

TABLE I  
Analysis of Hemoglobin.

	Cystine %	N %	S %	Fe %	Atomic ratio S: Fe
Horse	0.41	16.70	0.39	0.33	2.05
Sheep	0.60	16.83	0.73	0.32	4.00
	0.61				
Dog	1.17	16.48	0.57	0.33	3.02
	1.24				
	1.09				
	1.15				
Average	1.16				

The differences in the yields of cystine from these 3 hemoglobins are particularly striking and suggest that the yields of other amino acids from hemoglobins of different origin may likewise vary widely.

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### Experimental Fetal Nephritis.

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The problem of uranium poisoning in the pregnant animal has been investigated by MacNider, Helms, and Helms,<sup>1</sup> who found that during gestation susceptibility to this poison is especially marked, and that the changes in the blood, urine, liver, and kidneys, as well as the clinical course, resemble certain major toxemias of pregnancy in man.

Our interest in this problem has been to determine whether the fetus likewise suffers from the intoxication. The series studied at Beirut comprised 4 dogs, 10 rabbits, one normal pregnant dog and one normal pregnant rabbit for control. More recently observations have been made on 2 dogs, 6 rabbits, and one cat. The results with the latter group are essentially the same as those in the first group, the data for which are outlined in Tables I and II. Uranium acetate was used in our experiment. MacNider and his associates employed uranium nitrate.

<sup>1</sup> MacNider, W. deB., Helms, S. T., and Helms, S. C., *Bull. Johns Hopkins Hosp.*, 1927, **40**, 145.

Regarding the effect on the pregnant animal, our results confirm those of MacNider, Helms, and Helms, who employed injections of 4 mg. of uranium nitrate per kg. We used smaller doses in most

TABLE I

Animal	Uranium Acetate		Injected Date	Delivery	Death
	Wt. Kg.	Amount Mg.			
Dog 1	12	36	Oct. 10	Oct. 13, 4 puppies living, 1 dead.	Oct. 21, due to hemopericardium following heart puncture.
" 2	5.2	20.8	" 10	Oct. 17, dog moribund. Hysterectomy; 2 living puppies, 1 dead.	Oct. 18.
" 3	7.1	14.2	Nov. 14		Nov. 18, 4 fetuses near term; 1 macerated fetus.
" 4	11.6	11.6	" 2	Dec. 2, dog delivered a separated placenta; next morning 1 dead puppy found in cage.	Autopsied Jan. 18.
Rabbit 1	2.15	10	Oct. 13	Oct. 17-18, 3 dead young.	Oct. 21.
" 3	2	10	" 21	Oct. 22, premature separation of placenta, 1 dead fetus near term.	Oct. 27.
" 5	1.83	10	Oct. 31		Nov. 4, 5 fetuses removed.
" 8	2.36	5	Nov. 29	Dec. 5, 4 dead and 1 living young, appeared somewhat premature.	Dec. 6.

of our experiments in an attempt to obtain living offspring and found that 1 mg. per kg. in the case of dogs was sufficient to produce a very marked intoxication.

A brief statement of the microscopic findings is given in Table II. The changes in the glomeruli were found to be somewhat variable, both in the mother and young, but greater uniformity was noted in the case of the tubules. Such variations as occurred could be explained on the basis of such factors as dosage, duration of the intoxication, and the opportunity for reparative processes. Marked dilatation of the convoluted tubules (Fig. 1), suggestive of cystic kidney, was a frequent occurrence in the new born, especially in the puppies. This was apparently due to obliteration of the collecting

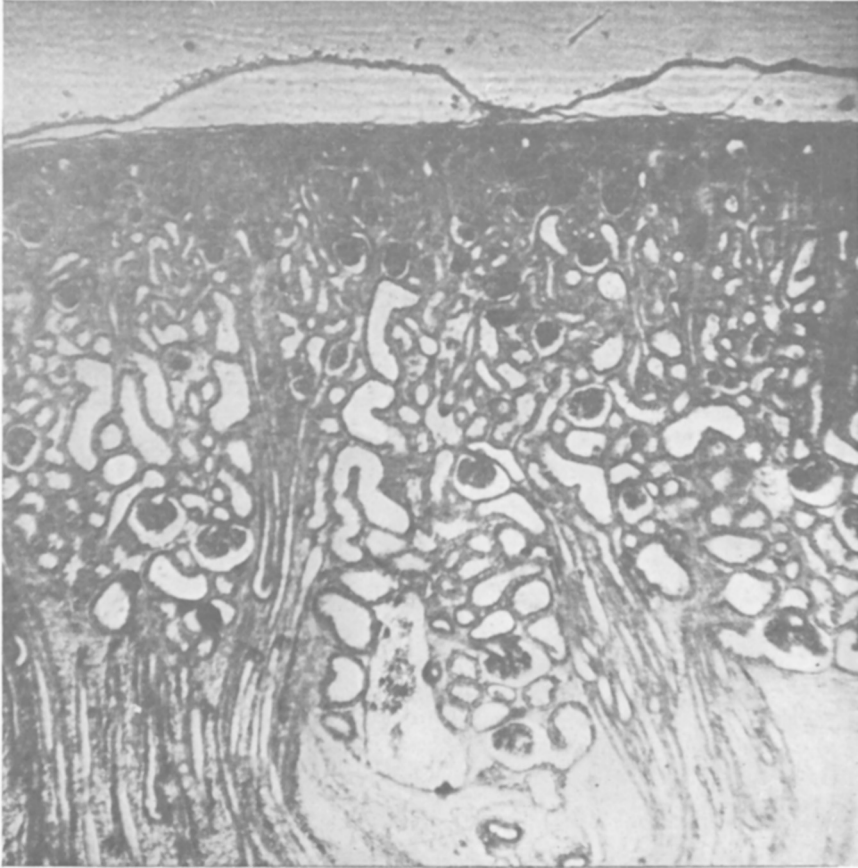


FIG. 1.  
Dilatation of tubules and some dilatation of capsular spaces. Puppy 2 a.  $\times 57$ .  
H and E stain.

tubules, at least in part, from compression by proliferating connective tissue (Fig. 2).

At birth the N.P.N. in the blood of the young was similar to that of the mother. Thus in Dog 2, the N.P.N. was found to be 368 mg. and that of the living puppies, 369 mg. Protein was present in the bladder urine of all newborn nephritic animals, but not in the controls.

In Dog 1 several hours before delivery the N.P.N. was 77.6 mg. The litter was born during the night. On the following morning the N.P.N. in the blood of the puppies was 79.2 mg. and that of the mother, 173 mg. Three days later the mother's N.P.N. was 216 mg., followed by a decrease on the seventh day to 182.5 mg.

TABLE II

Number	Glomeruli	Tubules	Blood Vessels	Interstitial Tissue
Dog 1	Slight exudate into capsular space.	Cloudy swelling and degeneration of convoluted tubules; granular casts in straight tubules; collapse of some.	Negative	Negative
Puppy 1a (dead at birth)	Tufts negative; Bowman's capsule distended with exudate.	Convoluted-cloudy swelling; some show degeneration, dilatation, hemorrhage into some.	Engorgement	Edema
Puppy 1b (living—autopsied 1st day)	Tufts negative; slight distension of Bowman's capsule.	Convoluted-cloudy swelling; some show degeneration, slight dilatation and few casts.	Negative	Increased cellularity, collapsed tubules in medulla.
Puppy 1c (found dead on 4th day and puppy 1d autopsied on 8th day). Dog 2	Tufts negative; distension of Bowman's capsule with exudate.	Convoluted-cloudy swelling; some show degeneration, dilatation of some tubules.	"	Increased cellularity.
Puppy 2a (living at birth).	Tufts-partial destruction; capsules distended with exudate. Patches of infarcts from cortex to medulla with connective tissue proliferation.	Convoluted-advanced cloudy swelling and degeneration, granular and hyaline casts. Convoluted-some cloudy swelling-marked dilatation of lumen.	Connective tissue around vessels increased.	Proliferation of fibroblasts in midzone.
Dog 3	Tufts-Partial destruction; capsular-exudate.	Convoluted-cloudy swelling, some show degeneration; casts in straight tubules.	Connective tissue around blood vessels especially in midzone. Negative	Proliferation of fibroblasts in medulla around collecting tubules and ducts of Bellini. Increase of connective tissue.
Puppy 3a	Tufts-congestion; capsular-exudate.	Convoluted-cloudy swelling and dilatation.	Engorgement	Congestion of medulla.
Dog 4	Tufts-increased cellularity; Bowman's capsule adhesions, partial obliteration, some have a little exudate.	Convoluted-begging of process of regeneration in degenerated ones; absence of casts.	Increase of connective tissue around blood vessels. As seen by Mallory's aniline blue stain.	Increase of collagen fibres around tubules in medulla.

Puppy 4a	Negative	Convuluted-cloudy swelling; some show degeneration, exudate and dilatation.	Negative	Proliferation of connective tissue in midzone (cortico-medullary zone).
Puppy (newborn normal)	Normal	Normal	Normal	Normal
Rabbit 1	Tufts-some destruction; capsule, some exudate.	Convuluted-extensive cloudy swelling and degeneration; collecting-granular casts.	Engorgement	Some leucocytic infiltration.
Young a and b	Tufts-some destruction; some show proliferation of epithelium and exudation.	Convuluted-cloudy swelling, dilatation of some; straight-collapse of some.	Negative	Proliferation of connective tissue in midzone.
Rabbit 3	Tufts-practically negative; capsules-some show exudate and some of these proliferation of the epithelium.	Same as Rabbit 1		
Young a	Tufts-practically negative; capsules-some show exudate and some of these proliferation of the epithelium.	Convuluted-cloudy swelling and degeneration; beginning dilatation.	Congestion of medulla.	Proliferation of loose connective tissue in medulla
Rabbit 5	Slight involvement	Convuluted-advanced degeneration, collecting-abundant casts.	Some closed; some thickened.	Increase of connective tissue.
Young 5a	Tufts-negative; capsules-some show dilatation.	Convuluted-patches of hyaline degeneration and cloudy swelling, dilatation.	Negative	Negative
Rabbit 8	Partial to complete damage of glomeruli.	Convuluted-advanced degeneration; collecting-abundant casts.	"	"
Young 8a (born dead).	Incomplete development.	Convuluted-slight cloudy swelling; beginning dilatation.	"	"
Young 8b (born alive).	Tufts-practically normal; capsules-slight exudate into some.	Convuluted-marked swelling, more than 8a; dilatate more marked.	"	"
Rabbit (new-born normal)	Normal	Normal	Normal	Normal

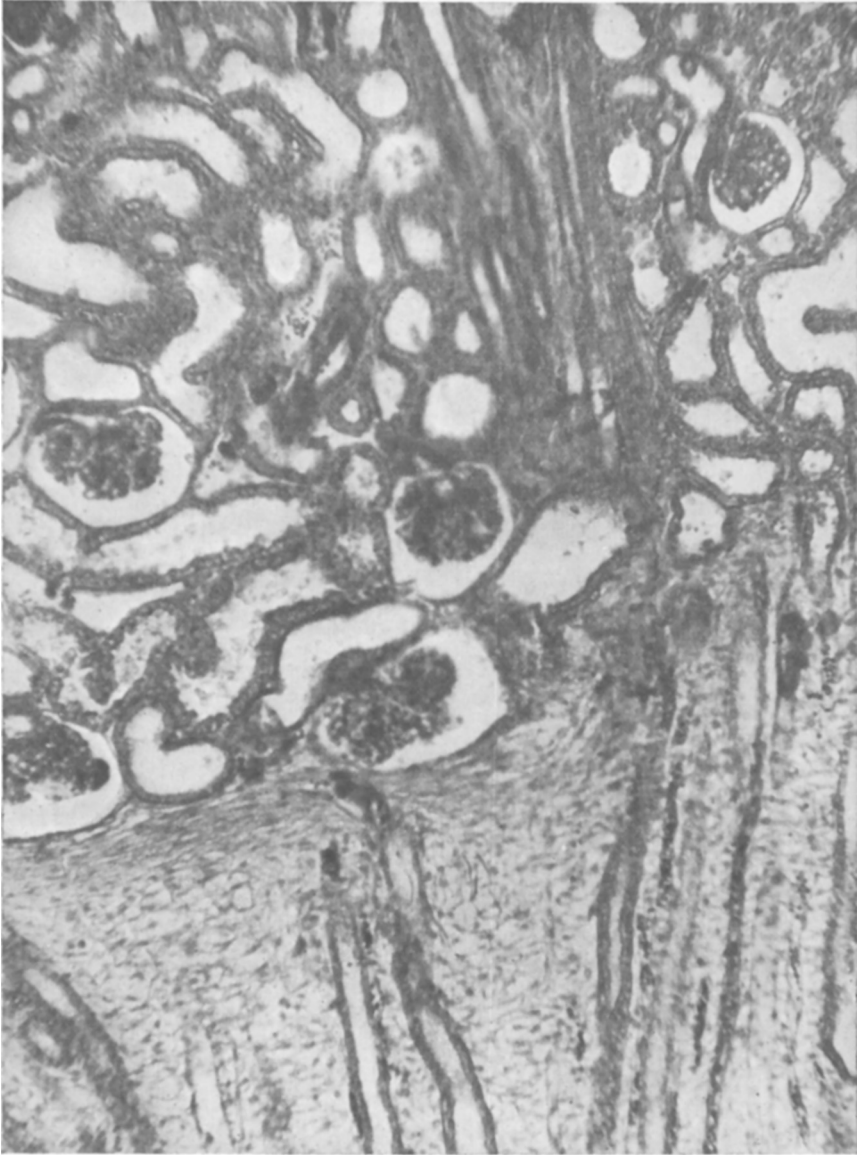


FIG. 2.

Dilatation of tubules, fibroblastic reaction of the midzonal region, together with compression of some of the tubules. Granular debris in convoluted tubules. Puppy 2 a.  $\times 130$ . H and E stain.

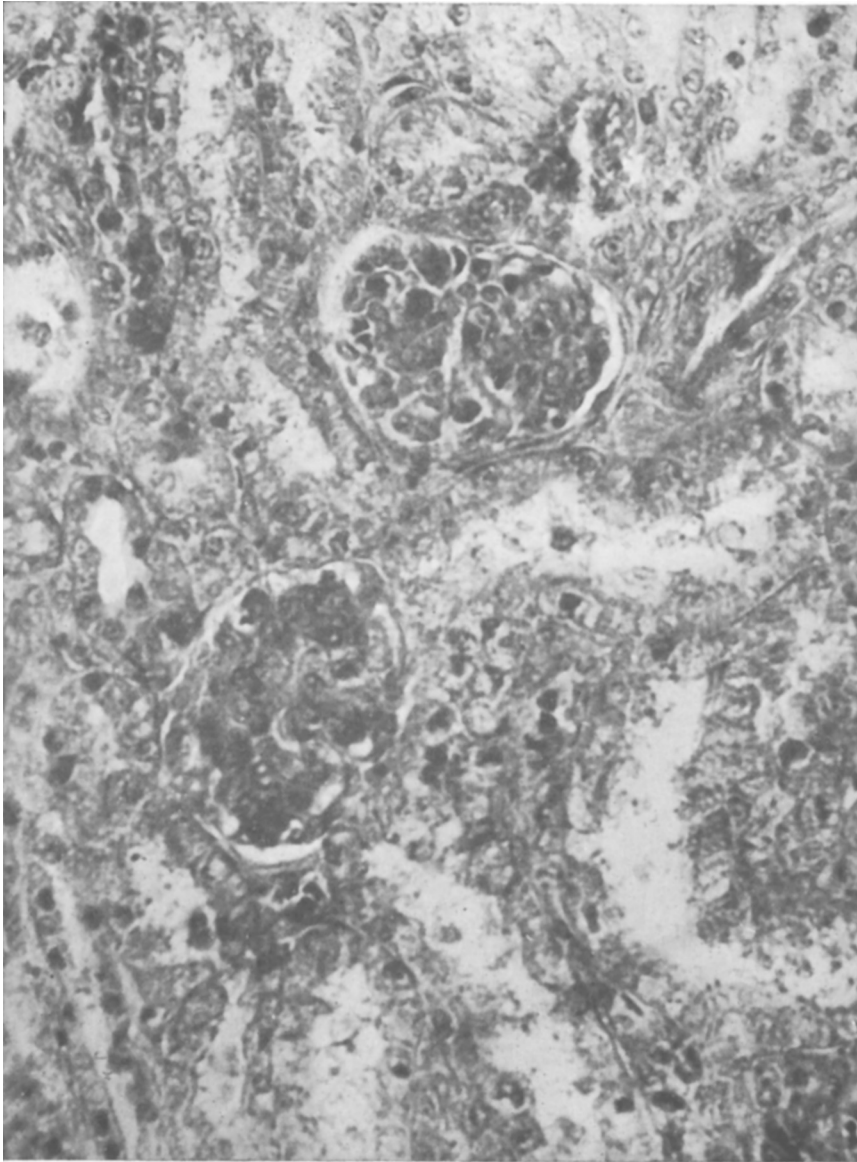


FIG. 3.

Relatively little change of the glomerular tuft, but marked changes in convoluted tubules; swollen granular cytoplasm and in some areas, loss of nuclei. Granular debris and desquamated epithelial cells in tubules. Puppy 1 d.  $\times 480$ . H and E stain.

At this time the surviving puppy showed an N.P.N. of only 102 mg , suggesting a somewhat more rapid return to normal function.