

ABSTRACTS

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

THE HUMAN REQUIREMENTS OF THIAMINE. E. Gordon Young, Dept. of Biochemistry, Dalhousie University, Halifax, N. S. (Read November 12, 1945). An analysis of the data of a dietary survey carried out by the individual method amongst individuals receiving incomes of \$450-\$1500 per annum per family in Halifax, N. S. has been done relative to the intake of thiamine expressed per 1000 Calories. This survey included 385 individuals in 82 families. The average consumption was 0.20 mgm. for men, with a range of 0.13 to 0.43; 0.19 mgm for women, with a range of 0.12 to 0.43; and 0.22 mgm. for children, with a range of 0.09 to 0.45. Expressed on the basis of non-fat calories the averages were 0.37, 0.35, and 0.37 mgm. respectively. In no case was clinical thiamine deficiency evident.

CHANGES IN THE INORGANIC CONSTITUENTS OF DEVELOPING SALMON EGGS. F. R. Hayes, Dept. of Biology Dalhousie University, Halifax, N. S. (Read November 12, 1945). Sodium, potassium, calcium, magnesium, chloride, and phosphorus have been estimated in the coelomic fluid bathing ripe eggs, in the eggs before and after water hardening, and in the embryo and yolk during development. There appears to be insufficient sodium and calcium to supply needs, for these ions alone are taken up from the surrounding water. In the embryo, calcium and organic phosphate increase in molar concentration during development; other ions show no marked changes. In the yolk, potassium decreases in molar concentration during development, which means that the embryo is specifically selecting this ion; other ions are little changed.

LIPEMIA, BLOOD LIPIDS, AND HEPARIN. C. B. Weld, Dept. of Physiology, Dalhousie University, Halifax, N. S. (Read November 12, 1945). The ability of heparin injected intravenously to reduce the visual opacity of a plasma showing alimentary lipemia has been extended to olive oil and oleic acid as well as cod liver oil. If lipemic plasma from one animal is injected at a constant rate into another animal, a lipemia is readily induced and this is cleared by heparin despite the continuation of the injection of lipemic blood.

If a continuous injection of an artificial oil emulsion (cod liver oil, 5 to 20 % in 5 to 7% isinglass, emulsified in a Waring Blender) is performed intravenously there is no lipemia unless excessive amounts are given, when the lipemia becomes evident first in arterial blood and only later in venous blood. The oil globules are demonstrable histologically in lung and cause oil embolism of the coronary vessels with heart failure.

Fractionation of the blood lipids into total lipid (alcohol-ether soluble), free lipid (ether soluble), and combined lipid (ether insoluble, alcohol-ether insoluble), and lipid phosphorus has been done. All fractions rise with the development of lipemia by some 20 to 30 % while the optical density of the plasma is increased some 8 to 10 fold. After

heparin administration the lipid fractions remain unchanged though the optical densities return nearly to normal.

Microscopic study of the plasma and estimation of the chylomicron counts show that proportionately the chylomicron changes are much greater than the optical density changes. Further studies are being undertaken to ascertain whether or not agglutination of the chylomicrons may occur.

THE INFLUENCE OF TRIMETHYLAMINE OXIDE UPON THE GROWTH OF BACTERIA. C. H. Castell, Atlantic Fisheries Experimental Station, Halifax, N. S. (Read December 10, 1945). Trimethylamine oxide, which is present in relatively large amounts in many sea fish, has a selective action on certain types of bacteria. One per cent added to agar media reduced the bacterial count of fresh fillets approximately 50% and brought about varying reductions in the counts from many other materials. By using pure cultures it has been shown that the inhibiting action of the oxide is confined to certain gram-positive organisms. These findings are in agreement with the generic succession that is known to occur in the microflora of fish as it spoils. The original flora, consisting predominantly of gram-positive micrococci is succeeded by a group of gram-negative rods.

THE KINETICS OF LYSOLECITHIN HEMOLYSIS. H. B. Collier, Dept. of Biochemistry, Dalhousie University, Halifax, N. S. (Read December 10, 1945). The effect of various factors upon the hemolysis of rabbit erythrocytes by lysolecithin (prepared with rattlesnake venom) has been investigated by a photoelectric method. It has been found that the action of lysolecithin is dependent upon cell concentration, has a negative temperature coefficient, and is optimal at pH 6. The action is accelerated in hypotonic solution, but the lysis decreases hypotonic fragility. Cholesterol inhibits, as does serum or plasma.

ABSORPTION OF TRYPAN BLUE FROM THE HUMAN KNEE JOINT. R. L. Saunders and E. G. Young, Depts. of Anatomy and Biochemistry, Dalhousie University, Halifax, N. S. (Read January 28, 1946).

Trypan blue in saline solution has been injected into a living normal knee joint one hour prior to amputation. During this time 99% was absorbed and microscopic examination revealed that the dye had stained only lightly the synovial and subsynovial tissues. In general the synovial cells were devoid of dye granules but these were visible in the macrophages, the fibroblasts, and the monocytes.

The same amount of trypan blue was injected into the ankle joint after amputation. After five hours 88% had been absorbed but much of this remained fixed in the synovialis and both cells and matrix showed intense staining to a depth of 2 mm. It is concluded that trypan blue is absorbed rapidly from the normal knee joint mainly by diffusion

into the blood and to a much less degree via the lymph and by phagocytosis. Circulation to the joint is shown to be an important factor.

PROTEIN AND FAT AS ENERGY SOURCES FOR THE DEVELOPING SALMON EGG. Andrew Hollett, Dept. of Biology, Dalhousie University, Halifax, N. S. (Read January 28, 1946). Estimations of protein and fat before hatching fail to show a loss of either despite recorded respiratory measurements which suggest a loss of some 0.6 mg. of fat. An egg weighing 130 mgm. starts off with 25 mgm. of protein, of which 45% is consumed during development; for fat the corresponding figures are 9.4 mgm. and 77%. The dried embryo, when the yolk is gone, weighs 17.3 mgm. The ratio of calorific output as embryo to input as yolk is 43%. Carbohydrate plays no appreciable part as an energy source. Non-protein nitrogen increases steadily throughout development, being stored in the embryo. The carbohydrate, protein, fat sequence of energy sources, said to be of general application, could not be demonstrated; a more likely one is fat, protein, fat, protein.

THE INFLUENCE OF TEMPERATURE ON THE RESPIRATORY TOLERANCE OF YOUNG GOLDFISH (*Carassius auratus L.*) Virginia S. Black, F. E. J. Fry, and Edgar C. Black, Department of Physiology, Dalhousie University and Ontario Fisheries Research Laboratory, University of Toronto. (Read January 28, 1946). The ability of goldfish to use oxygen in the presence of dissolved carbon dioxide was determined at 1°, 7°, 15°, 20°, 25° and 32° C. A group of fish was acclimated to one of the above temperatures. Each fish was then placed in a half-pint sealer of water containing a known amount of carbon dioxide and oxygen. The sealer was completely filled, tightly sealed, and kept at the temperature at which the fish had been acclimated. When the fish had used all the oxygen possible and showed no signs of life, the bottle was opened and the water analyzed for carbon dioxide and oxygen. When the tension of carbon dioxide in mm Hg (abscissa) is plotted against the oxygen tension (ordinate) for each fish, a curve can be constructed showing that above a certain carbon dioxide tension the fish is unable to use all the oxygen in the water. It was found that the position of the rise in the curve changed with change in temperature of acclimation. At 1°C the curve rose at 60 mm carbon dioxide; at 7°, 110 mm; at 15°, 120 mm; at 20°, 140mm; at 25°, 160mm and at 32°, 190mm. As the temperature to which the fish was acclimated was increased, the ability of the fish to withstand dissolved carbon dioxide also increased. This change in tolerance with temperature may indicate a means of physiological adjustment whereby the fish can more readily unload oxygen from the blood to the tissues at low temperatures where the affinity of the blood for oxygen is greater than at high temperatures.

AN APPARATUS FOR DYNAMIC SORPTION STUDIES. M. R. Foran, J. A. Pearce, C. A. Winkler, S. G. Davies, and J. D. B. Ogilvie, Dept. of Chemistry, McGill University, Montreal, P. Q., and Dalhousie University, Halifax, N. S. (Read March 18, 1946). An

apparatus for determining continuously the weight of vapor from an air stream by a porous sorbent, and the amount escaping, is described. Typical data and the manner of analysing them to show the influence of such factors as the concentration of the vapor, the bed depth, temperature, linear velocity of the air-gas stream, and the previously sorbed material is shown. The general features of sorption and dynamic sorption are shown in relation to the accepted theories of the mechanism of sorption and layer filtration. This manner of determining the equilibrium and history of a sorption process is of particular important to those interested in hydration or dehydration studies at atmospheric pressure.

CORROSION IN CANNED FISH IN PLAIN CANS. Andrew Hollett, Fish Inspection Laboratory, Halifax, N. S. (Read May 6, 1946) Metallic odour and flavour of canned herring and mackerel in plain cans was found to be proportional to the concentration of extractable iron. There was also a rise in pH with increase in corrosion. No relation was found between the tin content and corrosion, metallic odour and flavour being due largely, if not entirely, to the iron dissolved from the steel base plate.

THE DISTRIBUTION OF THIAMINASE IN THE TISSUES OF SOME AQUATIC ANIMALS OF NOVA SCOTIA. J. B. Neilands, Atlantic Fisheries Experimental Station, Halifax, N. S. (Read May 6, 1946.) The visera and muscle of a number of aquatic animals have been tested for thiaminase activity. Chemical and yeast methods have been used for residual thiamine assays. The enzyme was found in a greater proportion of the fresh water and invertebrate species.

STERILIZATION OF SEA-WATER WITH ELECTRICALLY PRODUCED SILVER IONS. C. H. Castell, D. Ellis and G. Anderson, Atlantic Fisheries Experimental Station, Halifax, N. S. (Read May 6, 1946). It has long been known that minute traces of certain heavy metals in contact with a liquid have a germicidal action on bacteria suspended in the liquid. This reaction may be accelerated by passing a current of electricity through the liquid, using the heavy metal as the anode. Machines based on this principle have been manufactured in Nova Scotia and are being sold among others, to commercial fish plants, for purifying their water supplies. In the interest of the fishermen, tests have been made to determine the value and efficiency of these machines when used on sea-water. The results obtained indicate that because of the formation of insoluble silver salts this process is of no value with sea-water.