5454

Correlation of Uric Acid Production with Growth of Kidney Tubules in Chick Embryos.

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In previous microchemical studies it was shown[1] that uric acid is the chief end-product of nitrogen metabolism in chick embryos, that it begins to accumulate in the allantoic cavity sometime during the fifth day of incubation and that the rate of its excretion rises, in general, proportionally with the body weight. By the end of the first 13 days of incubation the allantoic fluid contains, on the average, 15 mg. of uric acid dissolved more or less completely in about 6 cc. of water. These facts have sufficed to prove that the mesonephros is an active excretory organ and that protein is burned by the developing embryo to a significant degree.

The present article represents a continuation of this cooperative study with Dr. Fiske, in which attention has been focused on the morphological development of the mesonephric tubules. As a basis of study 7 serially sectioned chick embryos from the Harvard Embrological Collection, ranging from 5 to 14 days of incubation, were selected for reconstruction. These were graded embryos that had been collected and serially sectioned, some years before, under the supervision of the writer. Every third section throughout the length of the mesonephros of each embryo was drawn to scale under an Edinger projection apparatus. On these drawings each glomerulus was systematically recorded and the total number counted. Then, by the Born method, wax models of the Wolffian bodies were reconstructed. Finally, at a much higher magnification, 7 mesonephric tubules—one from each embryo, and selected from comparable portions of the left Wolffian body—were reconstructed in wax. The modelling of these tubules proved to be a difficult undertaking, especially in the 55 mm. embryo where the convolutions were exceedingly tortuous. After the models were completed, the total volume of each was obtained by submerging it in water and measuring the displaced fluid. Then each model was divided into glomerular, secreting and collecting portions, and the volumes of the 3 parts separately measured.

By these methods it was ascertained that in the period ranging from 5 to 14.2 days of incubation the Wolffian body (including both vascular and nephrogenic tissue) increases its volume approximately

[1] Fiske and Boyden, *J. Biol. Chem.*, 1926, **70**, 535.

12 times, although the total glomerular count shows no significant increase. During the same period representative tubules increase their volume approximately 16 times. The most striking feature, however, is the inequalities of growth manifested by different parts of the mesonephric tubule. Thus, while the renal corpuscle is increasing its volume approximately 3 times, and that of the collecting portion of the tubule about 10 times, the secretory tubule increases its volume about 33 times.

As a check on the growth of the renal corpuscle 6 glomeruli from each embryo were separately modelled and their volumes ascertained. These figures show that although the glomerular knot, as contrasted with the whole renal corpuscle, is becoming more lobulated, it increases in volume only 2⅐ times during the period from 5 to 14.2 days of incubation. Incidentally it is of interest to note that the mesonephric glomerulus of the 14.2 day chick is about 50 times the size of a glomerulus from the metanephros of the same embryo. (The tubular portions were too small to model.)

Similarly, linear measurements of the mesonephric tubules indicate that the secretory portion of the tubule is the part that is elongating most rapidly. Thus, from 5 to 14.2 days of incubation—when the whole mesonephric tubule (including the glomerulus) is increasing in length approximately 6⅓ times, and its collecting portion about 3½ times—the secretory portion increases 9 times in length.

From a preliminary analysis of this data, therefore, it is apparent that during the period when uric acid is being increasingly excreted, the secreting portion of the mesonephric tubule is the part that is growing the fastest.

5455

Developmental Potencies of Explanted Quadrants of Hensen's Node.

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This article is part of a series of studies designed to test the potencies of the embryonic chick blastoderm, particularly that part of the primitive streak designated as Hensen's node. When this node, in stages prior to the formation of the head-process, is transplanted to the chorio-allantoic membrane of 9-day chicks, the grafts