

## ABSTRACTS

**THE SYSTEMIC EFFECTS OF MALIGNANCY.** R. W. Begg, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read November 14, 1949). Systemic effects in tumor-bearing animals are regarded as those changes which take place in tissues remote from the actual tumor, and in which no evidence is found of invasion by malignant cells. In rats bearing tumors, hemoglobin, liver catalase activity, adrenal and thymus weights, adrenal cholesterol, ascorbic acid, and liver glucogen were determined, and the adrenal glands subjected to histological examination. The material is presented to show that the degree of the systemic effects is a function of the relation of tumor size to body weight.

**A NUTRITIONAL SURVEY OF YOUNG CHILDREN IN HALIFAX, N. S.** Ada V. MacLeod and E. G. Young, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read November 14, 1949). A survey of 55 children, 1 to 6 years of age, has been carried out by means of dietary records, supplemented by anthropometric measurements, physical, urinary and hematological examinations, and assessment of age of calcification by radiographs. The observations were repeated after six months.

Quantitative data have been obtained relative to twelve essential nutrients, the levels of consumption have been compared with modern dietary standards, and have been considered in relation to physical state and growth. From the results it has been possible to construct curves relating body weight to consumption for some nutrients, and to arrive at average figures per kilogram or per 1000 Cals. for others. The period of two to three years of age has been shown to be a critical one in the nutrition of children.

**THE ACTIVITY OF ENZYMES EXTRACTED FROM ULTRAVIOLET IRRADIATED YEAST CELLS.** K. D. Stewart and J. G. Aldous, Pharmacology Dept., Dalhousie University, Halifax, N. S. (Read November 14, 1949). This investigation has been undertaken to determine whether the lethal action of ultraviolet light is a specific one on the enzymes of the intact cell or whether it is an all-or-none effect.

Suspensions of the cells of Baker's yeast were irradiated with sufficient dosage of the radiation to render 50 percent of the population non-viable. After washing, the cell preparation was dried and ground in a Wiley mill. From this powder various enzymes were extracted and their activities determined. The 'specific activity' of each preparation was expressed as;

$$\frac{\text{activity of aliquot}}{\text{N content (mg) of aliquot}}$$

Similar (control) preparations were made from unirradiated material and their specific activities determined. The results for five enzyme systems showed that cozymase, carboxylase, and hexokinase activities were all depressed by an amount in keeping with the depression of cell division (50 percent). On the other hand, alcohol and lactic dehydrogenases exhibited virtually no inhibition of activity.

**THE INFLUENCE OF ADRENAL CORTICAL EXTRACT ON THE SYSTEMIC EFFECTS OF TUMORS IN RATS.** R. W. Begg, T. E. Dickenson, and D. G.

Withers, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read December 12, 1949). From previous evidence it is apparent that rats bearing tumors pass through the stages of the 'alarm reaction' and come into a phase of adrenal cortical failure. Under the circumstances tumor bearing animals might be expected to benefit from the exhibition of adrenal cortical extract.

Upjohn's Lipo Adrenal Cortex was given in large doses to rats bearing the Walker 256 carcinoma and the effect on tumor and host compared with oil injected controls. Only the hemoglobin level was altered to a significant degree by the treatment. It is probable that some other factor than the adrenal cortical failure is responsible for malignant cachexia and death.

EXCHANGE OF MATERIALS IN A LAKE STUDIED BY THE ADDITION OF RADIOACTIVE PHOSPHORUS BELOW THE THERMOCLINE. J. A. McCarter, F. R. Hayes, L. H. Jodrey and M. L. Cameron, Departments of Biochemistry and Biology, Dalhousie University, Halifax, N. S. (Read December 12, 1949). Approximately 100 millicuries of radioactive phosphorus in the form of potassium dihydrogen phosphate was introduced into the hypolimnion of a small acid-bog lake by causing a bottle containing a solution of the material to burst about 3 metres below the thermocline and about 1 metre above the bottom. The depth of water at the point of introduction of the bottle was 6 metres. After bursting the bottle the distribution of the radioactive phosphate through the waters of the lake was followed by withdrawing and analyzing samples of water from different localities and from different depths. Samples of ooze from the bottom of the lake were also taken for measurement of their content of radioactive phosphorus.

It was found that the radioactive phosphate moved through the hypolimnion in a lateral direction at a rate which did not exceed 1 foot per hour. Although it moved as far as 42 metres in a lateral direction, the extent of its movement vertically appeared to be not greater than about 1 metre, i.e., it did not penetrate the thermocline to a measurable extent. The radioactive phosphorus appeared early in the mud of the lake bottom, and its concentration there increased to such values as to suggest that the major part of the radioactive phosphorus added to the lake was removed by the mud, probably by a process of exchange of phosphate between the mud and water.

THE EFFECT OF TISSUE DISINTEGRATION ON THE DETERMINATION OF LIVER CATALASE ACTIVITY. T. E. Dickinson and R. W. Begg, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read December 12, 1949). During the course of investigations it was observed that liver catalase activity was greater when rat liver was disintegrated in a Waring Blendor than when ground with sand in a mortar. Evidence was presented showing that the monomolecular reaction constant  $K$  became progressively greater as liver was (a) ground lightly in a mortar, (b) ground thoroughly and, (c) homogenized in the Waring Blendor, despite dilution to constant amounts of nitrogen and tyrosine in all cases.

THYMUS TUMORS IN RATS. R. W. Begg, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read January 16, 1950). During investigation of the effect of testosterone propionate on rats two tumors of the thymus were noted. These proved to be reticulum cell sarcomas.

By an estimation of the alkaline phosphatase content it has been shown that there is a formation of new connective tissue during thymus involution caused by steroid hormones. The possibility that this new formation of connective tissue may go on to malignant transformation was discussed.

**EFFECT OF REVERBERATION ON SPEECH INTELLIGIBILITY.** R. H. Bolt and A. D. MacDonald, Physics Dept., Dalhousie University, Halifax, N. S. (Read January 16, 1950). A general statistical theory is developed for the masking effect of reverberation on the intelligibility of words. Speech is considered a series of discrete pulses distributed statistically over a 30-db range in sound pressure level in a given frequency band. The articulation index is calculated as a function of reverberation time, using preliminary values of speech pulse lengths and spacings obtained from Visible Speech spectrograms. The percent articulation for words is then calculated from the articulation index and is compared with Knudsen's experimental values. The theoretical values agree precisely with the measured values at reverberation times less than two seconds and differ by less than 17 percent out to six seconds. The calculations are extended to include a combination of background noise and reverberation.

**SOME NEW RESULTS ON THE BEHAVIOUR OF THE GULF STREAM.** W. L. Ford and F. C. Fuglister, Naval Research Establishment, Halifax, N. S. (Read January 16, 1950). This paper presents a description of the Gulf Stream system between Cape Hatteras and 60° W. Long. and a qualitative analysis of the water masses in its surface layer based on observations taken during the period November 15 to December 6 1948. The 'cold wall' edge of the Stream was explored for 1050 miles of its length. The meanderings of the stream and its tendency to develop large eddies are demonstrated. Surface current velocities are given for many points; flows in excess of 5.5 knots were found on several occasions.

A temperature-salinity analysis of the surface layer shows that four basic water types are involved in the system. These are Gulf Stream water itself, Sargasso water from the Sargasso Sea, slope water from that region between the Gulf Stream and the 100 fathom line and, lastly, shelf water which originates on the continental shelf. The occurrence and interplay of these water types is discussed. One noteworthy feature is that as the Gulf Stream flows eastward from Cape Hatteras it is modified by the addition of Sargasso water only. No evidence of the absorption of slope waters was found.

**THE THEORETICAL COMPUTATION OF THE PHYSICAL PROPERTIES OF SIMPLE SOLIDS.** W. J. Archibald, Physics Dept., Dalhousie University, Halifax, N. S. (Read February 13, 1950). Starting with the law of force between atoms an attempt is made to compute the thermodynamic functions for the solid state of simple substances such as argon, neon, etc. The methods of statistical mechanics are employed and the model of the solid state to which the calculations refer is that suggested by Einstein according to which each atom may be treated as an harmonic oscillator. The immediate objective of the paper is to deduce the equation of state.

**A BRIEF SURVEY OF THE THEORETICAL CONSIDERATIONS CONCERNING THE RESISTANCE EXPERIENCED BY BODIES OF VARIOUS SHAPES IN PASSING THROUGH FLUIDS.** A. W. Mattis, Naval Research Establish-

ment, Halifax, N. S. (Read February 13, 1950). An account was given of the basic principles of the boundary layer theory, and the consequent derivation of the formulae for the drag exerted by fluids on a body passing through them. The range of conditions considered was from the classical Stokes theory up to Reynolds numbers of order  $10^5$ . The dependence of the pressure drag and the viscous drag on the shape of the body was dealt with in some detail, and it was explained how the boundary layer equations can be used for approximate solutions when the exact ones are unattainable. In conclusion a brief account of empirical data was given.

THE USE OF A BOLOMETER AS A MOLECULAR BEAM DETECTOR. C. A. Reilly, Chemistry Dept., Dalhousie University, Halifax, N. S. (Read March 13, 1950). The central problem in any research using a molecular beam is that of detection. The adaption of a platinum strip bolometer cooled with liquid nitrogen to the detection of molecular beams was shown. The bolometer consists of two strips of platinum each about 30 m wide and 10 mm. long rolled from Wollaston wire of core diameter 0.0004 inches. These two strips form two arms of a Wheatstone bridge, the unbalance of which, due to the molecular beam falling on one strip is detected by a Perkin-Elmer D.C. Breaker Amplifier. This amplifier is linear and its output is taken as a measure of the molecular beam intensity. This system has been used successfully to detect beams of various molecules and also a beam of free methyl radicals.

A FURTHER EXPERIMENT ON THE ADDITION OF RADIOACTIVE PHOSPHORUS TO A LAKE. F. R. Hayes, J. A. McCarter, M. L. Cameron, and D. A. Livingstone, Depts. of Biology and Biochemistry, Dalhousie University, Halifax, N. S. (Read April 3, 1950). In July, 1949, 1000 milligrams of radioactive phosphorus were added to Bluff Lake, in the quartzite-granite area west of Halifax. The lake is geologically primitive, has a volume of  $11.5 \times 10^4$  cubic metres, and the water is unstratified. It thus provides a contrast to the lake studied during the previous summer. The added phosphorus was followed by means of periodic water, plant, and mud analyses for a month, and the rate of uptake studied. It appears that there is a continual exchange between water and mud at such a rate that a complete turnover of the water phosphorus occurs every ten days. The participating store of phosphorus in the mud is also continually released to the water, but at a slower rate, being totally exchanged every three months.

A CALIBRATING INSTRUMENT FOR SIMULATING THE TEMPERATURE AND PRESSURE CONDITIONS IN THE SEA. J. R. Longard, Naval Research Halifax, N. S. (Read April 3, 1950). An instrument has been developed at the Naval Research Establishment to simulate in the laboratory conditions of temperature and pressure met with at sea. It was built specifically for the calibration of a bathythermograph, but is generally applicable to testing other oceanographic equipment. To aid in illustrating the method of operation a description of the bathythermograph and the more recently developed sea-sampler is given. In the calibration chamber temperatures of  $30^\circ$  to  $90^\circ$  F. can be obtained with an accuracy of  $0.05^\circ$  F. and pressures can be applied simulating depths to 900 ft. with an accuracy of 5 ft. and to 450 ft. with an accuracy of 2 ft. In performing a bathythermograph calibration certain known depths

and temperatures are traced on a smoked slide. The slide is then superimposed on an adjustable grid representing depth and temperature coordinates which upon being photographed gives the completed calibration grid.

**ELECTROPHORETIC AND ENZYMIC ANALYSES OF THE PANCREATIC JUICE OF THE DOG.** G. M. Byrne, J. I. Phinney, M. Schachter and E. G. Young, Biochemistry Dept., Dalhousie University, Halifax, N. S. (Read May 9, 1950). Pure juice has been obtained by direct cannulation of the main pancreatic duct from dogs with permanent gastric and duodenal fistula. Chemical estimations have been made of the amylolytic, lipolytic and proteolytic activities of pancreatic juice secreted in response to various physiological and pharmacological stimuli. A portion of each sample has been subjected to electrophoretic analysis and fractionation in a Tiselius-Longworth apparatus. The concentration of total protein has varied between 0.2 and 6 percent depending on the stimulus but it was usually between 1 and 3 percent in response to food. The electrophoretic pattern at pH 8.6 in barbiturate buffer has consistently shown six peaks, exclusive of the false boundary. The distribution has been relatively constant and independent of the nature of the stimulus. This appears to be true also of the enzymic activity of the juice.

Evidence has been obtained to identify the B boundary as associated with proteolytic activity and the F boundary with amylolytic activity. The former comprised approximately 30 per cent and the latter 10 per cent of the proteins present. The A boundary possessed a relatively high ionic mobility and comprised only about 2 percent of the total protein. D was the major component and accounted for about 40 percent. Components C, D and E have not yet been identified.

**THE ACTIVITY OF ENZYMES EXTRACTED FROM YEAST CELLS EXPOSED TO RADIATION FROM RADON.** K. D. Stewart and J. G. Aldous, Dept. of Pharmacology, Dalhousie University, Halifax, N. S. (Read May 9, 1950). This is a supplementary study to the action of ultraviolet radiation upon the enzymes of the intact yeast cell. Differences between the actions of these two forms of radiation are reported and discussed.

**A CYTOLOGICAL STUDY OF THE OVOTESTIS IN CERTAIN PULMONATE GASTROPODS.** Anne H. G. Watts, Biology Dept., Dalhousie University, Halifax, N. S. (Read May 9, 1950). In this paper the ascorbic acid, mitochondria, and alkaline phosphatase content of normal developing germ cells is described. Deviations from the normal after experimental treatment, such as irradiation and exposure to low temperatures, are reported.

**THE CYTOLOGY OF THE MOLLUSCAN CELL.** Muriel J. Ord, Biology Dept., Dalhousie University, Halifax, N. S. (Read May 9, 1950). The cytoplasmic and nuclear constituents have been studied in the cells of the ovotestis of certain land pulmonates, with particular reference to the changes from young indifferent cells to highly differentiated male and female germ cells. This work has been done in two parts; A—the golgi apparatus was studied from its first appearance in the young germ cells to the characteristic form in the spermatid and egg cells; B—a mitotic poison, B B<sup>1</sup> DichloroDiethyl Methylamine Hydrochloride, was used to find its effects on the young indifferent cells, and also on the more specialized male and female cells.