and in consequence make it next to impossible for them to transmit such knowledge or insight to their pupils. And this arises from two eauses. First, we do not provide them with anything like adequate means for the study of science. They are consequently led to qualify themselves on scientific subjects, for the most part by the mere reading of books, gaining therefore only a dead knowledge of facts and laws, and rarely acquiring a conception of science as an ever growing body of knowledge, whose growth may be promoted by the humblest of its votaries if only he learn to use his eyes and ears and hands and brain.

Secondly, we attach far too great relative importance to literary and linguistic acquirements on the part of our teachers and far too little to the attainment of scientific proficiency. The more ambitious of our teachers naturally aim at winning the highest grade of teachers' license; and the course of study by which this is secured is very largely linguistic and literary and only to a very small extent scientific, while the examinations by which it is tested are far more searchiug in the subject of languages, history, etc., than in the department of science. It follows that it pays a teacher to put his strength into Latin and History and Grammar. and to neglect scientific subjects; and the ambitious man usually does so.

It seems to me therefore, that two very beneficial changes might be made by those who have the direction of these matters,—first, the provision of better educational facilities in scientific subjects than we now possess, and secondly, the increase of the importance of scientific subjects relatively to the other subjects of the higher teachers' examinations. The complex character of our higher educational system renders the provision of improved facilities for scientific study, on any large scale, difficult, except by the slow process of educating the public. But while public opinion is being brought up to the point of expenditure, teachers might be led to use such facilities as we now possess more than they now do, by the second change referred to, For if scientific subjects were given a relatively greater importance in the requirements for license, and thorough knowledge which could not be acquired by the mere reading of text-books were demanded, this effect would be at once produced. I have elsewhere suggested that for this purpose two grades of teachers' license of the highest rank should be instituted, which might be roughly described as literary and scientific respectively, and which would differ from one another in the relative extent of the literary and scientific knowledge required. Were this course followed, the teacher of scientific tastes, could put his main strength into the study of science without running the risk of failure in applying for the highest grade of license ; and a body of teachers would thus be provided, able to carry out the wishes of School Boards whose members might have come to think that the thorough teaching of elementary science in our schools is a matter of great importance.

The effect of such a change on the work of our Institute is at once apparent. For not only would a body of teachers who had given their chief attention to scientific study, probably provide us with a number of active members, but the general diffusion of a knowledge of elementary science in the rising generation, would before long provide for us here and there men and women, who, whatever their main work might be, would for relaxation turn to the cultivation and advancement of some favorite branch of scientific study.

The need of change in our educational arrangements being thus apparent, I feel sure that I may congratulate the Institute on the fact of the appointment of its Corresponding Secretary to the important position of Superintendent of Education for Nova Scotia. Mr. MacKay is singularly well fitted for this position. For he is a man who distinguished himself in his University course, both in the literary and in the scientific department, having graduated both in Arts and in Science. His own tastes have led him in the direction of scientific research, and the special weakness of our schools in the department of science has led him to give much time and attention to means of securing improvement in this respect. We therefore have good ground for hope, that under his regime, sure progress in the diffusion of scientific knowledge will be made. On the other hand, however, the more conservative educationists, who have little confidence in science as a means of culture, have alse the satisfaction of knowing that he is an all-round man, with a literary as well as a scientific training, and unlikely, therefore, to exalt the latter at the expense of the former.

During the past year the Council has continued the extension, begun in the previous year, in the circulation of our publications. The last issue of the Proceedings and Transactions was sent to 594 Libraries and Scientific Institutions,

The majority of these are home and foreign Scientific Societies. But they include also, all Canadian Universities and Colleges, all Nova Scotian schools which have libraries, and all other Nova Scotian Libraries, of which we have knowledge. Of the Scientific Societies to which we are sending, about one half are already sending us their publications in return, so that the rapid growth of the Library to which I referred in addressing you last year, still continues.

The growth of our Library and the inconveniences of our present accommodation, which make access to our books extremely difficult, keep before our minds the necessity of some change in this respect. I regret to say that the effort, to which I referred last year as being made, to secure a building to accommodate the Provincial Museum, the Legislative Library, the City Library, the Art School, the Historical Society's library, and our own, has not resulted in success, and has had to be abandoned, at any rate, for a time. We, however, must make some new arrangement at an early date, if we are to avoid boxing up and storing in a temporarily inaccessible way, the publications which scientific societies are sending us; and the incoming Council cannot direct their efforts better than in an endeavour to secure a local habitation. I am firmly convinced the progress of the Institute is largely dependent upon its securing convenient rooms in which its meetings may be held and its members have easy access to the library. The main difficulty is of course, in the payment of the rent of rooms and the salary of a Librarian. At present the publication of the Transactions, the binding of books, and general miscellaneous expenses, use up our whole income, although the business of the Institute is so carefully managed that retrenchment seems impossible if its main work, the publication and circulation of its researches and the building up of its Library, is to be continued as at present. Possibly the annual expenditure necessary to secure convenient quarters may be considerably diminished by co-operation with the Historical Society, which, though more favorably situated than we are, nevertheless finds its work impeded through lack of accommodation. But in any case if a local habitation is to be secured, our income must be increased. Might I therefore suggest to the new Council that they should discuss the feasibility of what seems to me the only probable way of securing such addition to our income, viz., hiring rooms, appointing an Assistant Librarian to keep them open as many hours a day and as many days a week as may be found possible, subscribing for the leading scientific papers, throwing the Library open to the public on payment of a small annual fee, and then appealing to the public to assist us on the ground of the public utility of our action. To meet the expense incurred an active canvass would have to be made by our members. But there must be a large number of persons in the city especially, who would be willing to pay our small annual fee for the privileges which membership under the new conditions would bring, and many also who would be willing to become members in order to secure for the public the benefit which would be involved in aceess to our books.

Finally, before proceeding to the business of the evening, I wish to renew my thanks to the Institute for the honour they have done me in continuing my Presidency during the full term permitted by its laws. During my term of office, the Institute has met with serious reverses. But I think I may say that through the hearty co-operation of many of its members, it is now stronger, more active

in its work, and of greater public utility than ever before. From my own experience I can assure my successor that any efforts which he may put forth to forward the interests of the Institute will be warmly seconded and cordially appreciated.

The Treasurer presented his annual report, and Messrs. Bowman and Piers, having been appointed auditors, examined his statement and found it correct.

The following were elected officers for the ensuing year :—

President—M. MURPHY, D. Sc., C. E.
Vice-Presidents—H, S. POOLE, F. G. S., and PROFESSOR LAWSON, LL. D.
Treasurer—WM. C. SILVER.
Corresponding Secretary—A. H. MACKAY, B. A., B. Sc.
Recording Secretary—ALEXANDER MCKAY.
Curator of the Library—MAYNARD BOWMAN.

Councillors without office:—Professor J. G. MacGregor, John Somers, M. D., Principal O'Hearn, F. W. W. Doane, C. E., E. Gilpin, Jr., A. M., F. G. S., Augustus Allison, Harry Piers.

ORDINARY MEETING, Province Building, Halifax, 9th November, 1891.

The PRESIDENT *in the Chair.*

Inter alia.

A series of photographs of Fossils, presented by Sir Wm. Dawson, was exhibited.

A paper by T. C. Weston, of the Geological Survey of Canada, entitled : "Notes on Concretionary Structures in various rock formations in Canada," was read by Mr. A. H. MacKay, Superintendent of Education. (See Transactions, p. 137.)

ORDINARY MEETING, Province Building, Halifax, 14th December, 1891.

The PRESIDENT *in the Chair.*

Inter alia.

A paper, by the late Rev. Thos. McCulloch, D. D., first President of Dalhousie College, entitled :—List of Localities for Trap Minerals in Nova Scotia,—together with a letter from his son, Rev. Wm. McCulloch, D. D., of Truro, with reference to it, were read by Prof. G. Lawson. (See Transactions, p. 160.)

Professor G. Lawson read a paper entitled :—"Notes for a Flora of Nova Scotia, Part II."

ORDINARY MEETING, Province Building, Halifax, 11th January, 1892.

The PRESIDENT *in the Chair.*

Inter alia.

Mr. K. G. T. Webster, of Yarmouth, read a paper entitled:—"On the Fletcher Stone." (See Transactions, p. 208.)

A letter was read from R. B. Brown, Esq,, of Yarmouth, in reference to the Fletcher stone and other inscribed stones in Yarmouth County, N. S. In this letter Mr. Brown says :—

"The alleged discoverer of the Fletcher stone, Dr. Richard Fletcher, an Irishman by birth, and formerly a surgeon in the British army, settled in Yarmouth in 1809, and as he died in 1818, our first knowledge of it dates back to that period. Dr. Fletcher had it removed from the shore to a safe place near his residence to save it from mutilation, and there it remained for about 60 years, or until about 20 years ago, when it was brought round to the east side of the harbor, I believe, to have casts and photographs made from it. A contemporary of Dr. Fletcher was the late Dr. Henry Greggs Farish, whose son, Dr. G. J. Farish (also deceased), informed me that his father had taken him, when a lad of 15 years, to see this curiously marked rock. It will thus be seen that at least 80 years ago the stone with its mysterious writing was regarded as genuine by men of studious habits and scientific attainments, notwithstanding their inability to give an interpretation of its meaning.

"The original position of the stone was within a few feet of high water mark and about 300 feet south of Salt Pond dyke. A large boulder of quartzite weighing at least 2 0 tons, stands near the spot ; and on the south side of this boulder is a cavity from which, without doubt, the Fletcher stone was thrown off, probably by the frost. If Mr. H. Phillips' interpretation of the inscription is correct —"Haka's son addressed the men"—Haka's son may have done so from the summit of this boulder. There is no other rock immediately near it, and the point of land on which it lies is approachable at all times of tide. If the woods contained a savage foe, as they probably did about 1000 years ago, no better place could be chosen to prevent a surprise, with water on both flanks and in the rear.

"My first critical examination of the stone was made when I was about 17 years old. While engaged in making a careful drawing of it, to be submitted by my cousin, Mr. Lawrie of Glasgow, to one of the Scotch Antiquarian Societies, I noticed that at intervals in the glyphs *irregularly shaped thin scales and grains of quartz* of a glassy character had formed. It thus appeared that one of two things must have happened ; either there were hard silicious spots or veins running through the rock,—a common quartzite—from which the softer parts of the cuttings had been eliminated by some erosive action of the elements, or a general decomposition of the large flat surface of the rock had occurred, followed by a slow atomic deposition of silex in the cuttings of the inscriptions, facilitated and hastened perhaps by the salt spray of the tide water near by, as it was occasionally blown upon it by the westerly winds. The difficult problem was thus suggested as to how many centuries would be required in order to produce the effect described.

"Many years after this I had some correspondence with the late Judge James, relative to this matter. In a letter now in my possession, dated August 2nd., 1879, he says that a copy of my original drawing which I had given him, he had sent to Robt. Morrow, Esq., and also, that a photo taken by the Historical Society had been sent to several learned societies, including the Antiquarian Society of Stockholm, though with what result I never learned.

"The Judge very kindly copied and enclosed to me a Runic alphabet, with accompanying remarks taken from Sir J. Lubbock's 'Prehistoric Times,' and although I found some of the characters on the Fletcher Stone precisely like some of the letters of this alphabet, the most of them had no counterpart there.

"On one occasion when visiting Yarmouth the late Judge desired me to aid him in getting a sight of the stone as he had never seen it. I had heard that it had been brought over to the East side of the Harbor, and was on Water Street in front of a ship-chandler's establishment, and there we found it on the sidewalk inclined against a building; I had some difficulty in recognizing it however, and for this reason,—*the glyphs had been painted black.* An archipelago of *spatters* embellished the stone. I was afterwards told that the letters had been cleaned out with an iron spike, and then painted with a marking brush and lampblack, so that the photographer might be able to make a better copy.

"To those who may be interested in the solving of the mystery that surrounds this stone I would recommend a perusal of the introductory chapter of the 'Sequel to Campbell's History of Yarmouth,' the talented editor of which, Geo. S. Brown, Esq., being a grandson of Dr. Fletcher, must have been familiar with its history from his early childhood.

"I have reason to believe that this Fletcher Stone is not the only one of the kind in the county, as I have heard of at least one other on which similar markings occur. About twenty years ago Capt. Leonard Weston, a retired shipmaster and a very intelligent and well read man, told me of the existence of a large rock, I think on the Chebogue River, promising me that if I would come over to Arcadia, where he lived, he would take me in a boat to see it in order that I might copy the inscription. I regret to say that I delayed going until it was too late to profit by Capt. Weston's guidance. Both his sons, Mr. Dennis Weston and Rev. Walter Weston, had heard their father speak of the stone; but neither of them could give me any information as to where it was or what was on it. The only clue I can give to the locality of the stone is Capt. Weston's remark 'that we were to go in a boat from near his residence at that time (20 years ago) and that less than an hour's rowing or sailing would take us to the spot, that the stone was a pretty large one, and that it was near the water.' This does not amount to much as a pointer, but restricts the area of search to a radius of four or five miles and throws out of the question the whole west side of the river which could be approached without a boat. A search for it would occupy some three or four days and would involve the circumnavigation of a few islands and a visit to the site of an old Acadian village on what is called the Clements Farm.

"About sixteen years ago Mr. Louis B. D'Entrement in ploughing on his land at West Pubnico, Yarmouth Co., uncovered a stone on which was cut the figure of a leaping moose. The face of this stone was about 12x15 inches in diameter,

while its depth was at least 9 inches in the thickest part and rounded on the bottom, being evidently part of a beach-stone. It weighed about 200 pounds. The upper surface was nearly covered by an accurately drawn figure of a moose. The lines were very smoothly cut to a depth of from $\frac{1}{16}$ to $\frac{1}{8}$ of an inch. A careful examination of these lines through a magnifying glass showed none of that stippled appearance usual in inscriptions made on hard quartzites by means of a chisel or spike with sharp corners. I believe that only a flint implement could have been used with such effect. The stone was in my possession two days and was returned to the owner after I had made a plaster cast ; and from a careful drawing of this cast I have made the accompanying pen and ink sketch.

"In 1877 when the stone was brought to me in Yarmouth, the owner stated that buried under the soil about 18 inches were several others variously marked, grouped around this one in circular form. The owner believing that they in some way were indicative of buried treasure declined to part with them.

"A few years later than the above date, I was fortunate enough to have a call from the late eminent Micmac scholar, Dr. Rand, who was so much interested in the above facts, that he made enquiries amongst the most intelligent Indians of his acquaintance, and on his next visit to Yarmouth informed me, that a legend existed amongst them to the effect that before the expulsion of the French Acadians back to a remote period, tribes of Indians met in council once a year on what is called Pubnico Point, but he could learn nothing as to the purposes of these conventions or as to their duration. The figures on some at least of these stones the Doctor regarded as *totems* or insignia of rank.

"Recently, at my request, Mr. Ryerson visited the old stores where the moose stone had been left, but we could find no trace of it. His clerk remembered seeing it at his office about a dozen years ago, but could not tell what had become of it."

A paper was read by M. Murphy, D. Sc., Provincial Engineer, President of the Institute, entitled : Supplementary notes on the destroyers of submerged wood in Nova Scotia. (See Transactions, p. 215.)

ORDINARY MEETING, Province Building, Halifax, 8th February, 1892.

The PRESIDENT *in the chair.*

Inter alia.

A paper by Mr. W. H. Prest, entitled :—Evidence of the Post-glacial Extension of the Southern coast of Nova Scotia, was read by the Secretary. (See Transactions, p. 143.)

ORDINARY MEETING, Provincial Museum, Halifax, 14th March, 1892.

The PRESIDENT *in the chair.*

Inter alia.

A paper entitled :—Nova Scotia Gold Districts, their Geological Formation, as proved by Borings in the Killag Gold District, by H. Squarebrigs McKay, was read by the Corresponding Secretary. The following are extracts from this paper :—

"My first visit to the district was spent in making a preliminary survey, noting the very large number of excavations made, some almost obliterated by time, while others showed, plainly, the diligent work of the prospector, without any particular method in his work. These excavations are mostly round pits, sunk in some instances to bed-rock, but in most cases not. The whole ninety-six mining areas are literally honey-combed with these excavations.

"In about the centre of the property, and covering an area of about thirty acres, is a depression in the formation where in some past age, there has been a lake, but which is now filled with sediment from the washings of the surrounding hills, till it is now a basin of quick-sand and mud, in places twenty-five feet deep, to bed-rock.

"This quick-sand prevented the prospector from carrying on his burrowing here, but it is surrounded to the very edge, with these excavations. In the centre of this sediment-filled lake, I found the mine which we had bought. It was filled with water.

"I found, by inquiry, that the top of the rock formation in the mine, was very much broken, but further down it was solid. This being the fact, it was perfectly clear what was best to do. I saw it was not necessary to drain the swamp, and that it was very necessary to see the mine in the shortest possible time, and for the smallest possible expense. From all the evidence I could procure, I was convinced that the geological formation of the district was not at all understood ; that I would, in all probability, make a total failure if I followed the advice of other people and did not make my own investigation, because from the investiga-

tions up to that time made, it was not possible for any one to know anything definite about the mine.

"Knowing all these facts, I commenced the investigation by building a coffer dam around the top of the shaft to keep out the water. This was done by building a frame-work round the shaft on the solid rock, 15 feet down on the inside, calking round this framework and between it and the rock, then sealing up the entire shaft from the frame-work to above high water mark, with grooved and tongued plank, leaving a space back of the plank, and between the plank and the rock, of about 8 inches, which was filled with Portland cement, after first calking all the cracks that could be found in the planking. When this cement hardened, —which it did in half an hour after being poured in, the seams in the rock and plank were perfectly filled with the cement; making it impossible for water to get through the plank and rock to the shaft, thus preventing any further trouble from surface water, all at a cost of one hundred and seventeen dollars and seven days' time.

"With this solution of the water problem, I was able at once to pump out the mine and set miners to work in the shaft and stopes, to expose the lode four feet in height and seventy feet in length. While this was being made ready I milled the ore that I found already mined and it yielded an average of 26 dwts. per ton. When the lode was exposed the entire length of the tunnel, four feet high, I commenced at the westerly end and crushed the ore as it was taken down, and I did not see one sight of gold in the quartz from the shaft, or the first thirty-six feet of the westerly end of the tunnel, it giving, in the mill test, but 1-2 dwt. to the ton; but at a point thirty-six feet east of the westerly side of the shaft along the stopes, the quartz showed good sights of gold, and from there to the end of the stopes, gave an average of 36 dwts. per ton. I carefully marked this line between the good ore and the poor, and repeated the test in the same manner farther down in the mine, finding this time 65 feet of the west end of the tunnel giving but 1 dwt. per ton, while the remaining 10 feet of the tunnel gave 26 dwts. per ton. This proved to my mind that the ore in the shaft and the westerly end of the tunnel was practically worthless, but at the extreme east of the mine was evidently good ore, and from this evidence it appeared that the mine was opened too far west to find the best ore. It was also evident that there was a 'pay chimney' and that it had a dip east, there being a large body of ore east and running out to a point about 20 feet west of the shaft. This line of dip I was able to obtain exactly by drawing a line from the point marked in the first test, between the good and poor ore, to the point marked on the last test, between the good and poor ore. This gave the 'pay chimney' dipping east at an angle of 40 degrees in the lode.

"A tunnel has now been driven 300 feet east on the lode in this 'pay-chimney' and from this tunnel has been taken, in all, 428 tons of quartz, which has yielded 493 ounces of gold or an average of 23 dwts. per ton, and the ore is as good in the extreme end of the tunnel, 300 feet east of the point of beginning as it was at the start. This 'pay chimney' is well defined and is dipping east, as above stated, at an angle of 40 degrees, containing ore worth 23 dwts. in gold per ton, while ore outside of it, west, contains but 1 dwt. per ton. This investigation proves the mine to have been open at least 400 feet west of the centre of the pay ore; and to have gone down with the shaft as originally opened, would have

proved a perfect failure. By opening the mine 400 feet east from where it was originally opened, and on what I now know to be 23 dwts. ore, it cannot but be a great success.

"While testing this lode, I have at the same time been making a careful survey of the entire district with a view of finding out the extent of the ore body in this district, with the exact geological formation of the rock.

"Former unsystematical prospecting, had been carried on in the drift, and sufficient return had been obtained to pay expenses of working for ten years in this way without one lode carrying gold being found. By further carefully surveying the facts, it is very evident some places are richer in gold from this drift, than others, and the richest of this comes within an area 500 feet north and south by 1,000 feet in length east and west, richer in the centre and grading off toward the ends ; and the whole area is 600 feet south of what I suppose to be the anticlinal of the formation. Also the description of the drift found, does not agree with that from the lode now worked, and this would evidently prove that there were richer lodes there than have yet been worked, and that with the proper systematic search, they could be found.

"Knowing where this rich drift had been found, it was clear that it came from the north, as the glacial throw of Nova Scotia is well known to be from north to south. The next thing necessary was to find the apex of the anticlinal, which, hitherto, has been unknown in the district. It is clear the glacial action has caused this drift to be carried south from the lodes in the folds of the strata forming the apex of the anticlinal. This is proved by my investigation, as will be seen by referring to my map. [The paper was illustrated by a detailed geological map of the district.]

"From surface indications and the rock formation, I was able to tell about where the centre of the fold of the anticlinal was. I had the surface soil removed from where it seemed to be, uncovering a space twenty-five feet long by twelve feet wide. This proved to uncover the rock exactly on the apex of the fold of the anticlinal with the lodes on the north side dipping north at an angle of 40 degrees, while those on the south were perpendicular and turning round on the east end, with a flap dip east. This proved the location of the anticlinal and the point of greatest erosion, and where there ought to be, from the evidence of twenty years' prospecting and the geological facts of the district, a great many quartz lodes. I then bored north and south with a diamond drill and found the number of lodes to be 52 in number, varying from one inch to three feet in width.

"The table on the following page gives their width and material with results of tests when made.

TABLE OF LEADS AND BELTS.

Lead.	Description.	Width.	Width and Material of Belts.
1	Not tested.....	2 in..	From 1 to 2 is 6 ft.—slate.
2	"	½ " ..	" 2 " 3 " 2 " "
3	"	½ " ..	" 3 " A " 11 " "
A	Good base metals.....	9 " ..	" A " 4 " 17 " —quartzite.
4	Not tested.....	½ " ..	" 4 " 5 " 4 " "
5	"	7 " ..	" 5 " 6 " 2 " —slate.
6	"	10 " ..	" 6 " 7 " 8 "quartzite & slate.
7	"	9 " ..	" 7 " 8 " 5½ " "
8	"	2 " ..	" 8 " 9 " 4½ " —quartzite.
9	"	3 " ..	" 9 " 10 " 1⅓ " —slate.
10	"	4 " ..	" 10 " D " 4 in. - quartzite.
D	About 18 dwts. per ton.	18 " ..	" D " 11 " 17½ ft. —slate.
11	Open fissure	12 " ..	" 11 " 12 " 10 " —quartzite.
12	Not tested.....	4 " ..	" 12 " 13 " 12¾ " "
13	"	2 " ..	" 13 " 14 " 5¼ " "
14	Open fissure	14 " ..	" 14 " 15 " 8 " "
15	Not tested.....	2 " ..	" 15 " 16 " 4 " "
16	1½ oz. per ton	4 " ..	" 16 " S " 17 " —slate.
S	1 oz. per ton.....	14 " ..	" S " 17 " 8 " "
17	Not tested.....	3 " ..	" 17 " 18 " 40 " —tunnel.
18	"	5 " ..	" 18 " 19 " 7 " —slate.
19	"	3 " ..	" 19 " 20 " 4½ " "
20	"	4 " ..	" 20 " 21 " 4¼ " "
21	"	6 " ..	" 21 " 22 " 4 " "
22	"	1 " ..	" 22 " 23 " 5 " "
23	"	½ " ..	" 23 " 24 " 1 " "
24	"	5 " ..	" 24 " 25 " 17 " "
25	"	½ " ..	

"The kind of rock with its width between the quartz lodes, will be of the greatest importance to us in our future work, as we will be able to estimate very closely, what the cost will be to cross-cut from one lode to another. And another important matter, is to be sure what will be reached by going in any given direction. It is uot known how many lodes are outside of those given above, as that is the extent of the borings. I thought these enough to keep a mine running for a great many years, so did not go to the expense of boring further. Another important thing, in connection with the geological examinations, is the fact that in boring south, across the lode we were working, to see if it continued on, straight east, it was found it had shifted south 21 feet at a point three hundred feet east of the old Stuart shaft. This indicated a fault in the whole formation of the country, so I changed the diamond drill and bored at an angle of 90 degrees with the south boring and parallel with the lode, and strata, and discovered a quartz lode three feet wide, about 52 feet from the point of beginning. The strata were found to have been very much broken in the vicinity of this fault, showing the

tremendous strain that had been brought to bear, to fault the entire formation, and shatter the rock on either side of it. The core from the diamond drill showed all the base metals to be present in this cross lode, and every indication of its being a finely mineralized lode and one that can be expected to be a large producer of the precious metal. This cross lode is lying on a very flat dip east. About all the 52 lodes found, showed good base metal in the drill core, but as the core was only $\frac{7}{8}$ of an inch in diameter, there was not much chance of striking gold.

A paper entitled :—Notes on Nova Scotia Zoology, Part II, was read by Mr. Harry Piers. (See Transactions, p. 175.)

ORDINARY MEETING, Provincial Museum, 11th April, 1892.

The PRESIDENT *in the chair.*

Inter alia.

A paper entitled :—On the Graphic treatment of the Inertia of the Connecting Rod, was read by Prof. J. G. MacGregor. (See Transactions, p. 193.)

A paper entitled :—On the Nidification of the Winter Wren in Nova Scotia, was read by Mr. H. Piers. (See Transactions, p. 203.)

A paper by Henry M. Ami, M. A., entitled :—A Catalogue of Silurian Fossils of Arisaig, N. S,, was read by the Corresponding Secretary. (See Transactions, p. 185.)

A paper by Rev. A. C. Waghorne, entitled :—The Flora of Newfoundland, St. Pierre and Miquelon, was read by the Corresponding Secretary.

The Recording Secretary read a letter from Rev. M. Maury, D. D., of Waltham, Mass., Corresponding Member of the Institute, containing a suggestion as to the cause of the differences of colour in Granite rocks, as follows :—

"Visiting a pottery in the town of Keene, N.H., I was told of an establishment in which granite is *moulded* and made into tiles, building stones, ornamental pieces, &c., &c. The *moulding* of granite appearing to involve an incongruity, I wended my way toward the 'Keene Granite Terra Cotta and Tile Works' where I saw the mystery satisfactorily solved.

"An objection to granite as a building stone is the fact that it will not stand heat. Subjected to heat it loses its tenacity and becomes brittle. Of this property advantage is taken in the manufacture of moulded granite. Ten tons of the crude stone are placed at once in a kiln and heated with a wood fire—the process being altogether similar to the burning of lime. When taken from the kiln the granite will crumble. It is easily reduced to the condition of sand. The next features of the process are identical with those of the manufacture of tiles. The sand-like granite is intimately mixed in water with clay, pulverized felspar and silica, forming what the tilemaker knows as 'paste,' which closely resembles in

appearance a grey-colored mud. In this condition it can of course be passed into moulds, subjected to pressure and forced to assume the shape of any design. The moulds like those employed in the making of pottery are of plaster of Paris.

"At this stage in the process the scientific interest properly begins. If a portion of the moulded mixture is allowed to dry it is as brittle as a cake of oatmeal. Placed, however, in a kiln it becomes not only as hard as natural granite but a great deal more tenacious. It is difficult to break it with a hammer. If the mass be as thick as an ordinary brick it will resist many heavy blows. The pressure which it will sustain is enormous. In addition to this it is stated that the application of water to the baked granite when hot will not cause it to crack. The chief owner of the works told me he had had one tile heated to redness on 14 successive days and placed while red hot in water. It was not cracked by any or all of these tests.

"But the process of making artificial granite does not simply illustrate the power of heat as a rock-making agency. It does this admirably. But there is another point of even greater interest, because I do not think it has ever before been suggested, though here I may of course be in error. What makes the difference between red granite and grey? The 'charges' drawn from the kilns of the Keene Artificial Granite Works answer this question. A difficulty not uncommon in the 'firing' of pottery and tiles has very naturally been encountered in the granite making process. It is not easy to secure uniformity of temperature in every part of the kiln. Hence arises lack of uniformity in the color of the bricks and blocks of artificial granite. The majority are, as they should be, grey, precisely resembling the natural granite, and to be distinguished from the natural stone only by close inspection; but some are pink and some are red. These colors are produced where the heat of the kiln has been most intense. I should like to offer to the Nova Scotian Institute for their consideration and discussion the suggestion based upon this fact—that the color of pink and red granites is to be referred to the greater intensity of heat to which in the unequally heated kilns of nature, they have been subjected—in other words that they are superheated grey granites."

ORDINARY MEETING, Province Building, 9th May, 1892.

The PRESIDENT *in the Chair.*

Inter alia.

A paper by Mr. A. Cameron, Principal of Yarmouth Academy, entitled :—On the visibility of Venus to the naked eye, was read by Prof. J. G. MacGregor. (See Transactions, p. 148.)

A paper entitled :—The Geology of Cape Breton :--the Lower Silurian, was read bv E. Gilpin, Jr., A. M., F. G. S. (See Transactions, p. 167.)

ALEXANDER MCKAY,
Recording Secretary.