Since K is considered a measure of the available energy of an acid molecule which plays a role in the receptive processes, a relationship between K and other measures of the free energy of the molecule might be expected. Such a relationship would be apparent only if both energy measures were similar functions of the total energy of the molecule. For example, heat of combustion increases by 153 Cal. for each CH_2 group which is introduced into the dicarboxylic acid molecule. K increases by approximately 2.9 units up to succinic, beyond which there is little change with increasing CH_2 groups. The dissociation constants rapidly decrease up to succinic, beyond which there is little change. Thus a relationship may exist between K and the physical and chemical constants in so far as these particular constants may be a relative measure of the free energy of a molecule which is involved in stimulation.

A study of the dicarboxylic acid derivatives was chiefly a comparison of certain sterioisomers. Those used as stimulating agents were maleic and fumaric acids, d, l, and i malic acids, d, l, i, and m tartaric acids, saccharic, and mucic acids. In general it may be stated that those isomers having very similar physical and chemical properties have the same constants in the equation, while those of widely different properties have different constants in the equation. In general the more chemically active member of an isomeric pair is the more efficient stimulating agent. To illustrate these points two examples will be considered. All the isomeric tartaric acids have very similar physical and chemical properties and they give the same constants in the equation for stimulation. Both maleic and fumaric acids have practically the same heats of combustion and give the same K value in the equation. They differ widely in other properties, maleic being the more active chemically. Maleic is also the more efficient stimulating agent as shown by its higher n value in the equation.

For the dicarboxylic acids the order of effectiveness in stimulation is: pimelic = adipic = glutaric = succinic > malonic > oxalic. For the derivatives of the dicarboxylic acids the order of effectiveness depends on the concentration.

STUDIES UPON RENAL FUNCTION IN MARINE TELEOSTS

ALLAN L. GRAFFLIN and others, *Harvard University*

1. The effect of blockage of the gastro-intestinal tract upon urine formation in a marine teleost, *Myoxocephalus octodecimspinosus.* With DAVID ENNIS.

Obstruction of the gastro-intestinal tract of the sculpin at the pyloric end of the stomach results in a marked shut-down in urine formation, marked loss in body weight, and ultimately death. In the later stages the chloride content of the urine falls to low values or even to zero, while PO_4 continues to be excreted. Our experiments confirm the interpretation that the regulation of body weight and blood composition in marine teleosts is effected primarily by the con-

tinuous ingestion and absorption of sea water; and they add new evidence that the diuresis and high chloride excretion observed under certain conditions is an aggravation of this process initiated by trauma to the skin and consequent water loss through this route. (Completed paper submitted for publication in *Jour. Cell. and Comp. Physiol.*)

2. The occurrence of trimethylamine oxide in the urine of sculpin and flounder. With R. G. GOULD, assisted by GORDON SPENCE.

In the course of the summer a large quantity of sculpin and flounder urine was collected and suitably preserved (chloroform-toluol or 1% sulfuric acid). Analysis of the urine for all of the known nitrogenous constituents showed that in both animals approximately fifty per cent of the nitrogen was still unaccounted for. A large proportion of this undetermined nitrogen was subsequently isolated as trimethylamine oxide.

3. Observations upon natural and induced fluorescence in the kidney of the sculpin, *Myoxocephalus octodecimspinosus*. With M. J. EISENBERG.

The sculpin kidney shows a definite, though pale, natural fluorescence, somewhat more intense in the renal tubules than in the collecting ducts. The bladder urine shows quite marked natural fluorescence, which accounts for the variable definition of the lumina in the renal tubules and collecting ducts. Studies of the kidney during the excretion of fluorescein show the presence of the dye in good concentration in the cells of the renal tubules, and in variable concentration in the lumina. The collecting duct system shows concentrated dye in the lumina, but only natural fluorescence of the cells. We were unable to analyze the mode of appearance of the dye in the renal cells. These studies of natural and induced fluorescence (fluorescein, aesculin and acriflavine) give evidence of only one segment in the sculpin nephron, although Defrise, on cytological grounds, has divided the tubule into two segments, both showing brush border. It seems fairly certain from these studies that the concentration of the provisional urine takes place gradually as it passes along the tubule. The kidneys were found entirely free of fluorescein about thirty hours after relatively heavy dosage.

HISTOLOGY OF THE BRANCHIAL EPITHELIUM IN TELEOST FISHES

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The following report is a brief summary of the histological findings in regard to the occurrence of specialized epithelial tissue in the gills of a fairly representative group of teleosts.

The presence of specialized epithelium in the gills of fishes is particularly significant inasmuch as it has been suggested on the basis of physiological evidence (Smith, 1932) that the gills are responsible for extra renal secretion of several monovalent salts. The histological