

ABSTRACTS

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

THE NUTRITIONAL VALUE OF THE PROTEINS OF SOME SEAWEEDS AND FISH PRODUCTS. By W. W. Hawkins and B. A. Larsen, Atlantic Regional Laboratory. (Read November 14, 1960). Standard tests with young rats were applied to investigate the digestibility and the nutritional quality as protein of the nitrogenous constituents of the following materials: dried, alkali-extracted preparations of the seaweeds *Chondrus crispus* and *Laminaria digitata*; dried, defatted cod and haddock muscle (fish flour); dried autolystate of cod and haddock stomach and intestines (visceral meal); dried, partly defatted cod liver (liver meal). Egg albumin and casein were used as reference proteins.

From data obtained the following values were calculated; digestibility as the proportion of the ingested nitrogen which was absorbed; protein efficiency ratio, as the gain in body weight associated with the ingestion of a given quantity of nitrogen; biological value, as the proportion of the nitrogen absorbed from digestion which was retained. In these measures of nutritional quality egg albumin is a standard protein of high rank.

The digestibility of the nitrogenous materials of the seaweed preparations was about 70% that of egg albumin. The biological value of the *Chondrus crispus* preparation was 90% and that of the *Laminaria digitata* preparation 75% that of egg albumin. Their protein efficiency ratios were considerably less than half that of egg albumin.

The digestibility and protein efficiency ratio of fish flour were the same as those egg albumin, and its biological value 90% of the value for egg albumin.

The digestibility of visceral meal was the same as that of egg albumin, and of liver meal 90% that of egg albumin. Their protein efficiency ratios were respectively 12% and 30%, and their biological values 86% and 81% those of egg albumin.

These tests established fish flour as an excellent source of dietary protein. Visceral meal and liver meal were not, mainly because of poor metabolic use of nitrogen absorbed from them. The seaweed preparations were poor sources of dietary protein principally because of their poor digestibility. The metabolic use of the nitrogen absorbed from *Chondrus crispus* was good, and of that from *Laminaria digitata* was poor.

DOSE AND EFFECT IN EPIDERMAL CARCINOGENESIS. By J. K. Ball and J. A. McCarter, Dalhousie University. (Read November 14, 1960). Epidermal tumors were produced in the skin of CFW female mice treated with a single application of croton oil. The number of tumors produced per surviving mouse was related directly to the logarithm of the amount of the hydrocarbon that penetrated the skin.

STUDIES ON THE RELATIONSHIP PERIPHERAL RESISTANCE AND STROKE VOLUME IN A CIRCULATION SYSTEM. By W. Josenhans, Dalhousie University. (Read January 9, 1961). When investigating parameters of the human ballistocardiogram, it was found that a sudden change in the peripheral resistance (pressure-flow-ratio) has an equally sudden influence upon the ballistogram. The volume calculated by the Klensch-formula increased when the peripheral resistance dropped, with a delay of about 1/4 of a second. In order to explain the phenomenon a model experiment was carried out which will be described in more detail. The conclusions are that peripheral resistance directly and immediately changes

stroke volume by means of hydrodynamic coupling without involving any biological mechanism.

MEASUREMENT OF LOW PERMEABILITY IN CERAMIC TEST PIECES. By S. G. Whiteway, Atlantic Regional Laboratory (Read January 9, 1961). The apparatus described uses a pressure decline method for measuring the flow of gases through a permeable specimen. The final measurement is a time interval, automatically recorded by an electric timer. The relationship between this timer and the permeability is shown for viscous and molecular flow. The apparatus can be used to decide which type of flow is occurring.

SOME BIOCHEMICAL FEATURES OF SCALLOP MUSCLE PROTEINS. By J. J. Matsumoto, Fisheries Experimental Station. (Read January 9, 1961). The biochemistry of the muscle proteins have been attracting the interest of scientists, because these play a dominant role in the activity of muscle of which differ both in structure and in function.

In the present paper, some observations on scallop muscle proteins will be presented.

The proteins of the white adductor muscle of the scallops are more soluble in salt solution of low molarity than the vertebrate muscle proteins, while their extracts show similar behaviour by ultracentrifugal analysis. On the other hand, the scallop proteins differ somewhat from those of some molluscs such as the squid. The distribution of the protein fractions of the mantle muscle of the scallops appears different from those of the adductor muscle.

THE AMINO ACID COMPOSITION OF COD TROPOMYOSIN. By P. L. Hoogland, H. C. Freeman, Beryl Truscott, and A. E. Waddell, Fisheries Experimental Station. (Read February 13, 1961). A purified tropomyosin was prepared from the muscles of Atlantic cod (*Gadus callarias*). The amino acid composition of this preparation was determined by automatic chromatography. From the results, the number of residues of each amino acid occurring in the tropomyosin molecule was calculated. The obtained values were compared with those reported for other tropomyosins.

INTERACTION BETWEEN OCEAN WAVES AND CURRENTS. By R. W. Stewart, Dalhousie University (Read February 13, 1961). Water waves propagating in regions where the horizontal current speeds are not uniform, are not only refracted, but suffer changes in wave length, wave height and wave energy. This results not only from well known "wave kinematic" effects but from an energy transfer between the waves and the currents.

GRAVITY MEASUREMENTS IN NORTHERN NOVA SCOTIA. By J. E. Blanchard, Dalhousie University. (Read February 13, 1961). Measurements of the earth's gravitational field in Northern Nova Scotia show significant variations which can be attributed, in part, to evaporites deposited in the Mississippian system. Quantitative interpretations of the observations yield much geological information.

RESULTS OF STUDIES CARRIED OUT ON THE PASSAMAQUODDY POWER PROJECT. By R. W. Trites, Atlantic Oceanographic Group. (Read March 13, 1961). In 1956, the International Joint Commission established two Boards to consider the engineering and economic feasibility of the power project and to forecast the effects that these structures would have on the fisheries of the region. The effect of the proposed installation on physical oceanographic conditions is considered here.

The proposed project involves the construction of a series of dams across the mouth of the Passamaquoddy and Cobscook Bays. Passamaquoddy Bay, the proposed high pool, will be filled near high water by 90 filling gates, and Cobscook Bay, the proposed low pool will be emptied near low water by 70 emptying gates. Water will flow from the high pool to the low pool through a 30-turbine powerhouse, generating continuous, but fluctuation power. Oceanographic conditions within the impounded areas will be markedly altered. Tidal ranges and currents will be reduced, while greater seasonal variation in temperature and salinity of the surface layer is anticipated. Outside the dams, only relatively minor changes are expected.

OZONOLYSIS OF MONOETHYLENIC FATTY ACIDS. By R. G. Ackerman, M. E. Retson, and F. A. Vandenheuvel, Fisheries Technological Station. (Read March 13, 1961). The position of the double bond in ethylenic fatty acids may be determined by oxidative fission and examination of the products. An ozonolysis technique is described giving high product yields, a minimum of secondary oxidation, and total recovery of the dicarboxylic acids. Analyses, using gas-liquid chromatography, require careful selection of column packing materials.

SHELL-HEAP ARCHAEOLOGY AND SOME FAUNAL REMAINS. By J. S. Erskine, Wolfville, Nova Scotia. (Read April 10, 1961). During 1960 a number of Indian campsites were excavated, chiefly on the South Shore. These showed a division of Nova Scotian Algonkian culture into two sub-cultures, the "Souriquoian" in the south west, the "Nigumakhian" from Lunenburg County east and northward. Oysters and quahogs were shown to have survived in Mahone Bay until about the eleventh century and quahogs at least until the thirteenth century in St. Margaret's Bay. The appearance of caribou in Nova Scotia can be recognized in the thirteenth century, and they seem to have replaced white-tailed deer by the fifteenth century. Periwinkles (*Littorina Littorea* Linne) were found in two sites of the thirteenth century by St. Margaret's Bay, and the dating was supported by carbon-testing.

ANALYSIS OF BALLISTOGRAMS BY MEANS OF A CIRCULATION MODEL. By W. Josenhans, Dalhousie University. (Read March 13, 1961). A circulation model was developed which (a) gives a ballistogram nearly identical to the human ballistogram, (b) has similar values as in man of infarcadial and intraarterial pressures, pulse rate and stroke volume.

Parameters such as stroke volume, heart rate, blood pressure, flow ratio upper to lower body were varied one at a time and their influence was determined on the ballistogram. The size and shape of the ballistogram will be explained in so far as these experiments carry us.

PHENANTHRENE, AN ANTI-INITIATING AGENT. By T. Y. Huh and J. A. McCarter, Dalhousie University. (Read May 8, 1961). Phenanthrene applied at the same time as the carcinogenic hydrocarbon 9, 10-dimethyl-1, 2-benzanthracene to the skin of the CFW female mouse inhibited the tumorigenic activity of the latter substance.

THE APPLICATION OF CLASSICAL COLLISION THEORY TO PROBLEMS OF ENZYME PHYSIOLOGY. By J. G. Kaplan, Dalhousie University. (Read May 8, 1961). The catalase activity of intact, anaerobically grown, yeast cells is not cryptic, that is, lysis of the cell does not reveal additional activity. Despite this, the activation energy for the enzyme-substrate system is considerably higher for the intact anaerobic cell (919Kcal./mole) than for the cell lysed by treatment with butanol (46.

Kcal./mole). An attempt has been made to explain this phenomenon in terms of classic collision theory, applying the equation $k'' = A \exp(-H^*/RT)$ where the terms have their usual meanings and A is the frequency factor, defined by the following relation: $A = P Z$, where Z is the collision number and P the so-called steric factor. P may be considered a correction to take into account that the colliding molecules must have the proper orientation in order for the reaction to occur. Calculations of the steric factor (P) have been made, yielding a value of 2×10^2 for the intact cell enzyme and 1×10^{-2} for the lysed cell enzyme. This difference of four orders of magnitude has been interpreted to indicate that the enzyme in the intact cell is oriented in such a way as to make an activated collision with substrate much more probable than after the enzyme has been released from its intracellular configuration by lysis. Since $\log P$ is proportional to the entropy of activation, it follows that S has gone down following lysis (by approx. 20 e.u.). It is believed that classical collision theory provides a more helpful picture of the consequences of cell lysis than does the theory of absolute reaction rates.

THE STRAWBERRY VIRUS. By D. L. Craig. (Read Valley Chapter February 6, 1961). The Kentville Research Station's application of fundamental research to the problem of strawberry viruses was explained in detail.

In 1949 Nova Scotia strawberry stock has reached an advanced stage of degeneration. Improvement through selection and propagation of superior clones did not obtain the desired results. Virus was found to be the cause of plant degeneration. Most varieties, *Fragaria vesca* to be symptomless virus carriers and the wild strawberry *Fragaria vesca* was found to be virus sensitive and therefore a suitable indicator plant.

A scheme was devised by the Research Station and the Provincial Department of Agriculture for the propagation and distribution of virus free strawberry plants. This scheme is in effect at the present time. This scheme has been a major factor in the recent doubling of strawberry acreage in the province and in the substantial yield increases that have occurred.

Plants expressing a number of known viruses were demonstrated. The newly discovered soil viruses were discussed as was the possibility of obtaining tolerance to virus by the application of plant breeding techniques.

It was suggested that the program for the production of virus-free strawberry plants could and should be extended to other fruit crops such as the red raspberry.

THE UTILIZATION OF SPHAGNUM PEAT BOGS FOR CROP PRODUCTION. By D. C. MacKay and E. W. Chipman. (Read Valley Chapter, March 6, 1961). Experiments initiated in 1952 have indicated that sphagnum peat bogs, when cleared and drained, provide a good physical media for growth of economic plants. In general peat soil is a poor source of plant nutrients and requirements for the major elements, nitrogen phosphorus and potassium are high. Calcium and magnesium are necessary as well, and are supplied by dolomitic limestone which is also required to correct the acidity. Of the trace element nutrients, boron has given response with some crops and recently molybdenum deficiency has been identified.

The extreme acidity and other conditions have presented problems not encountered in other organic soils or in inorganic soils. It is expected

that a thorough experimental program will continue to provide answers to these questions as they arise, and that these areas will be valuable agricultural soils in the future.

ERRATA

Volume 25, Part 1. "The Orthoptera of Nova Scotia," by V. R. Vickery.

Page 2, para. 6, lines 5 and 6	—	For 'Colchester' read 'Hants'.
Page 7, para. 5, line 4	—	For ' <i>Chorthophaga</i> ' read ' <i>Chortophaga</i> '.
Page 37, para. 4, line 4	—	For 'Cholchester' read 'Hants'.
Page 38, line 11	—	For ' <i>Nemotettix</i> ' read ' <i>Nomotettix</i> '.
Page 33 line 2	—	Insert 'Hist. Nat. between 'Mem' and 'Ins'.
Page 59 line 14	—	For ' <i>Acryptera</i> ' read ' <i>Arcyptera</i> '.
Page 61 line 3	—	For ' <i>Chorthophaga</i> ' read ' <i>Chortophaga</i> '.
Page 69 line 17	—	For ' <i>Chorthophaga</i> ' read ' <i>Chortophaga</i> '.
Page 70 line 18	—	For '(Chorthopaga)' read '(Chortophaga)'.
Page 70 line 19	—	For '44' read '43'.