

# PROCEEDINGS

OF THE

## Nova Scotian Institute of Science

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SESSION OF 1929-30  
(Vol. XVII, Part IV)

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68TH ANNUAL BUSINESS MEETING.  
*Dalhousie Medical Science Building, Halifax,*  
*9th October, 1929.*

The President, Dr. Douglas McIntosh, in the chair.

Other members present: Dr. E. G. Young, Prof. D. S. McIntosh, D. J. Matheson, Dr. H. R. Chipman, Dr. H. S. King, Prof. G. A. Burbidge, Dr. A. H. Leim, Dr. J. H. L. Johnstone, Dr. S. G. Ritchie, G. A. Sandoz, Dr. E. W. H. Cruickshank, Dr. R. Hamer and H. Piers.

The President delivered the opening address as follows:

In that admirable document, the Constitution of the Nova Scotian Institute of Science, under the heading "Duties of the Officers and Council," these lines are found:

"The President shall, if he sees fit, deliver at the annual business meeting of the Institute an address reviewing the progress of the Institute during the year; giving a short sketch of the life and scientific work of members deceased during the year, and treating such other topics as he may deem conducive to the welfare of the Institute and the promotion of its objects."

Each President, as far as I am aware, has seen fit to shoulder the implied obligation and, in a brief address, has commented on matters affecting the Society during his year of office. The privilege of integrating our losses and gains is one which I value too highly to forego.

For the first time in several years, we mourn the removal of members by death, for two, Dr. A. H. MacKay and W. Stewart Allen, have passed on.

Dr. MacKay, a past President of this Society (1899-1902), its most distinguished and almost our oldest member, filled a unique place in the community, and as Superintendent of Education, influenced in a direct way the lives of generations of Nova Scotians. Coming to the Education Office, after building up Pictou Academy to the position of the first school in Nova Scotia, as the appointee of a political party to which he did not belong, which, in Nova Scotia at least, marks his intellectual stature as nothing else could, he spent a long life in the service of education and science. Due to him, science occupies a place in the curriculum of our schools; while his original work in zoology and his activity as Instructor in Biology at Dalhousie made him known and honoured amongst the students of his own science. During his whole lifetime in Halifax he exerted himself in the furtherance of the aims of this Institute, and for many years acted as our editor, an office necessitating almost infinite patience and tact. His last active work had to do with our Transactions, and letters to members contributing papers were sent out but a few days before his death. The lines to Marmion are hardly out of place in expressing his relation to the work of this society: "He died a gallant knight, his sword in hand." A resolution, to be placed on our records, by one who enjoyed his friendship for many years, will be moved later in the evening.

W. Stewart Allen, a young biologist of promise, met a tragic death while on scientific work in the Gulf of Mexico. Those well acquainted with the deceased unite in praising his qualities of heart and mind. While the passing of a member who has exceeded the span of life allotted to us by the Psalmist is to be deplored, far sadder is the death of one just entering into scientific life, "who dies not knowing how the day has gone." Suitable action was taken by the Society in the case of the deaths of both these members.

The Transactions for 1927-28 were issued in good time, but those for the past year will be delayed,—indeed it may be

necessary to ask some of those who contributed papers during our last session for duplicate copies. Dr. King has been requested by the council to take the onerous post of editor, and Messrs. Johnstone, Young and Chipman to act with Dr. King as a committee of publication. All these gentlemen have agreed to serve, and I ask you to assist in making their difficult work as light as possible.

Our ordinary meetings were, I venture to think, remarkably successful, and the papers read were of a high order of merit; one indeed excited an interest far outside this Province. Sixteen papers were contributed, a number of pieces of new apparatus were shown and several new methods of work demonstrated. It is a little difficult to classify our papers, as many are in the borderland between two sciences, indeed some are in a circle circumscribed by several sciences. Roughly, seven might be catalogued as physical or chemical, four were on fish treatment, two on pharmacological subjects, two on bacteriology and one on botany. To our new members I may say that one aim of the Institute is to have in its Transactions a record of all original work done in Nova Scotia, and that this does not preclude publication in journals devoted to special branches of science.

I believe our society is to be congratulated on the high standard of its meetings, and that those who attended have benefitted both from the papers and the free discussions.

If new members be taken as the sole mark of progress the past year must be looked on as a banner year in our history, for no fewer than twenty-one associate and ordinary members have been placed on our rolls for the first time, and our corresponding, associate and ordinary members now number approximately one hundred and twenty. A fair proportion of these are from sister universities, and the suggestion has been made that we should, from time to time, hold meetings outside of Halifax. This matter will come up for consideration during the coming year.

The Science Exhibition brought our society into the public eye, and it may not be amiss to repeat a part of the report of the Exhibition Committee:

"Approximately twenty-five hundred persons attended at Studley, and thirty-five hundred at least at the Medical Science Building. The exhibition, under the patronage of the Lieutenant Governor of Nova Scotia, was supported by the governors, students and staff of Dalhousie, by the press, and by many manufacturers, such as Moirs, the Nova Scotia Light and Power Company, the Maritime Telegraph and Telephone Company, the Imperial Oil Company, Birks and Sons, Eatons, the Eastern Hosiery Company, the Canadian Carbonate Company, the Canadian Liquid Air Company, etc.

The total receipts from the sale of programmes were \$209.55; while the expenditures were \$235.40, leaving a deficit of \$26.35, which was paid out of the funds of the Institute. It should be emphasized that all material received from Dalhousie University was paid for, so that the only direct expense borne by the College was for the lighting. Programmes, invitations and gratuities made up almost two-thirds of the expenses."

There is a wide diversity of opinion amongst our members as to the value of these exhibitions. Many hold that the expenditure of time and energy far outweighs any benefit derived by this society or by science in general. While I do not accept this view, it must be admitted that the labour entailed is too great to undertake another exhibition without serious consideration.

During the past two years, three of our members, Dr. Young, chairman, and Professors Johnstone and King, have revised our exchange list, which had become somewhat obsolete. The thanks of the Institute are richly deserved by these three gentlemen who gave ungrudgingly so much time to this revision. The Science Library is benefitting and will benefit from their efforts.

A committee, consisting of Dean Burbidge and Dr. Johnstone, has discussed with the council a more satisfactory method of addressing our Transactions and the monthly notices

of our meetings. A decision on this important matter has not yet been made.

The Nova Scotian Government has continued the \$500 grant to the library, and it is becoming daily of more value to the general public. While the library is a government institution, it has benefitted in the past by the exchange of the Institute's Transactions for those of other learned societies. Mr. Piers, however, will report on its conditions, and give an account of the recent accessions.

In closing this superficial review of the year's activities, I wish to express my thanks to the members for the honour they have done me in electing me President, and to the council and members for their support in all our undertakings. Let us endeavour to make the meetings of this session as successful and enjoyable as those held during the past year.

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The Treasurer's report was presented by D. J. Matheson, showing that the receipts for the year were \$2,413.59; the expenditures, \$1,076.04; balance in hand (in current account), \$1,337.55; and the balance at credit of reserve fund, \$201.22; while the permanent endowment fund is \$1,500.00. The report was received and adopted.

The Librarian's report was presented by H. Piers, showing that 1,382 books and pamphlets had been received through the exchange-list during 1928; and 1,246 have been received during the nine months, January to September, 1929. The total number of books and pamphlets received by the entire Provincial Science Library (with which that of the Institute is incorporated) during 1928, was 1,692. The total number in the Science Library on the 31st of December, 1928, was 76,669. Of these, 57,798 (about 76 percent) belong to this Institute, 18,717 to the Science Library proper, and 154 to the Hugh Fletcher Memorial Library. 142 books were borrowed in 1928, besides those consulted in the Library. A grant of \$500 has been again placed by the Provincial Government to the Library's credit, and with this have been purchased a number of the latest books on pure and applied science and the trades, and some additional volumes of the Proceedings of the Royal

Society of London have been bound. The report was received and adopted.

The Corresponding Secretary's report was presented by Dr. H. R. Chipman. During 1928 circular letters had been sent by Prof. McIntosh, then corresponding secretary, to societies and institutions in order to revise our mailing-list, and considerable correspondence resulted. Over 200 back numbers of the Transactions had been sent out, and more than 200 invitation cards for the Science Exhibition had been mailed. The report was received and adopted.

Mr. Piers spoke feelingly and at some length regarding the lamented passing of Dr. A. H. MacKay, who had been a member of the Institute for fifty-four years and also its president. The speaker sketched that gentleman's eminent attainments as an educationist and biologist which had made his name known in both America and Europe. He also possessed fine qualities of heart which endeared him to his many friends.

The following resolution, moved by Mr. Piers and seconded by Dr. Hamer, was then passed unanimously.—

Resolved that the Nova Scotian Institute of Science, at its annual meeting held at Halifax, N. S., on the 9th of October, 1929, place on record its deep sense of the irreparable loss it has sustained through the death at Dartmouth, on the 19th May last, his eighty-first birthday, of its distinguished member and former president, Alexander Howard MacKay, B. Sc., LL.D., F.R.S.C., etc., late Superintendent of Education for the Province of Nova Scotia. He joined the Institute as an associate member on 11th. January, 1875; became an ordinary member on 21st October, 1885; was its president from Nov. 1899 to Nov. 1902; its corresponding secretary, 1902 to 1911; and editor of its Transactions from about 1908 till his death.

The many papers he published in the Institute's Transactions, as well as elsewhere, are learned and valuable contributions to our knowledge of various biological, but particularly botanical, subjects, and made him very widely known as one of the foremost scientific workers in Canada.

His notable career while principal of the Pictou Academy, 1873-89, and of the Halifax Academy, 1889-91, and finally as superintendent of education, 1891-1926, places him in a similarly high position among our educationists.

The Institute desires to express sincere sympathy with his family in their bereavement.

The recording secretary requested that past-presidents, who had not already done so, would send in photographs of themselves to be placed on file.

Dr. Hamer of Acadia University spoke of the good work done by the Institute and the general need of more research work throughout Canada.

Drs. Johnstone, Ritchie and Cruickshank were appointed a nominating committee and on their report the following were elected officers for the ensuing year, 1929-30:

*President*,—Prof. Douglas McIntosh, D.Sc., F.R.S.C., *ex-officio* F.R.M.S.

*First Vice-President*,—Prof. E. Gordon Young, Ph.D.

*Second Vice-President*,—Prof. Donald S. McIntosh, M.Sc.

*Treasurer*,—Donald J. Matheson, B.Sc.

*Corresponding Secretary*,—H. Ritchie Chipman, Ph.D.

*Recording Secretary and Librarian*,—Harry Piers.

*Councillors without Office*,—Prof. Harold S. King, Ph.D., Prof. J. N. Gowanlock, B.Sc.; Prof. George A. Burbidge; Prof. Alexander H. Leim, Ph.D.; Prof. George H. Henderson, Ph.D.; Donald J. Mackenzie, M.D., and Capt. W. F. Mitchell.

*Auditors*,—P. R. Colpitt and Prof. W. P. Copp, B.A., B.Sc., M.E.I.C.

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#### FIRST ORDINARY MEETING.

*Medical Science Building, Halifax.*

*13th November, 1929.*

The President, Dr. McIntosh, in the chair. Attendance 23.

It was announced that S. Bateson, H. M. Chisholm, S. A. Beatty, B.A., J. R. Sanborn, B.Sc., Ph.D., and J. H. Mennie, M.A., B.Sc., Ph.D., the three last of the Fisheries Experimental Station (Atlantic) had been elected ordinary members on the 4th of November.

The following papers were presented:—

(1) Investigations on the Protozoan Fish Parasites of the St. Andrew's Region.—By Marjorie F. Ellis, B.A. (See *Trans.*, p. 268).

(2) An Attempt to Demonstrate the Existence of Short Range Alpha Particles from Radium C.—By Prof. G. H. Henderson, Ph.D., and J. L. Nickerson, M.Sc. (See *Trans.*, p. 256).

(3) The Effect of Pituitary on the Bird.—By R. Morash, Department of Pharmacology, Dalhousie University, Halifax, N. S.

*Abstract.*—An investigation has been conducted with the object of throwing further light on the depressor action produced by pituitary on the blood pressure of birds. Experiments were firstly directed to ascertaining the peripheral changes wrought by the separated pituitary products which were generously supplied by Dr. Kamm of Messrs. Parke, Davis and Co. The results of this work show quite clearly that the alpha or oxytocic fraction is much more powerfully depressant than the beta or vasopressin. Furthermore that the beta fraction contains a pressor substance which in some cases may produce pure rise of pressure.

Pressure changes can be largely explained by alterations in the peripheral vessels, as shown by direct blood flow measurement, and confirmed by pletysmograph tracings.

A few experiments conducted on the exposed heart in situ gave no definite evidence of a direct effect. As these experiments are not complete they do not eliminate a direct cardiac action.

Owing to the similarity of the pressure reactions to choline and especially to acetyl choline, efforts were directed to ascertain if this substance be responsible. Atropine in large doses practically obliterates the choline reaction and has little effect on either pituitary substance. This eliminates choline, but as the same does not hold true for acetyl choline, a comparison of the effects of alpha and beta pituitary, choline, acetyl choline and histamine were made on the oviduct, and the isolated intestine.

The results of this work made it quite clear that the depressor compound present in both pituitary fractions is not acetyl, choline, or histamine. This conclusion is further supported by the fact that repeated doses of the alpha fraction lead to a temporary loss of reaction not produced by either of the cholines, or histamine.

The pressor reaction which can be obtained with beta pituitary and which is due to a peripheral vascular contraction, and associated with a marked blanching of the comb and wattles, is possibly homologous with the typical pressor reaction obtained in mammals. This is supported by the ready desensitization of the bird to this reaction.

This work was made possible by the award of a junior National Research Scholarship, and was conducted under the supervision of Professor O. S. Gibbs. Full details of this work will be published.

Demonstrations were given as follows:

- (1) The Latest Model of an Artificial Heart.—By Prof. O. S. Gibbs, M.B.
- (2) A Sensitive Test for Mercury.—(3) A New Reagent for Carbon Dioxide Determination.—By Prof. Douglas McIntosh, D.Sc.

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#### SECOND ORDINARY MEETING.

*Medical Science Building, Halifax.*

*9th December, 1929.*

The President, Dr. McIntosh, in the chair. Attendance 27.

It was announced that Warren J. Duchemin, B.A., J. Clement Young, B.A., and C. W. Startup, B.Sc., of Dalhousie



University, had been elected ordinary members on the 2nd of December.

The following papers were presented:—

(1) The Variation of Dielectric Constant with Frequency.

—By Prof. J. H. L. Johnstone, Ph.D. and John Warren Williams, Ph.D.

*Abstract.*—Measurements of dielectric constants were made of solutions of nitro-benzene and para-dichlorobenzene in mineral oil of high viscosity at three concentrations. A decrease in dielectric constant of nitrobenzene with increasing frequency is found. Para-dichlorobenzene shows no dispersion effect. An approximate value of the relaxation time for nitrobenzene is calculated from the Debye formula after corrections are made for molecular associations. The diameter of the nitrobenzene molecule calculated from it is of the right order of magnitude.

Published in full, *Phys. Rev.*, **34**, 1483-90(1929).

(2) The Source of the Ammonia Formed in the Autolysis of Fish Muscle.—By S. A. Beatty, B.A., Fisheries Experimental Station (Atlantic), Halifax, N. S.

*Abstract.*—Juice was pressed from fresh muscle, and the amide nitrogen and ammonia determined. The muscle plasma was then allowed to autolyse under toluol for periods of three to five days, when the amide nitrogen and ammonia were again determined. The rise in ammonia was found to equal the decrease in the amide nitrogen.

(3) A Study of the Nutritional Requirements of Canadian College Students.—By Prof. E. Gordon Young, Ph.D., Department of Biochemistry, Dalhousie University, Halifax, N. S.

*Abstract.*—From the analysis of the daily muscular activity of a group of one hundred and seventy-two Canadian medical male students the energy output has been determined to average 2592 Calories per day. The average weight was 155.5 lbs. and the average age was 22 years for this group.

From the analysis of the daily diet the average energy intake was 2808 Calories. The distribution between the groups of foodstuffs was 100 gms. protein, 116 gms. fat, 328 gms. carbohydrate; and in terms of percentage of the total calories consumed 14.6% from protein, 38.5% from fat, 47.3% from carbohydrate.

This diet is taken to be at an average level of protein intake for sedentary work compared with world standards. The fat consumption is very high. The surplus of energy of intake over output of 216 Calories represents 8.5% and is notably low.

The scarcity of Canadian dietary standards is emphasized.

To be published in the *Can. Med. Ass. J.*, **23**, 1930.

Prof. H. S. King, Ph.D., then gave demonstrations as follows: (1) An Analytical Test for Sodium; (2) Apparatus for Thermal Diffusion; (3) Some Rare Inorganic Elements and Compounds.

THIRD ORDINARY MEETING.  
*Medical Science Building, Halifax.*  
 13th January, 1930.

The President, Dr. McIntosh, in the chair. Attendance 14.

The following papers were presented.—

- (1) The Edema of Para-Phenylenediamine.—By Prof. O. S. Gibbs, M.B., Ch.B. (See Trans., p. 238).
- (2) The Preparation of Absolute Ethyl Alcohol.—By Prof. E. Gordon Young, Ph.D. (See Trans., p. 248).
- (3) Notes on the Specific Gravities of Liquid and Solid Sulphuric Acid.—By Prof. Douglas McIntosh, D.Sc. (See Trans., p. 259).

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FOURTH ORDINARY MEETING.  
*Medical Science Building, Halifax.*  
 12th February, 1930.

The President, Dr. McIntosh, in the chair. Attendance 28.

It was announced that A. S. McFarlane, B. S. A., Halifax, had been elected an ordinary member on the 3rd of February.

The President reported that the Proceedings and Transactions for 1928-29 (vol. 17, part 3) had come from the press.

The following papers were presented:—

- (1) The Acadian-Newfoundland Earthquake.—By Prof. D. S. McIntosh, M.Sc. (See Trans., p. 213).
- (2) The Acadian-Newfoundland Earthquake of November 18, 1929.—By Prof. J. H. L. Johnstone, Ph.D. (See Trans., p. 223).
- (3) Transient Electric and Magnetic Disturbances Accompanying the Seismic Waves of the Recent Newfoundland Earthquake.—By Prof. Richard Hamer, Ph.D., Acadia University, Wolfville, N. S.

*Abstract.*—Some evidence is presented that transient electric waves were associated with the Acadian-Newfoundland earthquake. The geophysical basis for such electrical tremors is discussed and a new method for locating the epicentre of an earthquake is indicated.

(4) Some Chemical Aspects of Marine Algae.—By Margaret R. Butler, B.A., Department of Biochemistry, Dalhousie University, Halifax, N. S.

*Abstract.*—Several species of algae common to the North Atlantic Coast have been analysed for their content of moisture, ash, potassium, iodine, protein and crude fibre.

Moisture determinations on nine species were found to average 80%, with a maximum of 91% and a minimum of 68%.

Ash determinations average 25% of the dry weight; maximum in *L. longicurvis* of 33.2%, minimum in *P. laciniata* of 15.7%.

Potassium determinations on six species gave an average content of 5.57% of the dry weight; maximum in *R. palmata* of 12.22%, minimum in *P. laciniata* of 2.69%.

Iodine has been determined in twelve species the average content of which is less than 0.1% of the dry weight. The maximum of 0.349% was found in *L. digitata*, a minimum of 0.0085% in *P. laciniata*.

Nitrogen determinations were made on six species, three of which were much higher than the others, and calculated as protein ( $N \times 6.25$ ) would average 22.6%.

Crude fibre determinations were made on six species and only one found to be above 5%; the majority are less than half of this amount.

To be published in *Plant Physiology*, 6, 1931.

#### FIFTH ORDINARY MEETING.

*Medical Science Building, Halifax.*

17th March, 1930.

The President, Dr. McIntosh, in the chair. Attendance 18.

Mr. Piers presented a list of books purchased in 1929 for the Provincial Science Library.

The following papers were presented:—

(1) Colloidal Uric Acid.—By Prof. E. Gordon Young, Ph.D., and F. F. Musgrave, B.A., Department of Biochemistry, Dalhousie University, Halifax, N. S.

*Abstract.*—A study has been made of the conditions under which uric acid will form a gel in aqueous solution. The influence of supersaturation, of temperature and of hydrogen ion concentration are all shown as important factors. The hydroxides of sodium, potassium and lithium form with uric acid more or less stable gels within limiting conditions. This power of gel formation is also possessed by numerous organic bases, especially the lower alkyl amines, guanidine, hydrazine, coniine, hydroxylamine and hexamethylene tetramine. Certain of these substances can also form sols with uric acid. The colloidal nature of the complex has been determined from diffusion experiments, molecular weight determinations and microscopic observation. From quantitative estimations of solution ratios, of elementary composition and from the electrometric titration of pure uric acid, a theory is advanced to explain the colloidal behavior of uric acid in aqueous solution. Its applicability to normal physiology is demonstrated.

To be published in *J. Biol. Chem.*

(2) A Note on the Biological Assay of Tincture Digitalis.—By G. A. Grant, M.Sc., and S. G. Alexander. (See Trans., p. 244).

(3) The Müller Conglobation Reaction in the Diagnosis of Syphilis.—By Zebud M. Flinn, Dalhousie Medical School, Halifax, N. S.

*Abstract.*—The preparation of the antigen used by Müller in his conglobation reaction is given in detail. There follows a description of the technic employed in this reaction. Comparative tables are given illustrating a series in which both the Müller conglobation test and the Kahn precipitation test were done on blood from both treated and untreated, syphilitic and non-syphilitic patients.

Published in full in *The Journal of Laboratory and Clinical Medicine*, 1930.

#### SIXTH ORDINARY MEETING.

*Medical Science Building, Halifax.*

14th April, 1930.

The President, Dr. McIntosh, in the chair. Attendance 29.

The President was appointed delegate to represent the Institute at the May meeting of the Royal Society of Canada.

The following demonstration and papers were presented:—

(1) Prof. O. S. Gibbs, M.B., Ch.B., showed motion pictures illustrating the attachment of his artificial heart to a cat, in place of the natural heart, and also illustrating the recording of the effects of the administration of certain drugs to the animal.

(2) On the Specific Heat of Tungsten, Molybdenum and Copper.—By H. L. Bronson, Ph.D., and H. M. Chisholm, Department of Physics, Dalhousie University, Halifax, N. S.

*Abstract.*—This investigation was undertaken in order to determine the specific heat of tungsten. This was needed for certain theoretical problems and the values obtained by previous investigators were very discordant.

A Richards adiabatic calorimeter was used for the heat measurements. The metal was heated in an electric furnace or cooled in solid carbon dioxide and dropped directly into the calorimeter, its initial temperature being measured by a thermocouple. The apparatus and method was identical with that used by Cooper and Langstroth (*Physical Review*, **33**, 243, 1929) except for the design of the furnace and the measurement of the high temperature. The final temperature was in all cases about 20°C.

The measurements on molybdenum were taken to check Cooper and Langstroth's work after it was discovered that there was a large temperature gradient in the furnace used by them, thus introducing considerable uncertainty in the value of their high temperature measurements.

The International Critical Tables indicate that the value for the specific heat of copper is better known than that of most substances and it was thought to be of interest to see how the values obtained by our method would check with that in the tables.

Six measurements on the specific heat of copper between 20° and 280°C. gave the following equation:— $C_p = .0917 + .000028 T$ . This is very close to  $C_p = .0914 + .000025 T$ , obtained from the Tables.

For molybdenum we obtained from 15 measurements

$$C_p = .0597 + .000025 T.$$

In the case of tungsten there were 35 measurements which gave

$$C_p = .01313 + .000009 T.$$

The average deviation of the individual measurements from the above curves was about  $\frac{1}{4}\%$ .

The values obtained for the average specific heats between 20°C. and the temperature of solid carbon dioxide were as follows: for copper .0886, for molybdenum .0569 and for tungsten .0508. These values indicate that in all three cases the slope of the specific heat curve is greater below 20°C. than at higher temperatures.

It is our intention to carry out further measurements at still higher temperatures and to use a new calorimeter so designed as to largely reduce certain heat losses and corrections which may introduce constant errors of possibly  $\frac{1}{4}\%$  in the above results.

### (3) The Determination of the Amount of Gases in Liquids.

—By Prof. Douglas McIntosh, D. Sc., Department of Chemistry, Dalhousie University, Halifax, N. S.

*Abstract.*—Dissolved gases not forming compounds with the solvent are liberated when the liquid is frozen, as there is no place for the gas molecules in the crystal lattice. The gas, if present only in small amounts, is determined by a McLeod gauge, if present in larger quantities, by removing with a Toepler pump and measuring. The liquids sealed in glass tubes are placed in a chamber from which the air is exhausted; they are then frozen at carbon dioxide temperature and the gases measured.

Water boiled until three-quarters is evaporated still contains traces of gas. The carbon dioxide is not completely removed from its solution by freezing and remelting three times, but is almost completely removed by a double distillation at a low temperature. When the method is further developed it may be useful for the analysis of liquids decomposed on boiling or heating.

(4) A Separatory Funnel for Washing Heavy, Volatile Liquids.—By Prof. Harold S. King, Ph.D. (See Trans., p. 240).

(5) Notes on the Preparation of Alkyl Iodides.—By Prof. Harold S. King, Ph.D. (See Trans., p. 242).

(6) The Possible Correlation between Sun-spot Cycle and Apple Production.—By Prof. Richard Hamer, Ph.D., Acadia University, Wolfville, N. S.

The draft of instructions or information to the writers of papers, to occupy one page of print, was read and approved.

SEVENTH ORDINARY MEETING.  
*Medical Science Building, Halifax.*  
 12th May, 1930.

The President, Dr. McIntosh, in the chair. Attendance 23.

On motion of Dr. Henderson and Mr. Piers it was unanimously resolved that the thanks of the Institute be presented to the President for the able manner in which he has occupied the chair during his two years' term of office. Much regret was expressed at his intended departure from Halifax in the coming summer.

The following papers were presented:—

(1) Unusual Fishes and Other Forms in Nova Scotian Waters.—By Prof. A. H. Leim, Ph.D., Fisheries Experimental Station (Atlantic), Halifax, N. S.

*Abstract.*—In the fall of 1928 the water along the Nova Scotia coast was unusually warm from surface to bottom. Correlated with this warm water was the appearance of several species of southern fishes which rarely come so far north. The species recorded for Halifax Harbour were:

Shark sucker, *Echeneis naucrates* L.

\*Filefish, *Monacanthus hispidus* L.

\*Surmullet, *Mullus auratus* Jordan & Gilbert

The Fishery Officer at Liverpool, N. S., sent in specimens from his district of:

\*Rudderfish, *Seriola dumerili* (Risso)

\*Hardtail, *Caranx crysos* Mitchill

\*Moonfish, *Vomer setapinnis* Mitchill

\*Bluefish, *Pomatomus saltatrix* L.

(\*) Identifications made or confirmed by Mr. W. C. Schroeder, Museum of Comparative Zoology, Cambridge, Mass.

(2) The Range of the Alpha Particles from Uranium II.—By Sydney Bateson, B.Sc., Department of Physics, Dalhousie University, Halifax, N. S.

*Abstract.*—By means of a scintillation method a preliminary value for the range of  $\alpha$  particles was determined. The method was discussed. This work is being continued.

(3) The Preparation of Anhydrous Pinacol.—By Prof. Harold S. King, Ph.D., and W. W. Stewart. (See Trans., p. 262).

HARRY PIERS,  
*Recording Secretary.*

OBITUARY NOTICE OF  
ALEXANDER HOWARD MACKAY, B.A., B.Sc., LL.D., F.R.S.C.  
EDUCATIONIST AND SCIENTIST  
1848-1929.

By HARRY PIERS.

Alexander Howard MacKay, one of Canada's foremost educationists and scientists, was born at Plainfield, Mount Dalhousie, a small village in a beautiful and fertile farming district of Pictou County, Nova Scotia, on 19th May, 1848, the year memorable as that in which responsible government was established in the province. He was the son of John MacKay, a sturdy native of rugged Sutherland, North Scotland, who came to this province in 1822, and his wife, Barbara (Maclean) MacKay.

He received his earlier education at old Pictou Academy, taught a rural school in 1865, and then attended the Provincial Normal School, Truro, from which he graduated in 1866. Then he entered Dalhousie College, Halifax, where in 1873 he graduated as a bachelor of arts with honours in mathematics and physics; and in 1880 he received the degree of bachelor of science with honours in biology, from the short-lived University of Halifax.

His career as an educationist virtually began in May, 1873, when he was appointed principal of the Annapolis County Academy, but in November of the same year he became principal of Pictou Academy in succession to Dr. Herbert A. Bayne, and there taught mathematics and science. Under his able and vigorous leadership the Academy revived, made phenomenal progress, and rapidly became celebrated throughout, and far beyond, the province. Pupils flocked there from all parts of the country, until there was not enough room for all, and a larger building had to be built in 1880. When the Munro

exhibitions and bursaries were established in that year, for students matriculating into Dalhousie University, Pictou Academy men began to win most of these prizes. He organized the Pictou Academy Scientific Association which inspired many a young man with an ardent love of nature. During his regime the Academy probably reached the pinnacle of its efficiency and fame. Among the teachers associated with him we find such now notable names as Hector McInnes, K. C., Hon. Mr. Justice Mellish, Dr. David Soloan, and others. Many who later also rose to prominence were pupils of the Academy at this period.

In the meantime MacKay was earnestly engaged in original scientific work, and his high attainments in this respect were recognized when in May, 1888, he was elected a Fellow of the Royal Society of Canada.

In 1889 after sixteen years of marked success, he resigned from the Pictou institution to assume the principalship of the Halifax County Academy in succession to that grand old schoolmaster, Dr. Gilpin, of revered memory. There he remained but two years, when he was wisely selected as the educationist who most deserved further promotion.

On 4th November, 1891, he was appointed superintendent of education for Nova Scotia, succeeding Dr. Allison, an appointment which was greeted with universal satisfaction and commendation. In addition to his onerous official duties, he lectured in biology in Dalhousie College and the Halifax Medical College from 1890 to 1895.

The well-earned honorary degree of doctor of laws was conferred upon him in 1892 by Dalhousie, and in 1905 he received the same honour from the University of St. Francis Xavier, Antigonish, N. S.

He was at the head of the department of education for nearly thirty-five years, or more than half the period our school system had been in existence. He finally retired from office on 31st July, 1926. Thereafter he devoted himself to study and research, while continuing to take his wonted keen interest in all intellectual work and every commendable cause in



Halifax. In Nov. 1928, a dinner in his honour was given by the Dalhousie Biology Club and a large number of his friends.

In May, 1929, while on his way to visit invalids at the hospital, he was caught in a drenching rain. This brought on a cold which developed into pneumonia. He passed away at his home, 163 Queen Street, Dartmouth, N. S., on his eighty-first birthday, 19th May. His last resting place is with his kin in the family lot at quiet Scotsburn, a few miles from his birthplace, and amidst the things of nature which he had loved so well.

In 1882 he had married Maude Augusta, only daughter of Dr. George Moir Johnstone of Pictou. Their children are a son, G. M. Johnstone MacKay, M.Sc., Schenectady, N. Y., and a daughter, Lois, wife of Dean Everett Fraser of the University of Minnesota, Minneapolis, U. S. A.

His activities were notably extensive and varied. He was a member or officer of many learned and other societies and clubs, and connected with the management of numerous institutions. With the Nova Scotian Institute of Science his association extended over the long period of fifty-four years; and he was an active worker and a most faithful attendant at all meetings, no matter what the weather, thus setting a good example to members far younger. He joined the society as an associate member on 11th Jan., 1875, and therefore was its senior active member; and became an ordinary member on 21st Oct., 1885. His first paper appeared in its *Transactions* in 1881. He was elected second vice-president in Oct., 1887, was corresponding secretary, 1890-92, and again in 1902-11, and president from Nov., 1899, to Nov., 1902. When not an official he served on the council. The *Proceedings and Transactions* were edited by him from about 1908 till his death.

Shortly before his death the Institute voted to present him with a suitably engraved piece of silver plate "as a token of deep respect and in recognition of his long and eminent service in the cause of science and education, and this was to have been given to him at a complimentary dinner on 11th May, 1929, but his last illness prevented the carrying out of this gathering in his honour.

He was also president of the Provincial Educational Association, 1874-76; in 1887 he organized the well-known Nova Scotian Summer School of Science, designed to prepare teachers for teaching the nature lessons in the prescribed course of study, and was its first president, 1887-88. He was also president of the Dominion Educational Association, and honorary vice-president of the World's Educational Congress, Chicago, 1892. He was a Fellow of the Geographical Association of the United States and a life member of the Royal Colonial Institute, a director of the Biological Board of Canada and the Nova Scotian member of the Geographic Board of Canada from its inception; president of the Victoria School of Art and Design, Halifax; president of the North British Society, Halifax, 1894; vice-president of the Nova Scotia Historical Society, 1896-1902; delegate to the Federal Conference of Education, London, Eng., 1907-12; vice-president of the Religious Education Association, 1908; member of the Simplified Spelling Board, 1909—"reformed spelling" being a subject in which he took much interest; president of the Botanical Club of Canada; president of the Canadian Club, Halifax, 1912-3; honorary president of the Canadian Defence League; a governor of Dalhousie University, a senator of the Halifax Presbyterian College, and a director of the Halifax Ladies' College.

He was a member of the executive of the Strathcona Trust for the encouragement of physical training and military drill in the schools of Canada, and was largely instrumental in introducing such training into the common and high schools of this province, in recognition of which he was made an honorary colonel in 1912.

Furthermore he associated himself with almost every other local organization for the advancement of intellectual and the betterment of moral and social conditions, and was present at most of the meetings. In fact I know of no one who gave his active support to so many worthy causes.

It is impossible to give here a list of his writings. The titles of thirty of his papers published before 1894, appear in the bibliography of the Royal Society of Canada, in its *Pro-*

*ceedings* for that year. He wrote extensively on educational subjects, and prepared the "Sketch of Education in Nova Scotia" for the Encyclopaedia of Canada, and articles for the British Special Educational Reports, and other publications. Besides these he prepared Annual Reports as superintendent of education.

His numerous scientific writings dating from 1881, were in the form of monographs, papers, or short articles. They are to be found in the old *Acadian Scientist* and its successor the *Canadian Science Monthly* of the eighties, the *Educational Review* ("Ferndale School", etc.), the *Canadian Record of Science*, Montreal, and the *Proceedings of the Royal Society of Canada*, although most of them appeared in our own *Transactions*. A large number of these are on botanical subjects, including the Diatomaceae and the ordinary Algae, while others are on freshwater sponges and on phenology, to the study of all of which he gave much time. Some are devoted to the popularization of nature study. He early began the formation of a herbarium of Nova Scotian plants, which was one of the seven collections upon which Dr. A. W. H. Lindsay in 1876 based his catalogue of our flora. This herbarium, I believe, was given by his family to Dalhousie University after his death.

As an editor he conducted the *Dalhousie Gazette*, 1870-3; was associated with A. J. Pineo in the editorship of the creditable *Acadian Scientist*, later the *Canadian Science Monthly*, Wolfville, 1883-5; and was Nova Scotian editor of the *Educational Review*, St. John, 1887-91, which journal he had assisted in founding in June of the first-mentioned year. Reference has been made to his editorial work for the N. S. Institute of Science.

As an educationist he gained a highly enviable reputation and has left a deep impress on our educational system. He was one of the ablest and most successful teachers we have ever had; and a large number of those whom he instructed and inspired, now occupy very distinguished positions in Canada and elsewhere. As superintendent of education he rapidly introduced many noteworthy improvements into our public

school system, a summary of which is given in his annual report for 1891-2, page xviii, and he also brought into increasing prominence the study of nature and the teaching of elementary science, subjects which he believed to be of more practical value now than such time-honoured ones as the so-called dead languages.

His administration is thus referred to in the first report of his successor, Dr. Munro: "Dr. MacKay had administered the free schools during a period of momentous intellectual and social change. Merely to have piloted the educational bark so as to avoid shipwreck, shows skill; to have reconditioned it so as to make relative progress, merits high praise. That our educational system is essentially sound and can face with assurance whatever changes the future may hold, redounds to the credit of the man who has directed the policy of the education office for so many years. As he retires from active service, Dr. MacKay can be assured of the warm appreciation of his fellow citizens and of their sincere wishes for a long and tranquil eventide of well-earned repose."

I think it may be fairly said that MacKay was the ablest and most energetic superintendent of education who had theretofore occupied that highly important and onerous position.

As a scientist his attainments and fame are as great as those he acquired as an educationist, and his name was well known to specialists far beyond the Dominion. There was no branch of science in which he was not interested, but he devoted most of his time to biology, in certain departments of which he was a widely recognized authority. No one had a greater knowledge of the flora of this province.

In counsel his carefully considered and circumspect opinions were always valued; furthermore he had a happy adroitness in smoothing out points of difference and suggesting conciliatory solutions of difficulties. Once only did I hear him speak with unwonted warmth or perhaps anger, and that was when an educated man seemingly tried to demonstrate to a large audience that the world might be flat! He endeavoured at all times to encourage any worthy effort or well-meaning person. De-

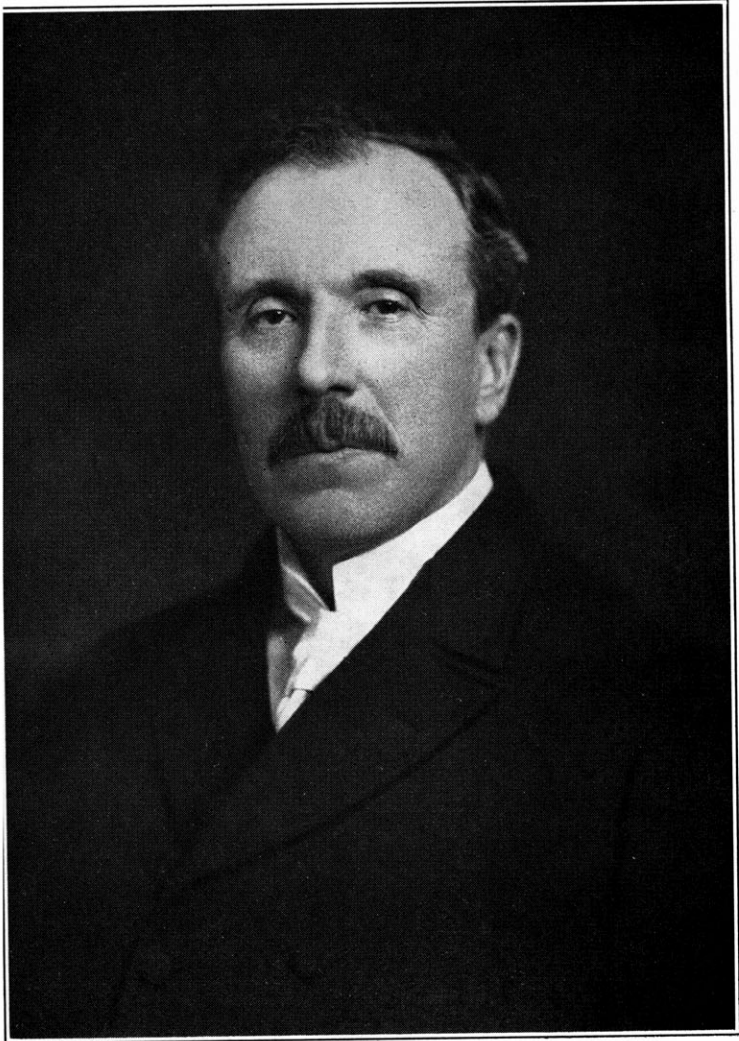
spite a busy life, he was ever ready to give his precious time to anyone who sought his aid or advice, and particularly liked to help young or inexperienced naturalists. I never knew him to take a real recreative vacation, and he would laughingly say that such a thing as an educational conference gave him an enjoyable holiday.

When addressing an audience he spoke with great deliberation and with almost unduly marked pauses. In latter years he was troubled with deafness which to some extent prevented him from taking his former alert part in discussions. His handwriting was a characteristically careful one, and unusual in having all the u's distinguished by the short-vowel sign.

A personal touch may be pardoned in this brief sketch of a long and busy life. I first met Dr. MacKay when I was a lad of eighteen, and such even then was his fame throughout the province, that his presence seemed to inspire my boyish mind with a sort of reverential awe. After he came to Halifax I got to know him intimately and to fully realize the fine qualities of his mind and to esteem him for those of his heart. His death has deprived me of a firm and honored and confiding friend and a sympathetic companion and co-worker. It is a satisfaction to write these few words of deserved appreciation of such a man.

The accompanying portrait of Dr. MacKay is from a photograph taken in London, Eng., about 1910, and shows him in the prime of life. It has the added interest of being the one which he had himself selected at the request of the writer.

Halifax, N. S., 17th November, 1930.



Yours very truly,

A. S. Mackay