Applying these principles to the total non-protein nitrogenous products, it is found that in a subject of average weight, for every gram of nitrogen retained, the non-protein nitrogen of the blood should be increased 1.33 mg. per 100 c.c. According to these calculations, in the cases presented here, if none of the retained nitrogen were assimilated or stored, and all of it circulated as waste-nitrogen because the kidneys did not excrete it, the figures shown in the table would be obtained.

This table shows that a positive balance of nitrogen in cases of nephritis on a mixed diet is not necessarily followed by a corresponding increase in the non-protein nitrogen of the blood. It is evident that discretion must be exercised in interpreting a normal figure for non-protein nitrogen of the blood as indicating that no nitrogen retention has taken place, and in considering a positive nitrogen balance as an absolute indication of the inability of the kidney to excrete this substance.

7 (1071)

On the occurrence and distribution of potassium in normal and nephropathic kidney cells.[1]

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The observations which are contained in this summary are based on the microchemical demonstration of potassium in the kidney cells of thirty-four dogs. The animals have varied in age from four months to something over ten years. Four of the animals may be grouped as "normal animals." They did not receive any nephrotoxic substance and neither were they subjected to the action of an anesthetic. After a period of three days of observation these animals were killed by shooting.

The remaining thirty animals were rendered nephropathic by uranium nitrate in the dose of 4 mg. or 6.7 mg. per kilogram. They were anesthetized by either Gréhant's anesthetic in 60 per cent. strength, or by morphine-ether.

[1] Aided by a grant from the fund for scientific research of the American Medical Association.

At the termination of the experiment small pieces of kidney tissue were removed, and frozen sections not over 20 micra in thickness were made. The sections were treated at once with Erdmann's[1] reagent as modified by Macallum[2] and used by him in his studies "On the Distribution of Potassium in Animal and Vegetable Cells."

The reagent which consists in a solution of the hexanitrite of cobalt and sodium serves as a complete precipitant of potassium from its solutions, in the form of an orange-yellow precipitate of the triple salt. If the salt is present in minute quantities the crystalline form is absent. To render the detection of small quantities of the salt possible, Macallum[3] used ammonium sulphide to react with the cobalt of the salt and form the black sulphide of cobalt which is easily detected. This suggestion of Macallum's has been employed in the demonstration of potassium in all of the sections.

The results which have been obtained are as follows.

1. The epithelial cells of the normal dog kidney show only traces of potassium. The potassium is most marked in the loops of Henle and is fairly evenly distributed throughout the cytoplasm of the cells. It has never been demonstrated within the nucleus of the normal cell.

2. The epithelium of the nephropathic kidney shows an increase in potassium over that of the normal. The potassium differs in distribution within the cytoplasm of the cell and has been demonstrated within the nucleus of the cell.

3. The potassium in the nephropathic organs has been especially marked in the cells of the convoluted tubules. In the cytoplasm of the cells forming these tubules the potassium is not uniformly distributed but is found to collect along the free margin of the cells bordering the lumen of the tubule. A similar observation on the distribution of potassium salts was first made by Macallum[4] in his studies of the frog kidney in which a decinormal solution of potassium chloride was injected into the dorsal lymph sacs of frogs.

[1] "Anorganische Chemie," 1898, p. 630. Reference given by Macallum.

[2] *Jour. Phys.*, Vol. XXXII, No. 2, p. 98.

[3] *Loc. cit.*

[4] *Science*, Vol. XXXII, No. 824, p. 497.

4. Such accumulations of potassium salts are as marked in the kidney epithelium of nephropathic animals which are polyuric, as they are in the nephropathic animals which have been rendered anuric.

5. The above observation would tend to minimize the importance of potassium in being responsible for a lack of function on the part of the kidney.

6. The age of the animal has apparently no constant influence on the amount of potassium microchemically demonstrable. However, the oldest animal of this series showed the most marked potassium precipitate. In this animal, and one other of the series, which were anuric from uranium, and in which the epithelium of the convoluted tubules had undergone a severe swelling and partial necrosis, not only did the cytoplasm of these cells give the potassium reaction but potassium was also demonstrated in the nucleus of the cell.

8 (1072)

The action of animal extracts upon the flow of bile.

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Our experiments were made upon etherized cats. We injected secretin at intervals and determined that equal doses of secretin were followed by equal increments in the bile secretion. The cystic duct was previously ligated close to the common duct into which a glass cannula was inserted. After determining the effect of a dose of secretin, we waited some time and then injected an equal dose of secretin plus the infusion of the animal extract. The drops of bile were counted for five-minute periods. We found that adrenalin and the hypophysin of Führer (pituitrin) greatly slowed the secretion. Pancreas slightly diminished the secretion. Thyroid extract had hardly any effect. Tonsil extract caused a marked increase. Thymic extract decreased it. Parathyroid, mammary and corpus luteum had no action.