No fundamental differences have been found between nephrocytes of aglomerular and glomerular nephrons, nor between these and the nephrocytes which compose the first portion of the proximal segment of the tubule of mammals. The chondriome, the chromophile substance of the Golgi complex (substance 0), and the apical zone (border and flagellate diplosome) all have the same morphological structure in the vertebrates. This is noteworthy because it justifies functional homologies between structurally similar tubular segments. Notwithstanding this fundamental similarity, nephrons of different species are composed of nephrocytes which present certain differences characteristic of each. The presence of the glomerulus at the end of the tubule apparently modifies the functional cycle of the nephrocyte by including a phase of reabsorption in the functional cyle of the cell. It has been proved that the kidney cell transports substances from the lymph into the lumen of the tubule. The attempt has been to increase experimentally this secretory work.

Particularly important results have been obtained in the aglomerular nephron. Water and caffein, which have no diuretic effect on the aglomerular nephron, do not modify the cellular structure. Urea has a diuretic effect in the aglomerular nephron but its elimination does not noticeably modify the structure of the nephrocyte. This is in perfect accord with the physiological results which demonstrate that the aglomerular nephron is not able to concentrate this substance. Magnesium sulphate acts directly upon the nephrocyte, in both the aglomerular and glomerlar nephron. This substance, from a cytological point of view, exhausts the renal cell, but allows restitution similar to that of the action of pilocarpine on the pancreatic cell. Magnesium sulphate, which is highly concentrated by the kidney, in doses producing no irreparable changes in the cell causes: loss of cytoplasmatic substance, diminution of the chondriome, modifications and diminution of the chromophil portion (substance 0) of the Golgi complex. These induced cytological modifications do not differ from that which are usually interpreted as a "secretory cycle."

RENAL FUNCTION IN THE ELASMOBRANCH FISHES

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It is known that the teleostean fishes regulate the water and salt content of their blood and tissues by ingesting sea water and excreting the Na, K and Cl by way of the gills. The osmotic work involved in this branchial salt excretion, which is of a considerable order of magnitude, serves to offset the tendency for the organism to become osmotically concentrated while living in a *milieu* of high osmotic pressure.

The elasmobranch fishes have amended the teleostean mode of osmotic regulation by the conservation of the end-product of nitrogenous metabolism, urea. The gills, oral membranes and integument

have been rendered relatively impermeable to urea, and the kidneys have acquired the capacity to conserve this substance so that it accumulates in the blood (to the extent of 2 to 2.5 per cent) until the osmotic pressure of the latter is significantly greater than the *milieu extérieur;* in consequence of this osmotic relationship water is absorbed directly, probably by the gills, and made available for the excretion of salts and metabolic waste products in the urine. This active renal conservation of urea is apparently effected by the reabsorption of urea by the renal tubules from the glomerular filtrate.

The observations of Marshall and Grafflin, that glucose can not be excreted by the aglomerular fish kidney, suggested that non-metabolized sugars might be used to evaluate the quantity of glomerular filtrate in fishes and higher animals. For this purpose, we have chosen the pentose, xylose, the excretion of which has been extensively examined in the dog by Jolliffe, Shannon and Smith. Measurements made upon dog-fish, *Squalus acanthias,* show that from 90 to 98 per cent of the urea which must be passed into the glomerular filtrate is normally reabsorbed by the renal tubules; this fraction is greatly reduced by diuresis and by phlorizin. Thiourea, a substance closely resembling urea in physical properties, but differing from it in chemical properties and especially by the fact that it is not decomposed by urease, is almost completely rejected by the dog-fish kidney. Thus the reabsorption of urea is a highly specific process.

By comparisons with xylose it is found that PO_4, Mg and administered creatinine are copiously secreted by the dog-fish kidney in addition to the moiety of these substances which is excreted by simple filtration. The secretion of creatinine and to a lesser extent the secretion of PO_4 and possibly SO_4 are apparently depressed by phlorizin —a result to be anticipated in view of the remarkable action which this drug exerts in depressing the reabsorption of glucose in the renal tubules. In view of this depressing action it is believed that the kidney of a phlorizinized animal is unsuitable for physiological investigations.

The observation of Buijtendijk that medullary *piqure* induces diuresis and the copious excretion of urea in elasmobranchs was not confirmed.

Observations on the Mg and SO_4 content of the urine of the sculpin indicate that the diuresis induced by trauma, etc., (as reported by Grafflin) is in part attributable to an increased tubular excretion of Mg and SO_4. Further studies on the blood flow and glomerular filtrate during this condition are contemplated.

REFLEX CARDIAC INHIBITION OF BRANCHIO-VASCULAR ORIGIN IN THE ELASMOBRANCH, SQUALUS ACANTHIAS

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Receptors which are especially important in regulating the circulation appear to be located in the vascular organs of elasmobranchs