

PRESIDENTIAL ADDRESS.

G. H. HENDERSON.

(Read October 13, 1937).

In reviewing the events of the past year I have to refer with sorrow to the deaths during that period of no less than four of our members.

Mr. Justice Humphrey Mellish was elected to this Institute in 1932. A man of wide reading and scholarship, he was keenly interested in Nature and wild life. His kindly human qualities and gifts of wit and humour combined with his legal ability to make him one of the outstanding personalities of this Province.

In the death of Mr. Hector McInnes, K.C., we have to mourn the loss of one of our oldest members, for he had been a faithful member of the Institute since 1889. A man of wide interests, his continued support of our work was typical of the manifold services he rendered to a community which recognized him as one of its leading citizens. It is not out of place here to record his long association with Dalhousie University, of whose Board of Governors he was Chairman.

Dr. E. E. Prince had been a Corresponding Member since 1897. A native of England, he was for long Commissioner of Fisheries and Chairman of the Biological Board of Canada. He was widely known as an authority on the fishes of Canada and contributed several papers to our Proceedings.

Dr. D. F. Fraser-Harris was actively associated with the Institute from the time of his arrival from Scotland in 1912 to take the Chair of Physiology at Dalhousie until he was forced to retire through illness in 1923, when he became a Corresponding Member. For three years, 1915-1918, he ably filled the office of President. Although overloaded with teaching duties which are today shared by a considerable staff, he found time to do much important research, some of the results of which were published in our Proceedings. He was not only very successful as an expositor in his specialized field but showed talents of high order in lecturing and writing

on the broader aspects of Science for the general public. Dr. Fraser-Harris was also outstanding in his knowledge and appreciation of literature and history, as is evidenced by several books and many essays written both before and after his retirement from active scientific work. Rich in mind and heart, with high ideals of scholarship and character, he gave of himself unsparingly. He will long be remembered as one of the most distinguished members in the long history of the Institute.

The Institute will also miss the presence of two of its members who have left the city. One is the Rev. Brother Cornelia of St. Mary's College, a former member of Council, who has been transferred to New York. The other is Dr. Margaret Butler, who had the honour of being the first lady member of Council and who has now become Mrs. Daniel Morrison of Antigonish. Both of these members have been loyal and earnest supporters of the Institute and their absence will be regretted by all.

In the past year 6 Ordinary Members, 3 Associate Members and 5 Student Members were elected. Seven meetings of the Institute were held during the year at which 16 papers were presented. These may be classified as follows: Zoology and Fisheries, six; Chemistry, Biochemistry and Botany, two each; and Physics, Geology, Hydrology and Meteorology, one each. In December last Volume XIX, Part 2 of our Proceedings was published, containing 3 papers, 16 abstracts making a total of 56 pages.

The year just concluded was a notable one in that it was the 75th in the history of the Institute. The occasion was marked by a special meeting held in the School for the Blind on February 15th at which over 250 persons were present. After brief remarks on the history and purposes of the Institute by the President the address of the evening was delivered by Major-General A. G. L. McNaughton, C.M.G., D.S.O., President of the National Research Council of Canada, on "The Organization of Research in Canada." At the conclusion of his address the thanks of the meeting were extended to him

by the President and the meeting closed with the singing of the National Anthem.

Through this meeting and through a number of articles dealing with the Institute appearing in the Press, the activities of the Institute came prominently and favourably to the attention of the public. We are greatly indebted to General McNaughton for coming from Ottawa to give us his address. This will be printed in the forthcoming number of our Proceedings.

The Institute has members throughout the Maritime Provinces and Newfoundland and papers have been received frequently from Members residing outside the city of Halifax. In order to encourage further papers from outside sources and to facilitate attendance of their authors at our meetings, the Council has this year, as an experiment, made the innovation of offering to pay part of the travelling expenses of members coming from outside to present papers. Under this arrangement Dr. H. B. Hachey of the Atlantic Biological Station, St. Andrews, N. B., gave at the regular meeting on March 15th a paper on "Ekman's Theory Applied to Water Replacements on the Scotian Shelf". The very general interest which this excellent paper aroused encourages the hope that the scheme may prove to be successful in widening the scope of the Institute.

Through the goodwill of Dalhousie University a room has been provided on the top floor of the Science Building for the storage of the stock of back numbers of our Proceedings. Adequate shelving has been provided and we now have this valuable asset stored in a fireproof building under lock and key.

In June of this year the Mining Society of Nova Scotia celebrated its 50th Anniversary. The original members of the Society having been largely drawn from among our Members, it may well be considered the child of the Institute. At the celebrations, the Institute was represented by our First Vice-President, Dr. King, who extended our congratulations and good wishes to the Society, which had already extended similar felicitations earlier in the year at our own Anniversary.

In conclusion I wish to thank the Members most sincerely for the honour they have done me in selecting me as President. I wish to thank the Members of Council and particularly the Corresponding and Recording Secretaries, the Treasurer and the Editor for the great services they have rendered to the Institute.

PROCEEDINGS OF MEETINGS.

SESSION OF 1937-38.

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

*76th Annual Business Meeting*, October 13th, 1937. The annual address of the President was read by Dr. G. H. Henderson.

The Treasurer's Report showed that the receipts for the year amounted to \$1,463.82; expenditures \$1,299.61; leaving a balance of \$164.21. Included among the expenditures an item was estimated at \$750.00 to be paid very soon for the publication of the current "Proceedings" in the press. The Reserve Fund consists of \$248.62 in Dominion Savings and \$500.00 in Dominion of Canada 4% bonds. The Permanent Endowment consists of (a) Telephone Bonds, 6% to 1941, then 4% to 1966, \$1,000.00, (b) Two Dominion of Canada Bonds 4½%, \$1,000.00, (c) Dominion of Canada, 4%, \$500.00.

The Corresponding Secretary reported that during the past year 148 back numbers of the "Proceedings" had been sent out, and nine new addresses had been added to the exchange list.

The Librarian reported the total number of books and pamphlets in the Provincial Science Library was now 101,867. During the year 2146 books and pamphlets were received through the exchange list; 116 books were purchased; 60 volumes were bound; and 1030 books and pamphlets were borrowed.

The Editor reported that the current number of the "Proceedings" was in press.

Officers elected for 1937-38 were as follows:

President.....	Dr. G. H. Henderson.
1st Vice-President.....	Dr. H. S. King.
2nd Vice-President.....	Professor R. J. Bean.
Treasurer.....	D. J. Matheson, Esq.
Corresponding Secretary.....	Dr. Ernest Hess.
Recording Secretary.....	Dr. F. R. Hayes.

Librarian.....Harry Piers, Esq.  
 Members of the Council.....Dr. C. C. Coffin, Dr.  
 D. LeB. Cooper, E. W. Todd, Esq., Dr. Dixie  
 Pelluet, Harry Piers, Esq., Dr. D. B. Finn, Dr. C. B.  
 Weld.

Auditor.....Professor W. P. Copp.  
 Nominees to the Government as members of the Provincial  
 Science Library Commission: Dr. G. H. Henderson  
 and Dr. Ernest Hess.

*1st Ordinary Meeting*, Nov. 15th, 1937. New members announced (elected by Council November 1, 1937): Ordinary members; Dr. R. D. H. Heard, Wm. G. Dore, B.A., M.Sc., Dr. Rhoda Grant. Student members: Andrew Hollett, B.Sc., Clyde V. Myers, B.A., and Florence H. Armstrong.

Papers: The Influence of Hydrogen-ion Concentration on some Acid Resistant Bacteria by Dennis W. Watson. A Quantitative Study of the Changes in Fatty Constituents during Early Sea Urchin Development by F. Ronald Hayes. Haemoglobin Determination in Dogs by C. Beecher Weld.

*2nd Ordinary Meeting*, Dec. 6th, 1937. New members announced (elected by Council Nov. 29, 1937): Ordinary member, Dr. J. G. MacDougall. Student members: A. St. C. Grant, B.Sc., J. R. Downing, B.Sc., L. E. MacHattie, B.Sc., Jean W. McLellan, B. A.

Papers: The Decomposition of Methylene Esters and Paraldehydes at Low Pressures by J. R. Dacey; The Genesis of Pleochroic Haloes by G. H. Henderson.

*3rd Ordinary Meeting*, Jan. 17th, 1938. New members announced (elected by Council Jan. 3, 1938): Student members; J. R. Dacey, B.Sc., R. E. Smith.

Papers: The Estimation of Allantoin by Catherine F. Conway; Blood Volume in Dogs by C. Beecher Weld; A Pipette for the Micro Estimation of Respiratory Gases by F. Ronald Hayes.

*4th Ordinary Meeting*, Feb. 14th, 1938. New associate member announced: Albert E. Roland, M.A.

Demonstration: A Self-indicating and Recording Balance by A. L. Wood. Papers: The Origin of Russeting in the Golden Russet Apple by H. P. Bell; The Protein of the Casing of Salmon Eggs by E. Gordon Young and W. Robert Inman; A New High Vacuum Gauge by C. C. Coffin.

*5th Ordinary Meeting*, March 14th, 1938. New ordinary member announced (elected by Council Feb. 28, 1938): A. L. Wood, B.Sc., B. E.

Papers: Temperature Characteristics for Certain Fresh Waters by R. H. M'Gonigle; The Assay of the Oestrus-inducing Gonadotropic Principle of Human Pregnancy Urine on the Dietary Anoestrus Adult Rat by R. D. H. Heard and S. S. Weinstein; The Bird Life of the Grand Manan Archipelago by O. S. Pettingill.

*6th Ordinary Meeting*, April 11th, 1938. New ordinary member announced (elected by Council March 28, 1938): C. Morton Shipley, B.Sc.

Papers: Hearing Acuity Tested in the Rat by the Alimentary-motor Conditioning Method by Rhoda Grant; A New Ketone from the Urine of Pregnant Mares by R. D. H. Heard. Demonstration: Kodaline Reflex Printing by Donald Mainland.

*7th Ordinary Meeting*, May 9th, 1938. New ordinary member announced: Dr. Richard L. de C. H. Saunders.

Papers: The Heat Capacity of Bismuth between  $-80^{\circ}$  and  $120^{\circ}$ C. by L. E. MacHattie; The Fish Population of Lake Jesse, Nova Scotia by M. W. Smith; Organic Sulphur Compounds in Coal Gas by F. B. Maddock.

F. RONALD HAYES,

Recording Secretary.

## ABSTRACTS.

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

**THE INFLUENCE OF HYDROGEN-ION CONCENTRATION ON SOME ACID RESISTANT BACTERIA.** Dennis W. Watson, Dept. of Biochemistry, Dalhousie Univ., Halifax, N. S. (Read Nov. 15, 1937). Fifty-three strains of bacteria resisting acid environments have been isolated and classified. Hydrogen-ion concentration tolerances have been determined under carefully controlled conditions. Proteolysis as revealed by ammonia production has been determined throughout the pH range 6.5-3.5. Micro-aerophilic species have been divided into groups according to their acidogenic, proteolytic and acid tolerant characteristics. Certain cellular reactions to hydrogen-ion concentration have been discussed.

**A QUANTITATIVE STUDY OF THE CHANGES IN FATTY CONSTITUENTS DURING EARLY SEA URCHIN DEVELOPMENT.** F. Ronald Hayes, Dept. of Zoology, Dalhousie Univ., Halifax, N. S. (Read Nov. 15, 1937). Periodical estimations were made of the total fat, sterol and phospholipid during the first 40 hours of development of *Arbacia*. The total fat decreases up to the time of hatching (8 hours), then increases for some 10 hours, and later decreases again. The sterol concentration remains unchanged throughout the period studied. Owing to fluctuations in the phospholipid readings, a definite conclusion could not be drawn as to whether this material is utilized as a source of embryonic energy. Of the total fat in an egg some 12.4 per-cent is sterol, and 60 per-cent phospholipid.

**HAEMOGLOBIN DETERMINATIONS.** C. B. Weld, Dept. of Physiology, Dalhousie Univ., Halifax, N. S. (Read Nov. 15, 1937). In the course of investigations relating to the measurement of blood volumes, a number of determinations of haemoglobin have been made. These have been done by the Van Slyke manometric oxygen capacity method, and by the Newcomer, Kny-Scheerer, and Sahli colorimetric methods upon the bloods of several dogs under varying conditions. The results of the haemoglobin determinations indicate that the ratio of the values obtained by the different methods is not always the same. The ratio differs in different dogs, and in a single dog it may change under different conditions.

**THE DECOMPOSITION OF METHYLENE ESTERS AND PARALDEHYDES AT LOW PRESSURES.** J. R. Dacey, Dept. of Chemistry, Dalhousie Univ., Halifax, N. S. (Read Dec. 6, 1937). By means of an optical lever manometer the decomposition velocities of methylene diacetate, ethylidene diacetate and paracetaldehyde have been determined down to initial pressures of 1/10 mm. In no case was any falling off in the rate constant observed so that the minimum number of internal degrees of freedom contributing energy to the molecular breakup is respectively 10, 12 and 15.

**THE GENESIS OF PLEOCHROIC HALOES.** G. H. Henderson, Dept. of Physics, Dalhousie Univ., Halifax, N. S. (Read Dec. 6, 1937). Four new types of pleochroic haloes recently described by the writer (*Nature*, 140, 191, (1937)) are due to radioactive elements of relatively short life. In attempting to explain the origin of these haloes it is sug-

gested that they were formed before the close of hydrothermal activity in the rocks in which they appear. It is supposed that the "parent elements" of the haloes, in radioactive equilibrium with longer lived predecessor elements, were found in hydrothermal solutions diffusing through channels or narrow clefts in the already formed biotite. At certain points in the channel where conditions were favourable for their precipitation, the parent elements were deposited and the formation of one or another of the new types of pleochroic haloes began. As the solution flowed past the point of precipitation freshly formed atoms of the parent element would be deposited and in the course of time sufficient radioactive material would have been collected in the nucleus to form a recognizable halo. This hypothesis is supported by detailed consideration of the various types of haloes.

**THE ESTIMATION OF ALLANTOIN.** Catherine F. Conway, Dept. of Biochemistry, Dalhousie Univ., Halifax, N. S. (Read Jan. 17, 1938). The Fosse-Maurot method for the estimation of allantoin permits a recovery of allantoin ranging from 65-95% from solutions having approximately the same titre. An investigation showed that the conditions of the method were not standardized. It was found that the potassium allantoate standard is reliable only when used immediately after preparation. Particular care must be taken during the development of the color produced by the phenylhydrazone of glyoxylic acid in the presence of concentrated hydrochloric acid and potassium ferricyanide. The solution must be heated in a bath at 100°C for exactly two minutes and immediately plunged into an ice-salt bath at -10°C. When these conditions are maintained, the intensity of the color developed is directly proportional to the concentration of the solution, when the titre of the solution is from 10-100 mgms. per litre. Cooling below -15°C increases the intensity of the color by an amount proportional to the cooling. It has also been found that complete hydrolysis of allantoin to allantoic acid is effected by heating for fifteen minutes at 90°C in 0.1 N NaOH. The allantoinase used by Fosse is unnecessary. The author's method recovers allantoin quantitatively from pure solution having a titre ranging from 5-100 mgms. per 100 cc. of solution with an error of  $\pm 3\%$ . The Larson and Christman methods and the author's modification were compared on urine. The Larson and Christman were found to be unreliable and did not recover added allantoin quantitatively. The author's modification did recover added allantoin quantitatively.

**BLOOD VOLUMES IN DOGS.** C. B. Weld, Dept. of Physiology, Dalhousie Univ., Halifax, N. S. (Read Jan. 17, 1938). Determinations of the volume of the circulating blood has been done in dogs, using the dye method with Brilliant Vital Red. It was found to range between 7% and 13% of the body weight in twenty-seven apparently normal dogs, the figures being fairly consistent in any one dog. On the day following a "Whipple Closed Loop" operation (intestinal obstruction) before vomiting becomes prominent, dogs appear well except for being somewhat apathetic. At this time the blood volume has dropped by some 20-40% and the plasma volume by 30-50%. Normal animals deprived of water for 2 or 3 days show a reduction in both blood and plasma volume in the order of 30%. Bleeding the operated animals to the extent of removing 10-20% of their original blood volume kills them at once, whereas removal of 20-25% of the original blood volume from the dehydrated dogs is well tolerated. Normal animals, two to four hours

after removal of 20-25% of their blood, show an increase in the plasma volume of some 15-20% and only a slight reduction in blood volume. It is suggested from these findings that anhydremia and dehydration are not the only causes of death in the obstruction dogs, but that some "shock"-like condition is contributing.

**THE ORIGIN OF RUSSETING IN THE GOLDEN RUSSET APPLE.** Hugh P. Bell, Dept. of Botany, Dalhousie Univ., Halifax, N. S. (Read Feb. 14, 1938). About the time of full bloom, many epidermal cells divide by a tangential wall. Later in June all the epidermal cells become vacuolated and some divide again by tangential walls forming a layer varying from two to four cells thick. Early in July a cambium is initiated in the innermost cells of epidermal origin. This cambium is very active and immediately gives off cells which differentiate into cork. Non-russeted portions may have either a very thick convoluted cuticle or a double layer of cuticle. The development of the periderm and the histology of the mature protective layers are illustrated by fifteen figures.

**THE PROTEIN OF THE CASING OF SALMON EGGS.** E. Gordon Young and W. Robert Inman, Dept. of Biochemistry, Dalhousie Univ., Halifax, N. S. (Read Feb. 14, 1938). The protein of the egg casings of *Salmo salar* has been prepared and analyzed. It has been found to be insoluble in all ordinary solvents and slowly hydrolyzed by pepsin. The content of certain amino acids has been determined as follows:—cystine 1.84% tryptophane 1.42% tyrosine 5.12% histidine 1.26% lysine 3.51% arginine 5.79%. The ratio of histidine: lysine: arginine is as 1:3:4. The protein has been classed as a pseudokeratin.

**A NEW HIGH VACUUM GAUGE.** C. C. Coffin, Dept. of Chemistry, Dalhousie Univ., Halifax, N. S. (Read Feb. 14, 1938). A high vacuum gauge, based on the thermal conductivity of gases at low pressures, has been developed. Pressure measurements are made by determining the rate of escape of carbon dioxide from a vessel filled with "dry ice" and immersed in the gas. The construction, calibration, advantages and disadvantages of the gauge are discussed.

**THE ASSAY OF THE OESTRUS-INDUCING GONADOTROPIC PRINCIPLE OF HUMAN PREGNANCY URINE ON THE DIETARY ANOESTRUS ADULT RAT.** R. D. H. Heard and S. S. Weinstein, Dept. of Biochemistry, Dalhousie Univ., Halifax, N. S. (Read March 14, 1938). The chief disadvantages of the familiar infantile rat test for the oestrus-inducing gonadotropic principle are variation in sensitivity with age and degree of accuracy attained. In most laboratories the latter is seriously restricted by the limited number of available young females of the same age. A system of assay using the dietary anoestrus adult rat (vitamin B deficiency) has been evolved which largely overcomes these objections and provides several additional advantages. The results of more than 1500 individual determinations clearly establish the suitability of the test object. The well known procedure of considering the percentage response of an adequate number (20) of animals at varying dose levels has been followed. Subdivision of the dose is unnecessary; vaginal cornification persists for 24 hours or more following a single injection of active extract. Age, degree of avitaminosis and body weight (within comparatively wide limits) are without influence. A number of successive tests (at least nine) can be carried out on the same group without appreci-

able disturbance in sensitivity. Dosage-response curves have been constructed for three strains of rats and have been analyzed by statistical methods.

HEARING ACUITY TESTED IN THE RAT BY THE ALIMENTARY-MOTOR CONDITIONING METHOD. Rhoda Grant, Dept. of Physiology, Dalhousie Univ., Halifax, N. S. (Read April 11, 1938). The use of this method in testing the hearing acuity in the rat was described and illustrated by slides of the apparatus and of graphic records of the motor responses to sound stimuli. This investigation has shown that it is possible to use rats in problems concerned with the hearing mechanism. The hearing thresholds found in a number of normal and hypophysectomized rats for different frequencies (10,000, 5000, 1000, 100 cycles) were given and briefly discussed. With the purpose of correlating possible functional changes with structural changes serial sections had been made of the middle and internal ear of the normal and hypophysectomized rat. Slides from photomicrographs of a number of these were shown.

A NEW KETONE FROM THE URINE OF PREGNANT MAES. R. D. H. Heard, Dept. of Biochemistry, Dalhousie Univ., Halifax, N. S. (Read April 11, 1938). Combustion figures indicate the empirical formula  $C_{19}H_{26}O_3 \pm C \pm 2H$  for the new ketone. It gives a golden yellow color with the Liebermann-Burchardt reagents and a yellow to orange solution with a green fluorescence on warming with concentrated sulfuric acid. Esterifiable hydroxyl groups are absent; no product was obtained with acetic anhydride at 100°. Quantitative hydrolysis of the semi-carbazone and its composition clearly establish the fact that only one oxygen atom is present in a reactive carbonyl group. The nature of combination of the remaining two oxygen atoms has not been determined.

THE HEAT CAPACITY OF BISMUTH BETWEEN -80° AND 120° C. Lloyd E. MacHattie, Dept. of Physics, Dalhousie Univ., Halifax, N. S. (Read May 9, 1938). The apparatus and methods employed have been fully described in previous papers by H. L. Bronson and co-workers (*Can. of Research*, 8, 282-303 (1933); 9, 84-93 (1933); 14, 181-199 (1936); N. S. I. S., 18, 222 (1933); 19, 211 (1936)). It was thought that the specific heat of bismuth might behave anomalously but nothing peculiar was found. In fact the linear equation,  $C_p = .1238_s + .0000445 t$ , giving the heat capacity in terms of centigrade temperature in joules per gram does not differ from the experimental curve by as much as .1% at any point. However, it is quite obvious that the slope of the experimental curve is definitely changing at both ends of the temperature range. The equation,

$$C_p = \frac{1}{209.0} D\left(\frac{119}{T}\right) + 3.997 \times 10^{-7} T^{1.703} \text{ in which } D\left(\frac{119}{T}\right)$$

is the Debye function, 119 the characteristic temperature of bismuth,  $T$  is the absolute temperature, and the units are joules per gram, has considerable theoretical interest and fits the experimental curve so accurately that one would feel justified in considerable extrapolation.

ORGANIC SULPHUR COMPOUNDS IN COAL GAS. F. B. Maddock, Dept. of Chemistry, Dalhousie Univ., Halifax, N. S. (Read May 9, 1938). The suitabilities of sodium plumbite solution, sodium hydroxide solution, and mercuric chloride solution for removing organic sulphur

compounds from coal gas have been investigated. Sodium plumbite solution and mercuric chloride solution were found to be unsuitable. By the use of sodium hydroxide solution some indications of the presence of mercaptans in Halifax coal gas were obtained. Organic sulphur compounds are removed from Halifax coal gas by scrubbing with oil. When the oil is stripped of its benzol the latter contains the sulphur compounds removed from the gas. From the results of experiments to determine the nature of the organic sulphur compounds in this benzol, it is concluded that carbon disulphide and methyl mercaptan occur in the coal gas. Very probably thiaphene is present as well. Organic sulphides are believed to be absent. In addition there is some evidence to suggest that ethyl mercaptan and the methyl thiaphenes may also be present. While methyl mercaptan has frequently been quoted as a possible constituent of coal gas, it is believed that, hitherto, no evidence to support this view has been brought forward.