

PROCEEDINGS
OF THE
Nova Scotian Institute of Science.

SESSION OF 1903-1904.

ANNUAL BUSINESS MEETING.

Legislative Council Chamber, Halifax, 16th November, 1903.

THE PRESIDENT, DR. HENRY S. POOLE, in the chair.

PRESIDENTIAL ADDRESS: (1) PROGRESS OF THE INSTITUTE, (2) THE
APPLICATION OF SCIENCE TO MINING.

By HENRY S. POOLE, D. SC., Assoc. Roy. Sc. Mines, F. G. S.,
F. R. S. C, Hon. M. I. M. E., &c.

Members of the Institute of Science: Gentlemen,—A year ago, when I was able to look back on a membership of thirty years, you honored me by election to the chair of this Institute. Now, as your President, it becomes a duty to submit a report of our proceedings during the past year, and to bid you welcome to-night to this, the opening meeting of another session.

The reports of the various departments, which will be presented to you by our indefatigable secretary, and our painstaking treasurer will show our standing as a society, and the gains and losses we have sustained in membership. Of the former we are hopeful of usefulness to come, but of the latter we are in no uncertain doubt, as the Institute has suffered the loss of two important members, Mr. W. C. Silver, full of years and honors, and Mr. A. Cameron, in the prime of life.

Mr. William Chamberlain Silver, who was born here of English parents in 1814, was for over half a century a well-known figure at

public meetings on various subjects, where his fine presence and pleasing address always commanded attention. Almost from the inception of this Institute, he took an active interest in its welfare, and until the day of his death continued to fill the important office of Treasurer.

In the loss of Mr. A. Cameron, the Institute is deprived of a contributor of exceptional ability on astronomical subjects, and provincial education, an acknowledged leader of the sort his country, Scotland; is so proud, and which has so often made a mark in the outer world.

THE INSTITUTE'S WORK.

During the late session, in addition to papers of the usual class that are read before us, we had meetings where the subject matter was, to a large extent, popularized by illustrations, models and diagrams that appealed to the eye.

Major English, R. G. A., who ranks among those of the service who have made a special study of guns and gunnery, explained very clearly, by blackboard and model, the advances in this direction that have of late made such strides. At the same time he showed how several branches of pure science, mathematics, chemistry, and metallurgy have been applied to practical account, and with a precision of result that is surprising to a civilian. Interest in his subject was excited at the time by press criticisms on the relative merits of the guns employed during the late Boer War.

Dr. A. H. MacKay, our President for many years, by ready free-hand drawing on the blackboard, and by specimens, described typical members of our native Fungi, while reading a paper on the subject from Mr. R. R. Gates, of Mt. Allison University, a promising student of this class of plants. He, at the same time, presented a summary of the species already identified as Nova Scotian. He also submitted a series of Phenological Observations conducted in 1902, in continuation of those of several previous years. The full series, now covering many years, should shortly enable deductions to be drawn of local variations of climate that will prove of much value.

Dr. Woodman, Professor of Geology at Dalhousie College, and who has lately brought among us the advanced views of Harvard University, entertained us and our friends by exhibiting slides of geological structure in the Rocky Mountains.

Mr. P. R. Colpitt, the City Electrician, happily explained Wireless Telegraphy, a subject of bewilderment to those whose daily observation led them to suppose a net-work of telegraph and telephone wires was essential to the control of electrical impulses conveying definite signals; and in this subject local interest has been excited by the selection of Glace Bay, Cape Breton, as the station for transatlantic communication. The great trouble to which Mr. Colpitt went to illustrate his subject, and his success, were fully appreciated by his audience.

Professor E. E. Prince, Commissioner of Fisheries, Ottawa, explained the colors of animals, their nature and meaning, by the aid of numerous lantern slides, which excited general admiration. The apparatus used to show the slides of Professor Prince and Dr. Woodman was generously supplied and operated by Mr. Jenney. Professor Prince also presented a paper on the Swim Bladder of Fishes, which he described as a degenerate gland.

Geological subjects furnished the text of several papers: The Meso-Carboniferous Age of the Union and Riversdale Formations of Nova Scotia, and their equivalents the Mispec and Lancaster Formations of New Brunswick, by Dr. Ami, of Ottawa; a note on *Dicthyonema Websteri*, was read by Mr. Poole, of Halifax, who also submitted comments on the question,—Is there coal under Prince Edward Island? as a companion paper to the official report on the allied subject by Dr. Ells, of Ottawa, an officer of the Geological Survey of Canada. The Geology of Moose River Gold District, N. S., was explained by Dr. Woodman; and Dr. Gilpin, the Government Inspector of Mines, gave analyses and sections of Nova Scotia coals, and also presented a paper on the Mira Grant. Mr. C. B. Robinson, of Pictou Academy, described a Lichen-mimicing Caterpillar, and also noted the Distribution of *Fucus serratus* in Nova Scotia.

The Kings County Branch of this Institute, under the direction of Professor E. Haycock, of Acadia College, discussed a number of subjects as mentioned in its report on p. xxv.

APPLICATION OF SCIENCE TO MINING.

Having been a worker among the mineral products of the province, it is natural for me to turn in that direction for matter on which to address you to-day. All of us have been constantly reminded during

the past three years of the keen and wide-spread interest taken in our chief mineral export—coal, and our principal mineral import—iron ore. The disturbing influence which accompanied the rapid development of iron and steel plants, and the re-equipment of old, and the establishment of new collieries, affected all classes, and largely those which had grown up since the local gold fever was epidemic in the late sixties. The influence of general prosperity stimulated search for mineral wealth in every direction, including the improbable and impossible, regardless of the pessimistic records acquired in the interest of science, without monetary stimulus. The onlooking student can learn much of human nature by observing the ready acceptance of alluring promises made by designing or untrained promoters, while the cautious utterances of the experienced are waved aside. The unit in the army of searchers, that the law of averages makes successful, is individualized and quoted as an authority by the rest, pitted as it were against individuals from the ranks of science, whom the same law would allow to blunder, or be unfortunate, without detriment to the correctness of a general truth.

And yet, of late, public confidence has been shown to a surprising degree, in some general deductions of a scientific nature, when it was assumed their successful application might result in financial success. The investigations of Mr. H. Fletcher of the Geological Survey in Cumberland and Colchester Counties, have made it possible that the views hitherto held on the structure of that region might be erroneous, and they have justified a letter I wrote to a member of parliament in 1894, urging a re-survey of that ground; and when this change of view, the result of Mr. Fletcher's explorations was realized, a boom was created, and application for mineral rights over the entire area brought in large sums to the provincial coffers, the supposition now being held that extensions of the thick seams of Springhill may possibly occupy in depth the basins east and west of that elevation and to the northward of the Cobequid Hills. To prove this theory, bore-holes to considerable depths and systematically placed, alone can determine the correctness of the hopes indulged in.

Mr. Fletcher's examination goes to show that the upper members of the series continue to the Cobequid Hills, without a reappearance at the surface of the underlying Millstone Grit as was assumed on the

map of 1884. The rush for areas did not stop in Cumberland County, but passed into Colchester and Pictou, and along the shore of Minas Basin, where small coal seams have been discovered for half a century or more. To some of these localities no countenance has been given by the survey, but encouragement by the prospector is taken on the ground that the first Pictou Coal Field map was at fault east of the Drummond Mine, and cut the coal field off too soon. This, it may be explained, arose from credit for accuracy being given to maps of early explorations made on behalf of the Drummond Mine, which late mining operations have failed to confirm. Speculation once awakened on these lines, hope, eternal hope, has underlaid the greater part of the Permian series in the latter counties with concealed coal wealth, and this view has been given official sanction in the catalogue of the minerals at the late Provincial Exhibition. It will, however, be well to remember, that that the Permian is known to rest in places directly on Millstone Grit rocks, and that further study of the sub-Permian structure and faulting is advisable before extensive explorations by bore-holes are conducted. Ideas of what this structure may be in parts, have been suggested by the work already done in the field, but any reference would be altogether premature at the present time, and before full counsel has been taken with men who have made a special study of great continental movements.

In the mining of gold, a marked degree of confidence has of late grown round certain theoretical deductions. It may even be said that the conclusions reached by Mr. E. R. Faribault, working in our gold districts on behalf of the Geological Survey, have been accepted by the rank and file of the miners as proven.

It was not very long after the public recognition, in 1860, of the presence of gold in paying quantities, that Mr. John Campbell, a local geologist, noted a regularity in the foldings of the strata, and that many of the leads, which on account of their richness had attracted the gold seekers, centred about anticlinal folds. Professor H. Y. Hind, about 1872, on behalf of the provincial government, extended these ideas, but the ordinary prospector, for a time, preferred to let chance govern his movements, and let those who chose to theorize come after him. In early days the theorist had no following, and if he failed to make a strike it was his fault and not his misfortune,

while if one of the great army of prospectors was singled out by the law of averages, or was smiled on by the fickle goddess Chance, the fortunate one so selected, became in the eyes of his fellows an expert.

Then it was, too, when the foreign miner criticised the skill of the native ; while lavishly praising the richness of the district, singular to say, he forgot to take advantage of his opportunity, apply his vaunted knowledge, and make a fortune for himself.

Summing up the experience of the first twenty years of mining in the province, in general language it may be said that each paying lead had yielded but one pay-streak, and when that was extracted, further search had failed to disclose others in the same lead. The work of collecting data relating to the structure of the gold field, and the mode of occurrence of the mineral contents, dropped by the local Department of Mines, was taken up by the Geological Survey under direction from Ottawa, and now what patient investigation has revealed is that leads other than those seen at the surface may confidently be expected to be within reach of shafts sunk on the anticlines, where the saddles of quartz will have their greatest thickness ; and secondly that pay-streaks will be found to have a well-defined relation to one another and to the axis of the anticline, together defining for each gold district a zone of special enrichment. Evidence on both these points has been given in the papers published with illustrations in the transactions of the Mining Society of Nova Scotia, and which explain the maps and sections issued by the Geological Survey in the meantime, and until the final report on the gold fields has been prepared.

Mr. Faribault having surveyed the field, noted the folds and their faulting, and the relation of the pay streaks, with the result that he found a structure after the manner of that at Bendigo, but on a larger scale : a series of saddles of quartz, sitting on the axis of the anticline, one over the other, in the spaces formed between the folded strata. Parallel with the axes, he claims there are inclined zones of enrichment, which passing from lead to lead in their courses, leave in each a pay-streak of definite extent. If these conclusions are generally confirmed in practice, the gold mining industry would be placed on a more secure footing, much of its late restricted aspect removed, and great inducement given to companies of sufficient capital to operate under judicious management.

In the field of metallurgy a question has arisen, which, so far, has not been satisfactorily answered. It has been found that of the gold associated with the antimony ores of West Gore, one-half of the assay value goes with the quartz tailings, which can be treated for the gold in one or the other usual ways. The other half of the gold values remains with the antimony concentrates, and the question is how to separate the two metals and obtain a high return for both.

Papers on the composition of many provincial minerals are given in various publications, accurate enough, doubtless, in themselves, but, where of commercial value, often lacking in some of the details which are essential to a full appreciation of the analyses. For instance, one may find specimens of chalcopyrite labelled as containing 30 per cent. of copper, a percentage that tells the mineralogist it is merely an assay of the richest portions picked out, and cannot be of an average sample of a deposit, as the uninitiated may be led to believe.

Again, in coal, in some of these analyses the percentages of ash and sulphur shown do not agree with the practical results obtained by the user and coke maker. They are too low, and this being well known the chief purpose they serve is to bring discredit on any carefully made reports with which they may be associated. Distrust once aroused it is difficult to get confidence restored, and the only remedy seems to be in accurately stating the associated circumstances, whether the result is obtained from a hand-picked specimen or from a specified quantity of ore properly sampled down ; or if of a coal seam, then of a strip taken from top to bottom.

Men of experience are hence apt to ignore all analyses of the class referred to, not endorsed with the name of the analyst, and to insist on independent investigation ; while there are others less experienced, who deceive themselves, and being of a sanguine temperament, mislead others. No good purpose is served by this, and the country at large is not benefitted. The Mining Society has had this matter under consideration, and has advocated the appointment of a provincial assayer, who, by the way, might well be also government instructor in the schools of higher mining, which, it is felt, are much needed in this province, to be associated in the work so well begun by Dalhousie University.

The Treasurer's report was presented, and having been audited and found correct, was received and adopted. The following is an analytical statement of the expenditure for 1902-1903 :

PUBLICATION OF TRANSACTIONS :—

Vol. X , Part 3, (1900-1901) :

Printing.....	\$ 247 60
Engraving (Jones portrait)	6 00
Wrappers	3 00

Vol. X., Part 4, (1901-1902) :

Printing.....	274 44
Engraving (Downs portrait).....	3 75
Wrappers	3 00

 \$537 79

DISTRIBUTION OF TRANSACTIONS :—

Vol. X., Part 3 :

Freight	\$ 1 38
Insurance.....	1 00
Postage	10 25

Vol. X., Part 4 :

Addressing and supervising distribution	15 00
Packing boxes	4 50
Insurance	1 00

 33 13

MEETINGS :—

Advertising annual meeting	\$10 00
Post cards and printing	36 25
Chairs	16 50
Electrical work and carpentry	7 68
Truckage	4 25

 74 68

Expressage on books received	1 20
Grant to Secretary	50 00
Postage (Secretary)	98
Telegrams	2 11
Typewriting report to Royal Society.....	75
Letter heads.....	2 25
Receipt book	2 50
File.....	1 20
Photograph of R. Morrow.....	1 50
Painting blackboard.....	2 50

 64 99

 \$710 59

The Librarian's report was presented and adopted.

A report was read from PRESIDENT ERNEST HAYCOCK, of the KINGS COUNTY BRANCH OF THE INSTITUTE, Wolfville, N. S., on the work done by the branch during its third session (1902-03). Meetings were held and papers read as follows :

10th February, 1903.

1. Review of previous year's work and suggestions for the future.—
By PRESIDENT HAYCOCK.
2. Election of officers :
President : PROFESSOR ERNEST HAYCOCK.
Vice-President : PROFESSOR E. W. SAWYER.
Secretary-Treasurer : PROFESSOR F. C. SEARS.
3. Principles of the Dynamo.—By PROFESSOR F. R. HALEY.

10th March, 1903.

4. Systems of Electric Lighting.—By D. R. MUNRO.
5. Dr. Alof Loring and his Specialty. —By A. DEW. BARSS,
M. D.
6. Retreat of the Coast of Minas Basin at Long Island, Kings Co.,
N. S.—By PROFESSOR E. HAYCOCK.

21st April, 1903.

7. Ice-borne Sediment in Minas Basin.—By J. A. BANCROFT. (See
Transactions, p. 158).
8. Teaching Material in Mineralogy recently added to the Acadia
College Collection.—By PROFESSOR E. HAYCOCK.
9. Life History of the Bud Moth.—By PROFESSOR F. C. SEARS.

The report was received and adopted.

It was resolved that the thanks of the Institute be conveyed to the HON. SIR ROBERT BOAK, for his courtesy in granting the Society the use of the Legislative Council Chamber as a place of meeting ; and to the SECRETARY OF THE SMITHSONIAN INSTITUTION for continuing to admit the Institute to the privileges of the Bureau of International Exchanges.

The following were elected officers for the ensuing year (1903-1904) :

President,—HENRY SKEFFINGTON POOLE, D. Sc., A. R. S. M., F. G. S.,
F. R. S. C, *ex officio* F. R. M. S.

Vice-Presidents.—F. W. W. DOANE, C. E., and PROFESSOR EBENEZER
MACKAY, PH. D.

Treasurer,—WILLIAM MCKERRON.

Corresponding Secretary,—A. H. MACKAY, LL. D., F. R. S. C.

Recording Secretary,—HARRY PIERS.

Librarian,—HARRY PIERS.

Councillors without Office,—MAYNARD BOWMAN, B. A.; WATSON L. BISHOP;
MARTIN MURPHY, C. E., D. Sc.; PROFESSOR STEPHEN M. DIXON,
B. A., B. A. I.; EDWIN GILPIN, JR., LL. D., F. R. S. C.; ALEX-
ANDER MCKAY; PROFESSOR J. E. WOODMAN, D. Sc.

Auditors,—RODERICK MCCOLL, C. E.; J. B. MCCARTHY, M. A., B. Sc.

FIRST ORDINARY MEETING.

Legislative Council Chamber, Halifax, 16th November, 1903.

THE PRESIDENT, DR. H. S. POOLE, in the chair.

It was announced that MAJOR-GENERAL CAMPBELL HARDY, R. A., of Dover, England, had been elected a corresponding member, and that D. BUDGE, General Superintendent of Halifax and Bermuda Cable Company, Halifax, had been elected an ordinary member.

VICE-PRESIDENT MACKAY took the chair while the PRESIDENT, DR. POOLE, read a paper "On the Age of the Conglomerate capping the Cambrian Rocks of Nova Scotia." (See Transactions, p. 236). The subject was discussed by DR. WOODMAN, DR. A. H. MACKAY, H. PIERS, T. V. HILL and W. H. PREST.

W. C. MILNER exhibited the manuscript of a geological map of Nova Scotia, which will be issued with the mining number of the "Nova Scotian."

SECOND ORDINARY MEETING.

Legislative Council Chamber, Halifax, 21st December, 1903.

THE PRESIDENT, DR. POOLE, in the chair.

It was announced that the following had been elected ordinary members: JAMES H. WINFIELD, Manager N. S. Telephone Company,

Halifax; GEORGE M. J. MACKAY, Dartmouth, N. S.; PROFESSOR DANIEL A. MURRAY, Dalhousie College, Halifax; PROFESSOR FREDERIC H. SEXTON, Dalhousie College, Halifax.

DR. A. H. MACKAY took the chair while the PRESIDENT read a paper by KENNETH MCINTOSH, C. E., St. George's Channel, N. S., "The Question of Subsidence at Louisbourg, C. B.," with introductory notes by the reader. (See Transactions, pp. 262 and 264). The paper was illustrated by a map of a recent survey of Louisbourg made by MR. MCINTOSH, and also by some old plans. The subject was discussed by DR. H. H. READ, DR. A. P. REID, H. PIERS, DR. WOODMAN and DR. MURPHY.

T. VARDY HILL read a paper on "The Creation and Development of the Inorganic Foundation of the Earth." The subject was discussed by DR. WOODMAN, and a vote of thanks was presented to MR. HILL.

THIRD ORDINARY MEETING.

Provincial Science Library, Halifax, 11th January, 1904.

DR. A. H. MACKAY in the chair.

On motion of H. PIERS and Dr. A. P. REID, it was resolved that the Nova Scotian Institute of Science learns with deep regret of the death of AUGUSTUS ALLISON, Dominion Meteorological Agent at Halifax. Mr. Allison was one of its oldest members, having been elected in February, 1869, was a former vice-president, and for a long period a member of the council. It was further resolved that the Secretary be instructed to send a copy of this resolution to the family of the deceased.

CAPTAIN J. H. BARBOUR, M. B., Royal Army Medical Corps, Halifax, read a paper on "Local Variations and other Notes on Blue-eyed Grass, (*Sisyrinchium angustifolium*)." (See Transactions, p. 190). The subject was discussed by the CHAIRMAN and others, and a vote of thanks was presented to DR. BARBOUR.

Owing to the unavoidable absence of the PRESIDENT, who was to have taken part in the discussion on the subject, DR. J. E. WOODMAN's paper on the "Origin of Peneplanes" was postponed, and he gave instead a lecture on "Drainage Development of Rivers." The subject was discussed by several of the members, and a vote of thanks was passed to the lecturer.

FOURTH ORDINARY MEETING.

Legislative Council Chamber, Halifax, 10th February, 1904.

The Institute met in conjunction with the CANADIAN FORESTRY ASSOCIATION, the chair being occupied by DR. A. H. MACKAY, Nova-Scotian Vice-President of the Forestry Association.

"Addresses on Forestry" were given by E. STEWART, Dominion Superintendent of Forestry, and R. H. CAMPBELL, Assistant Secretary of the Forestry Association, both of Ottawa. MR. STEWART'S lecture was illustrated by lantern views.

The subject was discussed by the CHAIRMAN, HON. J. W. LONGLEY, DR. M. MURPHY, and HON. WM. CHISHOLM, M. L. C.; and a vote of thanks was passed to MESSRS. STEWART and CAMPBELL.

 FIFTH ORDINARY MEETING.

Legislative Council Chamber, Halifax, 14th March, 1904.

The PRESIDENT, DR. POOLE, in the chair.

A paper by FRANK H. REID, on "Birds and the Selection of their Nests" was communicated by DR. A. P. REID. The subject was discussed by R. H. BROWN and W. L. BISHOP, and a vote of thanks was presented to the writer.

MR. PIERS read a paper by HENRY YOULE HIND, M. A., D. C. L., of Windsor, on "The Importance of a Knowledge of Rock Foldings to Miners." The paper was discussed by DR. WOODMAN and MR. PIERS; and a vote of thanks was passed to DR. HIND.

T. TRUMAN FULTON, B. A., read a paper on "The Faults of Battery Point, Sydney, C. B.", illustrated by a section of the strata under consideration. (See Transactions, p. 260). On motion, a vote of thanks was presented to MR. FULTON.

The following paper was then read, by title:—"The Structure and Succession at North Sydney, C. B.", by LORAN A. DEWOLFE, M. A., North Sydney; being communicated by DR. WOODMAN. (See Transactions, p. 289).

SIXTH ORDINARY MEETING.

Legislative Council Chamber, Halifax, 11th April, 1904.

THE PRESIDENT, DR. POOLE, in the chair.

ALEXANDER MCKAY took the chair while the PRESIDENT read a paper entitled "The Sunken Land of Bus (lat. 35° west, long. 53° north)." (See Transactions, p. 193). The subject was discussed by DR. WOODMAN, DR. A. P. REID, J. ADAMS, First Officer of Cable S. S. "Minia," and H. PIERS.

A paper by FRANCIS H. MASON, F. C. S., metallurgist, Halifax, entitled, "Notes on Hydraulic Lime and Cement," was read by the PRESIDENT. (See Transactions, p. 179). The subject was discussed by PROFESSOR F. H. SEXTON, J. W. MCKENZIE, PROFESSOR WOODMAN, the PRESIDENT, and H. PIERS.

The following papers were read by title:—

"Contributions to the Study of Solution of Hydroxylamine and its Salts," by W. H. ROSS, B. Sc. (See Transactions, p. 95).

"Structure of the Meguma (Gold-bearing) Series, with reference to the Theory of Cross-folds," by PROFESSOR J. E. WOODMAN, D. Sc., Dalhousie College.

"The Earthquake of March 21, 1904, in the Maritime Provinces," by PROFESSOR WOODMAN. (See Transactions, p. 227).

SEVENTH ORDINARY MEETING.

Legislative Council Chamber, Halifax, 9th May, 1904.

PROFESSOR STEPHEN M. DIXON in the chair.

DR. A. H. MACKAY read a paper entitled "Phenological Observations in Canada, 1903." (See Transactions, p. 271). The subject was discussed by DR. BARBOUR, R. A. M. C., who compared the time of flowering of plants in Nova Scotia and England.

A paper by PROFESSOR J. E. WOODMAN, D. Sc., Dalhousie College, entitled "Bibliography of the Meguma (Gold-bearing) Series of Nova Scotia," was read by title.

The council was authorized to receive, as read by title, such papers as may be presented too late for this meeting.

HARRY PIERS,
Recording Secretary.