

## PRESIDENTIAL ADDRESS.

E. Gordon Young.

(Read October 12, 1932).

It is the privilege of the president on this occasion to summarize the accomplishments of the past session and to draw to the attention of members of our society that which he may deem important.

It is my sad duty to record the loss by death of our senior corresponding member, the Reverend C. J. S. Bethune, M. A., D. C. L., F. R. S. C. on the 18th of April, 1932, in his ninety-fourth year, in the City of Toronto. Dr. Bethune was born at West Flamboro, Ontario, on the 11th of August, 1838. He received his education at Upper Canada College and Trinity University from which he was graduated in 1859. He began teaching in Trinity College School, Port Hope, and served as headmaster from 1870 till 1899. For fourteen years he was professor of entomology and zoology at the Ontario Agricultural College, Guelph, (1906-1920). He was one of the founders of the Canadian Entomological Society and the first editor of the "Canadian Entomologist." On the 18th of January, 1869, he was elected a corresponding member of the Institute. His main contribution to the entomology of this province was the description and identification of the species of Lepidoptera and Coleoptera published in our transactions for the year 1869.

Because of the belief amongst some of our members that the papers presented before the ordinary meetings of the Institute were of too technical a character to be generally enjoyed a committee consisting of Dean Burbidge and Drs. Ritchie and Johnstone was appointed to consider the advisability of reviving the popular lecture. After due consideration this committee recommended that the Institute do not undertake to provide lectures for the general public, but that the occasional popularized presentation of topics of general scientific interest could form a legitimate activity of the Institute. It was advised that such discussion should form part of the programme of the regular meetings. One such presentation was given during the session and proved of distinct interest. The practice is to be commended if it does not interfere with the communication of original papers to the Institute.

The Council has given some thought to ways and means of increasing the number of contributions for publication in the Proceedings. Enquiries have been made of various individuals

in the province by way of discovering whether any work of a scientific nature of provincial importance was in progress. Certain associate members in various centres have been asked to act as unofficial representatives of the society in an endeavour to secure such contributions. In the last analysis, however, your investigating committee is in agreement with the statement in a previous presidential address to the effect that the fault lies essentially with the naturalists.

During the year six ordinary meetings of the society were held and twelve papers presented. Classified according to the different branches of science, there were six biological, (three zoological, two botanical and one bacteriological), three chemical, two pharmacological, and one physical. The rise in the number of biological papers contributed is worthy of note in contrast to the drought of recent years.

I wish to call the attention of members to the growing value and possible field of service of the Provincial Science Library of which the library of the Institute forms the major part. Not merely as an invaluable store of research information is this library now to be consulted but also as a reference source of modern information on all scientific subjects with a considerable popular appeal. Your executive has been deeply concerned by the recent fire in an adjacent building to the library and the question of adequate insurance is under consideration. The matter is recommended to the new executive as one of importance.

I have made an analysis of our membership for the past year in order to discover its diversification and the number of members actively interested. The figures are worthy of consideration. Our total enrollment is 104 which is divided into

14 corresponding members—13%,  
 14 associate members—13%,  
 76 ordinary members—74%.

The number of members associated with institutions for teaching or research is 73 and of these 51 are living in the Maritime Provinces. They are distributed as follows; Dalhousie-Kings 28, Fisheries Experimental Station 5, Acadia 4, Mount Allison 4, Truro Agricultural College 2, and one each from the N. S. Technical College, Memorial College, St. Francis Xavier University, St. Mary's College, University of New Brunswick, the Halifax Academy, Prince of Wales College, Provincial Science Museum.

The activity of our society is thus supported by a relatively small group of individuals of our community. It is the privi-

lege of very few to devote much of their time to original investigation. Other than the N. S. Institute of Science there is no organization in the Maritime Provinces, to my knowledge, whose primary interest is scientific research work. Only those who have laboured at it appreciate the difficulties and discouragements. It is therefore of paramount importance that each individual of our society should look upon it as his or her duty to attend the ordinary meetings of the society although the subjects presented may be far removed from the primary interests of that individual. Such is my thesis in fostering the frail spirit of research in our community.

Of our total membership 60 members live in Halifax and 44 in more or less distant localities. Of those living in Halifax approximately 35 have attended at least one meeting in the course of the past year and so may be deemed to have an active interest in the meetings of the society. Our average attendance at an ordinary meeting is about 25. The number of members present is usually augmented by several guests. The number contributing to our programme is still smaller.

May I again be permitted to take this opportunity of offering my thanks to the members of the Institute for the honour and privilege of serving the society as president, and my grateful tribute to the members of the Council for their generous cooperation at all times.

## PROCEEDINGS OF MEETINGS.

## SESSION OF 1932-33.

*(All meetings were held in the Medical Science Building, Halifax).*

*71st Annual Business Meeting, Oct. 12, 1932.*—The President, Dr. E. G. Young, in the chair. Others present: D. J. Matheson, E. Hess, Dr. H. S. King, Dean G. A. Burbidge, Dr. G. H. Henderson, Capt. W. F. Mitchell, Rev. Bro. Cornelia, Prof. W. P. Copp, Dr. H. L. Bronson, Prof. C. B. Nickerson, Dr. S. G. Ritchie, Dr. J. H. L. Johnstone, Dr. F. R. Hayes, Dr. C. C. Coffin, J. M. Morton and H. Piers.

The President delivered an address in which he referred to the death of Rev. C. J. S. Bethune, a corresponding member for very many years. He stated that the full membership of the Society was 104. In dealing with the nature of the papers presented during the past session, he thought that possibly some of them were too technical in character to be of direct interest to many persons, and advised that popular lectures be occasionally presented. He also drew attention to the value of the Provincial Science Library.

The Treasurer's report showed that the receipts during the past year were \$1,614.42; expenditure, \$218.43; balance in current account, \$1,395.99; reserve fund, \$225.38; and permanent endowment fund, \$2,000.00. It was resolved that \$500.00 be placed in the reserve fund, and \$500.00 in the permanent endowment fund. The Corresponding Secretary reported that 63 back-copies of the Transactions had been sent out. A full inventory had been made of this stock of Transactions. Complete sets of vol. 1, 9, 11-18 (pt. 1) are still available; vols. 2, 3, 4, 6 and 8 are completely out of print, while of vol. 5, only pt. 2, of vol. 7, only pt. 4, and of vol. 10 only pts. 1, 2 and 3 are available. The Librarian's report showed that during the year ended Sept. 30, 1932, 3,343 books and pamphlets had been received through the Institute's exchange-list; and the total number in its library on that date was 66,244. The number of accessions of the entire Provincial Science Library (with which that of the Institute is incorporated) in the same period was 3,577; and the total number in the library on Sept. 30, 1932, was 86,177. During the year 870 books were borrowed. A number of books on pure and applied science had been bought, and 88 volumes of Transactions had been bound.

The following were elected officers for the year 1932-33:  
*President*,—Alexander Henry Leim, Ph. D.; *vice-presidents*,—

Prof. G. H. Henderson, Ph. D., and Prof. H. S. King, Ph. D.; *treasurer*,—D. J. Matheson, B. Sc.; *corresponding-secretary*,—E. Hess, M. A.; *recording secretary and librarian*,—H. Piers; *councillors without office*,—Dean G. A. Burbidge, D. J. Mackenzie, M. D., Capt. W. F. Mitchell, Rev. Bro. W. Cornelia, Prof. N. B. Dreyer, M. R. C. P., Prof. C. C. Coffin, Ph. D., and Prof. F. R. Hayes, Ph. D.; *auditors*,—Prof. W. P. Copp, B. Sc., and P. R. Colpitt.

Votes of thanks were presented to the retiring president, Dr. Young, the recording-secretary, Mr. Piers, the treasurer, Mr. Matheson, the editor, Dr. King, and the corresponding secretary, Mr. Hess.

*1st Ordinary Meeting, Nov. 14, 1932.*—It was announced that Prof. G. V. Douglas had been elected an ordinary member on Oct 31. A motion that a retiring president be made *ex-officio* a member of the council for the year following his term of office was lost. Dr. D. Mainland presented a paper on "A Quantitative Study of Epithelial Nuclei of the Body of the Uterus in Carcinoma and in Non-malignant Hyperplasia;" and Dr. E. G. Young and Dr. N. B. Dreyer one "On the Excretion of Uric Acid and Urate by the Bird."

*2nd Meeting, Dec. 12th, 1932.*—It was announced that W. Allister Crandall, B. A., had been elected a student member on Nov. 28. A paper by Prof. A. G. Hatcher, St. John's, Nfld., entitled "Note on a Rare Phenomenon in the Night Sky Seen at St. John's, Nfld., on Apr. 25, 1932," was read; as well as a note by F. B. Cubitt, S. S. "Cathcart," describing a halo, four rings and a partial rainbow, grouped about the sun, seen near the Magdalen Islands on Sept. 14, 1932. There was presented a "Report on the Programme of the Eclipse Expedition at Magog, P. Q., 1932: (a) Flash Spectrum, by Dr. G. H. Henderson; (b) Corona, by Dr. J. H. L. Johnstone."

*3rd Meeting, Jan. 16, 1933.*—It was announced that S. C. Carew had been elected an ordinary member on Jan. 3rd. Dr. F. R. Hayes presented a paper on "Nitrogen in Echinoid Ontogeny;" and Dr. H. L. Bronson one on "The Specific Heat of Tungsten, Molybdenum and Copper."

*4th Meeting, Feb. 13, 1933.*—Dr. C. C. Coffin described "Some New Physico-Chemical Apparatus," and Dr. W. W. Johnston presented a paper on "Hardened Plastics from Fish Muscle."

*5th Meeting, Apr. 10, 1933.*—It was announced that H. Roy Fraser had been elected an ordinary member on Feb. 27th. The printed Proceedings, vol. 18, pt. 2, were laid on the table.

The following papers were presented: (1) "The Odonata of the Maritime Provinces," by Dr. E. M. Walker, Toronto; (2) "The Geology of Purcell's Cove, Hfx. Co.," by C. K. Howse; (3) "Lactose Fermenting Bacteria from the Intestinal Contents of Marine Fishes," by Dr. N. E. Gibbons; and (4) "Accidental Occurrence of the Man-eater or Great White Shark (*Carcharodon carcharias*, L.) in Nova Scotian Waters," by H. Piers.

6th Meeting, May 8, 1933.—The following papers were presented: (1) "A Method of Control in the Chlorination of Toluene," by W. B. Beazley and Dr. H. S. King; (2) "Recovery of Salt from Fish Brines," by Dr. D. LeB. Cooper and R. H. Squires; and (3) "The Method of Compensating the Induced and Sub-permanent Magnetism on Iron or Steel-built Ships, with Relation to the Magnetic Compass," by Capt. W. F. Mitchell.

HARRY PIERS,  
*Recording Secretary.*

---

#### ABSTRACTS.

(Papers read before the Institute but not published in the Proceedings.)

ON THE EXCRETION OF URIC ACID AND URATES BY THE BIRD. E. G. Young and N. B. Dreyer, Depts. of Biochemistry and Pharmacology, Dalhousie Univ., Halifax, N. S. (Read Nov. 14, 1932). A study has been made of the ureteral excretion of uric acid by the cockerel. Under luminal anaesthesia the urine is a viscous cloudy fluid containing solid matter which consists of uric acid or urate or both. The normal average flow is 6.6 cc per hour and the variation 2-15 cc. The variation in pH is 5.0-6.8 with a mean value of 5.5. The concentration of urate is usually at a level of supersaturation, 0.2-0.7 per cent and a portion has been demonstrated to be colloidal by ultrafiltration. Under urethane anaesthesia the urine is clear, less acid and less concentrated. Birds whose ureters have been ligated die in about 24 hours and exhibit at post-mortem extensive deposits of uric acid or urate in the pleural, peritoneal and pericardial cavities and occasionally in the joints. The level of uric acid in the blood has never exceeded 0.091 per cent. Colloidal preparations of monolithium urate, injected intravenously, are recovered in the urine to the extent of between 100 and 250 per cent, monosodium urate and hexamethylenetetramine urate 40-100 per cent, piperidine urate little if at all. The extent of recovery is intimately related to the urinary volume. Of substances which might increase the solubility of uric acid in the kidney mechanism lithium carbonate is most effective, inducing marked diuresis and increasing the output of uric acid many fold. A similar action has been observed with lithium chloride, piperazine, piperidine and ethylenediamine. Methylamine, guanidine and hexamethylenetetramine were ineffective. Hypertonic solutions of glucose, sodium sulphate and sodium chloride cause a

diuresis with an increase in the output of urate. Theophylline, "euphylline" and to a lesser extent caffeine, adrenaline and colchicine act similarly. Theobromine and the salicylates are without definite effect. The general conclusion is drawn that any substance which will cause a diuresis in the cockerel will increase the output of urate and tend to make the urine alkaline. No substance has been found to increase the output of uric acid by allowing a concentration of urate greater than the normal.

CAMBRIDGE ECLIPSE EXPEDITION AT MAGOG, QUE., AUGUST 1932. G. H. Henderson and J. H. L. Johnstone, Dept. of Physics, Dalhousie Univ., Halifax, N. S. (Read Dec. 6, 1932).

(a) By G. H. Henderson

A short description was first given of the organization and equipment of the Cambridge University Eclipse Expedition and other expeditions stationed at Magog for the total solar eclipse. A discussion was then given of the flash spectrum and the methods of observing it. Special attention was directed to the question of photographic recording of the infra-red spectrum. A report was made on the successful preliminary tests carried out at Dalhousie with Xenocyanine plates which gave a clear record out as far as the helium line of wave length about 10830 Ångstroms.

(b) By J. H. L. Johnstone

A brief account was given of the various phenomena which any theory of the corona must explain. The spectrum of the corona was then discussed and the methods for observing it described. The setting up and adjustment of the large objective interferometer designed by Professor Carroll of Aberdeen University for the analysis of the green coronal line were described. A brief account of the smaller objective interferometer to be used for both the flash and coronal spectra was also given.

NITROGEN IN ECHINOID ONTOGENY. F. R. Hayes, Dept. of Zoology, Dalhousie Univ., Halifax, N. S. (Read Jan. 10, 1933). After the penetration of a spermatozoon the developing egg receives nothing from the outside except water and sometimes salts, until the comparatively advanced embryo begins to eat. The morphological phenomena of ontogeny—intracellular reorganization, cell division, gross changes in size and shape—can only be brought about by the expenditure of energy, and this energy must come from the materials present in the egg at the time of fertilization. The problems of chemical embryology include an investigation of the chemical transformation taking place, on which virtually nothing has been done. There are two sources of energy available in the egg—proteins and lipins. Primary amino groups were found to account for nearly 40 per cent of the nitrogen in *Echinometra* eggs. Now  $-\text{NH}_2$  nitrogen is known to change in metabolic processes, particularly with respect to its relation to  $=\text{NH}$  and  $\equiv\text{N}$  nitrogen. A study of the variation in the ratio  $-\text{NH}_2$  nitrogen to total nitrogen during the first 24 hours of development was made, for the purpose of gaining some idea of whether profound protein transformations accompany cleavage, hatching, and gastrulation. Koch's modification of van Slyke's micro-apparatus was used for the estimation of  $-\text{NH}_2$  groups; and micro Kjeldahl tests were made for total nitrogen. The results showed that, although there may be small variations, no major change occurs in the ratio investigated. From this it may be suspected that there is probably little change in the protein during the early stages, although a quantitative estimation of the several amino-acids present would be necessary before a definite conclusion could be reached. Since chemical changes of some sort almost certainly form a part of development,

the lipins also should be studied. As to size changes during the first 24 hours, measurements of diameters (85 to 90 $\mu$ ) showed that the egg within the shell (or fertilization membrane) decreased in size until hatching time (6 or 7 hours), following which there was a period of rapid growth.

ON THE SPECIFIC HEATS OF TUNGSTEN, MOLYBDENUM, AND COPPER. H. L. Bronson, Dept. of Physics, Dalhousie Univ., Halifax, N. S. (Read Jan. 10, 1933). A long series of determinations of the specific heats of tungsten, molybdenum, and copper have been made from  $-20^{\circ}$  to  $500^{\circ}\text{C}$ . A new type of all-copper adiabatic calorimeter has been designed and used. The complete elimination of water from the calorimeter removed several sources of error and resulted in increased reliability and accuracy. Two entirely different methods were used in determining the specific heats. The usual "method of mixtures" was used to determine the mean specific heat for a large temperature change and was applied to all three metals over the entire range of temperature. The specific heat of copper was also determined for 5- or 10-degree intervals from  $-5^{\circ}$  to  $110^{\circ}\text{C}$ . by heating the calorimeter electrically. It has been quite definitely shown that the specific heats of these metals over a temperature range as large as  $0^{\circ}$  to  $500^{\circ}\text{C}$ . cannot be expressed as a linear function of the temperature. An equation of the form  $C_p = A + BT - C/T^2$  was arrived at from theoretical considerations and the constants determined empirically with the following results:—

$$\text{Tungsten} \dots \dots \dots C_p = 0.03199 + 0.00000328T - 129/T^2$$

$$\text{Molybdenum} \dots \dots \dots C_p = 0.06069 + 0.0000120T - 361/T^2$$

$$\text{Copper} \dots \dots \dots C_p = 0.09292 + 0.0000136T - 452/T^2$$

where the unit of heat is the 20-degree calorie and  $T$  is absolute temperature. The average deviation of the individual determinations from the values calculated by these equations was only about 0.1%. As a matter of convenience and for purposes of comparison, linear equations applicable over smaller ranges of temperature have also been given.

HARDENED PLASTICS FROM FISH MUSCLE. W. W. Johnston, Fisheries Exp. Sta. (Atlantic), Halifax, N. S. (Read Feb. 6, 1933). A description of the methods employed and a discussion of the reactions involved in the formation of hardened plastics from waste fish were presented. Many substances of commercial use are made from casein and it has been found possible to make similar substances from fish muscle.

LACTOSE-FERMENTING BACTERIA FROM THE INTESTINAL CONTENTS OF MARINE FISHES. N. E. Gibbons, Fisheries Exp. Sta. (Atlantic), Halifax, N. S. (Read April 10, 1933). One hundred and twelve fishes, mostly taken in the vicinity of Halifax (2 at New Haven, Conn.) were examined for lactose-fermenting bacteria. Thirty-one strains were isolated which fermented lactose with the production of acid and gas and 3 which produced acid only. Ten strains belonged to the genus *Aerobacter*, 8 being *Aerobacter aerogenes* and 2 probably varieties of *Aerobacter cloacae*. Nine were soil types and the relationship of one was doubtful. Of 24 *Escherichia* types, 8 were fecal mammalian strains. These belonged to the species, *Escherichia coli*, *Escherichia communior*, *Escherichia grunthali* and *Bacterium immobilis*. One (*Escherichia grunthali*) was found in a haddock taken 3 miles off-shore; the others were found in fish taken near shore or in contaminated waters. Examination of the sea-water indicated that the off-shore fish were caught in unpolluted water; the shore fish were taken in water subject to land contamination. Lactose-fermenting organisms of



the coli-aerogenes type are not usually found in marine fish taken off-shore. They may be encountered in rare instances but are more common in fish taken near shore or in polluted waters.

RECOVERY OF SALT FROM FISH BRINES. D. LeB. Copoer and R. H. Squires, Fisheries Exp. Sta. (Atlantic), Halifax, N. S. (Read May 2, 1933). This experiment describes a possible method for the recovery of salt from brines contaminated by the process of salting fish. Recovery was attempted by the use of a semi-permeable membrane of cellophane. The results indicate that the salt diffuses readily but only one third of the protinaceous material diffuses in the time required to yield a practically saturated solution of salt inside the membrane. Graphs showing the preliminary results of the rate of diffusion of both salt and protinaceous material are given.