

PROCEEDINGS

OF THE

Nova Scotian Institute of Science

SESSION OF 1928-29

(Vol. XVII, Part 3)

67TH ANNUAL BUSINESS MEETING.

Dalhousie Medical Science Building, Halifax.

10th October, 1928.

The PRESIDENT, DR. J. H. L. JOHNSTONE, in the chair.

Other members present: DR. D. McINTOSH,[†] DR. E. G. YOUNG, D. J. MATHESON, PROF. D. S. McINTOSH, DR. A. H. MacKAY, DR. H. S. KING, DR. S. G. RITCHIE, DR. G. H. HENDERSON, PROF. R. J. BEAN, PROF. C. B. NICKERSON, DR. H. L. BRONSON, CAPT. W. F. MITCHELL, DR. J. CAMERON, DR. O. S. GIBBS, DR. H. R. CHIPMAN, and H. PIERS.

The PRESIDENT delivered the opening address as follows:

Gentlemen:—

We meet tonight for two purposes, first to close the 66th session, second to begin another year in the history of the Institute. It is part of my duty as president to review briefly the events of the past year and make suggestions for the future.

Our membership has been increased by the addition of 18 ordinary and corresponding members, and it now numbers 100. It is a pleasure to record that in this as in last year we have suffered no loss by death. The recording secretary informs me that the average death loss is two per year, so either we are living longer or the average age of the members is less than formerly. It is with great regret that I record the resignation of the Rev. Brother Cornelia, formerly science master at St.

Mary's College. As a member of the Institute and for the past two years of its Council, Brother Cornelia has always shown a great interest in our welfare. I feel certain that he carries with him the best wishes of the members of this society.

During the session eight council and seven ordinary meetings were held. Eighteen papers were presented which may be classified as follows:

Physico-Chemical	8
Biological	4
Physiological	5
Geological	1

In addition to these original contributions, several demonstrations of apparatus were held and, judging from the reception given them by our members, it would appear desirable to continue and perhaps expand this phase of our activity.

It is a pleasure to note that there has been a marked increase, not only in the average attendance at the ordinary meetings, but also in the interest shown by the members in our activities.

At the 1928 meeting of the Royal Society at Winnipeg, this society was represented by Dr. A. G. Huntsman, who presented a report on our operations for the year.

At the beginning of our last session a committee was appointed by your Council to revise the publication exchange list. The history of this list is briefly as follows: At the first session of the Institute in 1862, Dr. Carteret Hill in his presidential address said—"to afford a well constructed and organized channel for the contributions to the general stock of knowledge for those among ourselves, who are interested in natural science, the Nova Scotian Institute has been established. We look forward to the time when our transactions shall be exchanged with the older and more important institutions and any new and well authenticated fact, having passed the ordeal of our local organization, shall be transmitted to the great centres of science and become the property of the whole world." This prophecy was realized in Hill's lifetime chiefly through the efforts of the late Dr. MacGregor and Mr. Bowman. There is published in the Transactions for 1894

a list showing the institutions to which the Transactions were sent. It is noted that the mailing list then included 709 names, scattered over the world and that 383 exchanges were received. It was found that the mailing list for 1927 numbered 700 and that exchanges were received from 244 institutions.

It was evident that this list, thirty-three years old, needed revision. After much labor your committee made up a new list totalling 526 names, which were placed on a card index system which is easily accessible. A circular letter asking for exchange was sent to 324 institutions. This energetic committee deserves the thanks of the Institute for the able manner in which it carried its program to completion.

You will no doubt have a report from the editor of the Proceedings. Few of us realize the great amount of time and effort which is given to this work by Dr. A. H. MacKay. His labors would be lessened and publication would be accelerated if those presenting papers would promptly send them to the editor. This year's volume would now be ready for distribution if it were not for the laxity of a few of the contributors.

We have received our usual yearly grant from the Provincial Government and the Science Library grant continues to be paid. The Science Library was commenced by this Institute in 1864 and entrusted to the care of the government in 1900 on condition that it should be made a public library and maintained by the Province in connection with the Provincial Museum. No grant was made nor was any interest taken in the library by the Provincial Government for many years. Due to the efforts of some of your members, and the late Mr. G. S. Campbell, the government grant was resumed in 1927, and the librarian, Mr. Piers, now has funds to do a limited amount of binding and to purchase a small number of books. The library at present constitutes a valuable nucleus around which to build a sound structure, which can be made of great value to the people of this Province. I respectfully request the members of this Institute to take an interest in its welfare and to utilize it as much as possible. I wish to suggest that each year the librarian have published in the daily

press a list of the new books added, so that the public will come to realize the existence of this library and the books that are available.

In regard to our finances, I should like to call your attention to the fact that for the past ten years the cost of publishing our Proceedings has been continually increasing while our receipts have remained stationary. It is very evident that within the next few years we shall have either to increase our revenue or to decrease the size of our publication. To adopt the latter alternative means to decrease the number of papers published, which would be a backward step. The first alternative seems to offer the only satisfactory solution. Our income can be increased by additional Provincial Government grant *or* increase of annual fee paid by members *or* a large increase in membership; but best by a combination of the three methods. Apart from financial considerations, increase in membership is of vital importance to the welfare of this society. For the past number of years the new members elected have just been sufficient to balance the loss due to removal, resignation, etc. During the next year a determined effort should be made by each one of us to submit to the Council names of suitable candidates for membership.

In accordance with your wishes I appointed a committee under the chairmanship of Dr. D. McIntosh to arrange a science exhibition. This committee has arrangements well under way and you will tonight receive a progress report from its chairman.

May I take this opportunity of thanking the members of the Council, the recording and corresponding secretaries and the vice-presidents for the excellent services they have rendered the Institute during the past year. All have co-operated to the best of their ability, and that is saying much.

Again I wish to express to the members my thanks for the honor they have done me in electing me to the office of president.

The Treasurer's report was presented by D. J. Matheson, showing that the receipts for the year were \$2,824.86; the

expenditures, \$1,296.31; balance in hand (in current account), \$1,528.55; and the balance at credit of reserve fund, \$181.22; 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 1,412 books and pamphlets had been received through the exchange-list during the year 1927; and 1,073 have been received during the nine months, January to September, 1928. The total number of books and pamphlets received by the entire Provincial Science Library (with which that of the Institute is incorporated) during 1927 was 1,667. The total number in the Science Library on the 31st December, 1927, was 74,977. Of these, 56,416 (about 75 per cent.) belong to the Institute, 18,440 to the Science Library proper, and 121 to the Hugh Fletcher Memorial Library. 140 books were borrowed in 1927, besides those consulted in the Library. In 1928 the Science Library again received a grant of \$500 from the Provincial Government, for the purchase of books on pure and applied science and the trades, as well as for binding. With this grant, 43 recently published works have been added to the Library, and 15 volumes of Proceedings of the Royal Society of London have been bound. The report was received and adopted. At the request of the meeting Mr. Piers read a list of the authors and titles of the books which had been purchased.

The Corresponding Secretary, Prof. D. S. McIntosh, reported that he had sent out 309 circular letters in connection with the revision of the exchange-list. About 134 replies had been received. About 19 of the institutions, which had been applied to, did not desire to exchange publications with this society. Some 44 new names were to be added to the exchange-list on cards which had been prepared. The report was received and adopted.

The Science Exhibition Committee reported through its chairman, Dr. D. McIntosh, that it had decided to hold the exhibition on the 23rd and 24th of November in the Medical Science Building, College Street, and the Science Building, Studley. Admission would be free. The report was received and adopted.

The Editor, Dr. MacKay, reported that the papers presented at the last session had been printed, and the printing of the Proceedings would complete the part (Vol. 17, pt. 2).

On motion of Mr. Piers and Dr. Bronson, a vote of thanks was presented to Dr. MacKay for his services as editor.

It was announced that John G. Allen of the Cable SS. "John MacKay," Halifax, had been elected an ordinary member on the 1st of October.

Dr. Ritchie, Dr. Bronson, and Prof. Nickerson were appointed a nominating committee, and on their report the following were elected officers for the ensuing year, 1928-29:—

President,—PROF. DOUGLAS McINTOSH, D.Sc., F.R.S.C., *ex-officio* F.R.M.S.

First Vice-President,—PROF. ELRID GORDON YOUNG, PH.D.

Second Vice-President,—PROF. DONALD SUTHERLAND 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,—A. H. MACKAY, LL.D., F.R.S.C., PROF. H. S. KING, PH.D., PROF. J. N. GOWANLOCH, B.A., B.Sc., A. G. HUNTSMAN, M.B., F.R.S.C., (succeeded on 7th Jan., 1929, by A. H. LEIM, PH.D.), DEAN G. A. BURBIDGE, PROF. W. F. McKNIGHT, B.Sc., and R. P. SMITH, M.B., C.M.

Auditors,—P. R. COLPITT and PROF. W. P. COPP, B.A., B.Sc., M.E.I.C.

On motion of Mr. Piers and Dr. Young a vote of thanks was presented to the retiring president, Dr. Johnstone.

FIRST ORDINARY MEETING.

Medical Science Building, Halifax.

14th November, 1928.

The President, Dr. McIntosh, in the chair. Attendance 21.

It was announced that Melville Cumming, B.A., LL.D., Halifax, and R. F. Dimmitt, B.A., Dartmouth, had been elected

ordinary members, and Gordon F. Frame, B.A., Truro, an associate, on the 5th of November.

On motion of Dr. Bronson it was resolved that abstracts of all papers intended for submission to the Institute be laid before the Council prior to any decision being made as to placing their titles on the program of a future ordinary meeting.

On motion of Mr. Piers and Dr. Bronson it was resolved that authors of papers appearing solely in abstract in the Institute's Proceedings and Transactions, but published entire in other journals, should furnish the Institute's editor with full references to such places of publication, as soon as that information is available, in order that these references may appear with the printed abstracts.

On motion of Prof. McIntosh it was resolved that an abstract be printed at the beginning of each paper published in full in the Institute's Transactions.

The following papers were presented:—

(1) Two Simple Methods of Purifying Radium Emanation.
—By W. G. MORAN, B.Sc., Dalhousie University, Halifax, N. S.

Abstract.—A simple apparatus for the purification of radium emanation has been devised and put in operation at the Victoria General Hospital, Halifax, N. S. The method is low in cost and easy in operation. The use of liquid air is avoided and the removal of water vapor found unnecessary. Two different methods of purification have been developed.

One method ignites the oxygen and hydrogen with a hot copper oxide filament which also oxidizes the excess hydrogen. The other method uses a spark to unite the oxygen and hydrogen while the excess hydrogen passes through the walls of a heated palladium tube into the outside air. The emanation is pumped from the solution into the single small purifying tube and from there pushed directly up into the thin walled capillary. The emanation may be withdrawn and collected over mercury at any stage in the purification. The concentration attained compares favorably with the results obtained with much more complicated installations.

Published in full, *Phil. Mag.*, [7], 7, 399-404 (1929).

(2) Intestinal Reactions to Drugs in Different Fishes.—
By PROF. N. B. DREYER, M. A., M.R.C.S. (See *Trans.*, p. 199).

(3) The Effect of Velocity on Diffusion Rates: Preliminary Report.—By A. E. MURRAY, B.A. (See *Trans.*, p. 168).

SECOND SCIENCE EXHIBITION.

*Medical Science Building, College St., and Science
Building, Studley, Halifax.
23rd and 24th November, 1928.*

The great success which had attended the Institute's Scientific Exhibition of November 1926 induced it to hold another and larger one in the present year, on the 23rd of November from 8 to 10 p. m., and on the 24th of November from 3 to 5 and 8 to 10 p. m. The biological exhibits were shown in the Medical Science Building, and the remainder in the Science Building, Dalhousie University.

Among those who assisted were the various departments of Dalhousie University and of King's College, Maritime College of Pharmacy, N. S. Technical College, Fisheries Experimental Station (Atlantic), Dominion Government Laboratory, Pathological Institute, and many industrial organizations. Students of the universities were particularly helpful in installing the exhibits and assisting in demonstrating them to visitors. Two printed guides were on sale. Admission was free.

The exhibition again proved to be exceedingly popular, the rooms being always crowded with interested visitors of all classes. The attendance at the Medical Science Building was estimated at about 3,500, and at the Science Building about 2,500, making a total of 6,000.

SECOND ORDINARY MEETING.

*Medical Science Building, Halifax.
10th December, 1928.*

The President, Dr. McIntosh, in the chair. Attendance 17.

It was announced that W. E. Jefferson, B.Sc., Halifax, had been elected an ordinary member, and Prof. H. E. Bigelow, Ph.D., Mt. Allison Univ., Sackville, N. B., an associate member, on the 3rd of December.

The following demonstrations of apparatus were then presented:

(1) A New Form of Liquid Extractor.—By PROF. E. G. YOUNG, PH. D.

(2) A Method of Determining Small Quantities of Lactic Acid.—By PROF. E. G. YOUNG, PH. D.

(3) Artificial Heart.—By PROF. O. S. GIBBS, M.B., Ch.B.

(4) New Apparatus Used in Filtering.—By PROF. D. McINTOSH, Ph. D.

The President, as chairman of the recent Science Exhibition, presented a report thereon. The receipts from the sale of guides were \$209.55, and the expenditures \$235.90, causing a deficit of \$26.35. In the discussion which followed, the prevailing opinion seemed to be that the effort associated with the preparation and demonstrations was so great that it appeared inadvisable to undertake another exhibition for some time.

THIRD ORDINARY MEETING.

Medical Science Building, Halifax.

14th January, 1929.

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

It was announced that the following had been elected members on the 7th of January: Prof. D. U. Hill, Ph.D., Acadia Univ., Wolfville; Lt.-Com. F. L. Houghton, R.C.N., Admiralty House, Halifax; Prof. Richard Hamer, Ph.D., Acadia Univ., Wolfville; Prof. Roy Fraser, B.S.A., M.A. Mt. Allison Univ., Sackville, N. B.; Prof. Henry B. Bigelow, Ph.D., Museum of Comparative Zoology, Harvard Univ., Cambridge, Mass.; Miss Elizabeth G. Frame, B.A., Dalhousie Univ., Halifax; Prof. H. G. Perry, D.Sc., Acadia Univ., Wolfville; Prof. Muriel V. Roscoe, Ph.D., Acadia Univ., Wolfville; and George A. Edwards, M.I.R.E., Halifax.

The following papers were presented:—

(1) The Heats of Solution of Certain Alkali Halides and the Specific Heat of their Solutions.—By F. M. G. JOHNSON, PH.D., F.R.S.C., OTTO MAASS, PH.D., F.R.S.C., and H. RITCHIE CHIPMAN, PH.D., F.C.I.C. (See Trans., p. 149).

(2) Effect of Storage Temperature on Expressible Juice in Frozen Fish.—By A. H. LEIM, PH.D., Fisheries Experimental Station (Atlantic), Halifax, N. S.

Abstract.—The results to be reported are the recent ones from experiments begun by Messrs. D. A. MacFayden and H. R. Wyman at the Fisheries Experimental Station. The problem is to ascertain the optimum temperature for the storage of fish when frozen. The amount of juice expressed from a known weight of fish under constant conditions is taken as a measure of the destruction of tissues which has occurred in storage. After six months' storage at various constant and fluctuating temperatures (-5 to -20°C.) it is found that the amount of expressible juice is about 40% of the original weight for fish stored at -5° while it is about 23% for those stored at -20°. For freshly frozen material the amount is from 10 to 12%.

FOURTH ORDINARY MEETING.

Medical Science Building, Halifax.
13th February, 1929.

The President, Dr. McIntosh, in the chair. Attendance 19.

It was announced that the following had been elected ordinary members on the 4th of February: Prof. Norman J. Symons, M.A., King's College; Miss Anna M. Wilson, M.Sc., Fisheries Experimental Station (Atlantic); John C. Hall, M.Sc., Tower Road School; and John L. Greenham, B.Sc., of Moirs' Ltd.; all of Halifax

The following papers were presented:

(1) Some Measurements of the Heat Capacity of Fish Muscle.—By H. RITCHIE CHIPMAN, PH.D., and GEORGE O. LANGSTROTH, B.A., Fisheries Experimental Station (Atlantic). (See Trans., p. 175).

(2) An Attempt to Measure the Range of Alpha Particles from Thorium.—By J. L. NICKERSON, M.A., Dalhousie Univ. (See Trans., p. 172).

(3) A New and Accurate Drop Recorder.—By PROF. O. S. GIBBS, M.B., Ch.B., Department of Pharmacology, Dalhousie Univ., Halifax, N. S.

Abstract.—The instrument consists of three parts:

- (1) Displacement chamber similar to one previously described;¹
- (2) Suction electrodes;
- (3) Vacuum chamber and sulphate reservoir combined.

The fluid to be measured enters the displacement chamber and forces an equivalent amount of sulphate to the lower electrode. As it wells up it makes contact with the upper suction electrode, and is immediately carried away. The contacts are recorded in any convenient way. The instrument as shown will record 600 drops per cc. Full details will be published at a later date.

- (1) O. S. Gibbs. Journ. of Lab. and Clin. Med. 1927 XII, p. 686.
Published in full, Science, LXIX, 649-50 (June 21, 1929).

FIFTH ORDINARY MEETING.

Medical Science Building, Halifax.
13th March, 1929.

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

It was announced that the following had been elected ordinary members on the 4th of March: Clyde Marshall, M.D., C.M.; Mrs. Frances B. Marshall, Ph.D., and Prof. E. W. H. Cruickshank, M.D., D.Sc., Ph.D., all of Halifax.

The following papers were presented:

- (1) *Ichthyophonus Hoferi*, Plehn and Mulsow, a Flounder Parasite New to North American Waters.—By MISS MARJORIE F. ELLIS, B. A. (See Trans., p. 185).
- (2) The Endocellular Enzymes of *B. coli communis*.—By PROF. E. GORDON YOUNG, PH.D., Department of Biochemistry, Dalhousie University, Halifax, N. S.

Abstract.—Emulsions of *B. coli communis* have been prepared from stock cultures by growth on nutrient agar attaining concentrations of about 5×10^{12} cells per ml. These cells have been destroyed by repeated freezings and thawings over a period of several hours, cellular debris centrifuged off and the cellular extract passed through a Berkefeld candle. This liquid has been tested for its enzymic activity on certain substrates. It hydrolyses peptone at pH 7-8. It does not decompose glucose in the absence or presence of phosphate. It possesses a dehydrogenase acting on succinic acid anaerobically as shown by the Thunberg technique with methylene blue.

Correlating studies of cell death by the freezing technique with rate of methylene blue decolorization have shown that dehydrogenase activity on succinic acid and formic acid is independent of cell concentration but associated with cell stroma. Dehydrogenase activity on acetic acid, lactic acid, alcohol and glucose is destroyed by the freezing technique. Toluene has been shown to act identically. All oxidative mechanisms can be shown to be independent of living cell concentration temporarily.

Published in full, Biochem. J., 23, 831-9 (1929).

The President exhibited a new form of overflow siphon.

SIXTH ORDINARY MEETING.

Medical Science Building, Halifax.

15th April, 1929.

The President, Dr. McIntosh, in the chair. Attendance 19.

The President reported that the members of the Council had decided to tender a complimentary dinner and also make a presentation of a piece of plate to Dr. A. H. MacKAY, as tokens of the Institute's respect, on the 11th of May, and that a circular to that effect and asking for subscriptions had been sent on the 9th inst. to all members.

On motion of Prof. Gowanloch and Dr. Johnstone it was resolved that the N. S. Institute of Science record its expression of sorrow at the passing of Mr. W. Stewart Allan, who was for two years a member of the Institute. His death by drowning, while engaged in biological investigations in the Gulf of Mexico, cut short a career that held high promise of achievement in his chosen field.

The following papers were presented:

(1) *Ascophyllum nodosum*, Le Jolis: A Study of its Gross Morphology.—By MISS CONSTANCE I. MACFARLANE, Department of Botany, Dalhousie University, Halifax, N. S.

Abstract.—Collections of *Ascophyllum nodosum*, Le Jolis, taken throughout the whole year were studied. The receptacles appear in February, and take 18 months to develop. The air bladders develop one each year, appearing in April. The fastest growth is during the summer.

(2) The Reduction of Metanitrobenzaldehyde with Sodium Arsenite.—By PROF. H. E. BIGELOW, PH.D., and MISS JEAN H. PHILP, Mt. Allison Univ., Sackville, N. B. (See Trans., p. 193).

(3) An Adiabatic Calorimeter for Low Temperature Measurements.—By D. LEB. COOPER, M. Sc., and PROF. D. MCINTOSH, D. Sc. (See Trans., p. 197).

SEVENTH ORDINARY MEETING.

Medical Science Building, Halifax.

15th May, 1929.

The President, Dr. McIntosh, in the chair. Attendance 17.

The President announced that, owing to the serious illness of DR. A. H. MACKAY, the complimentary dinner and presentation to him in recognition of his services in the cause of science and education in this Province, which had been arranged for the 11th inst., had been postponed. Deep regret was expressed at his illness.

The following papers were presented:—

(1) Autolytic and Bacterial Decomposition of Haddock Muscle at Low Temperature above Freezing.—By ERNEST HESS, M. A., Fisheries Experimental Station (Atlantic), Biological Board of Canada.

Abstract.—The influence of temperature upon autolytic and bacterial decomposition of haddock muscle within the range of +2.2 to -1.1° C. (36 to 30° F.) has been followed by determining the increase in the amount of volatile basic nitrogen parallel with the increase in the number of bacteria. A mixed flora of bacteria normally occurring on haddock was used for inoculation purposes. The experimental results show that practically no autolysis takes place at these temperatures, and that the bacterial decomposition and bacterial growth rate at -1.1°C is only about half of that at +2.2°C. Expressed in mathematical terms, it was found that the temperature coefficients (Q_{10}) for these reactions during the phases of logarithmic increase were considerably higher than the values for Q_{10} for ordinary life processes at medium temperatures ($Q_{10}=2-3$, Van't Hoff). The values for Q_{10} increased rapidly with decreasing temperature range.

The practical application of these findings has been demonstrated to be of economical importance in the holding of fresh fish at -1.1°C, instead of the customary holding in crushed ice at about +2.2°C.

(2) Artificial Heart (Demonstration of Apparatus).—By PROF. O. S. GIBBS, M.B., Ch.B., Department of Pharmacology, Dalhousie University, Halifax, N. S.

Abstract.—As was previously reported to the society, experiments are being conducted in the maintenance of a complete circulation in the cat by means of a mechanical heart. The method at that time was unsatisfactory and has now been improved. Briefly it is as follows:

Blood from the heart flows through a light valve into a rubber bellows, on the other side of which is another valve of a different design suited to stand high pressures. Two such devices are enclosed in a brass box. Attached to each rubber bellows is a small moveable switch which is opened and closed by the movement of the bellows, the distance being controlled

by a single screw in each case. This apparatus is connected to a water supply at a pressure of twenty pounds per square inch by means of an electrical valve similar to one previously described. The apparatus contains an electrical heater and thermometer. As the blood flows into the bellows it expands and at a predetermined time makes contact, thus activating the electric valve and so turning on the water pressure. In this way the bellows are squeezed and the blood forced onwards. When the bellows are fully closed, the current is cut off and the valve opens. As the water drains, it exerts a slight suction on the bellows, helping them to fill again. The extent of this suction is controlled simply by the length of the outlet pipe. The two heart chambers are connected electrically so that both must fill before the valve is closed. In order to insure proper emptying the systemic chamber which works against much higher pressure is made the master of the electrical switch. The apparatus as shown works very comfortably at a speed of over two hundred beats per minute and against a pressure of well over 200 mm Hg. Simplicity of device has been aimed at in order to facilitate cleaning and repairing. An attempt has been made also at constructing the apparatus in a robust form so that accidental stoppage is minimized. In use, the apparatus is filled with warm gum ringer which appears all that is necessary for satisfactory use on a cat without the addition of extra blood.

Owing to the fact that slow records are frequently demanded and at this speed the heart beats as recorded are indistinguishable, a device is fitted to the valve which records only one beat in ten. Full details of this apparatus and its applications will be published in the *Journal of Pharmacology and Experimental Therapeutics*, 1930.

(3) Solubility of Uric Acid.—By PROF. O. S. GIBBS, M.B., CH.B., Department of Pharmacology, Dalhousie University, Halifax, N. S.

Abstract.—It has been recently found that the gel form of uric acid as prepared by the technic of Schrade and Boden can be obtained in a dried form by precipitating a concentrated solution by means of acetone or absolute alcohol, the precipitate being dried in vacuo. The resulting material is freely soluble in distilled water. It has also been discovered that a similar form of uric acid occurs in the fowl's blood.

Published in full in *Science*, Vol. LXX, pp. 241-242 (Sept. 6, 1929).

(4) On the Rate of Freezing in Fish Muscle.—By GEORGE O. LANGSTROTH, B.A. (See *Trans.*, p. 206).

HARRY PIERS,
Recording Secretary.