Thus they may be carried to or from adipose tissues, be deposited in the egg-yolk, or be secreted in company with fat in the milk of animals; they apparently do not traverse the placenta. The dyes have not been detected in the lipoids of the nervous tissue. We have failed to note any inability on the part of animals to utilize fats in which Sudan III. has been deposited.

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## Experimental studies on creatine and creatinine.

By **W. C. ROSE.**

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The excretion of creatine induced by starvation in rabbits, is inhibited partially or completely by feeding a diet of carbohydrates alone. The creatine elimination is not reduced by feeding a diet of fat alone or by a diet of fat and protein.

Experimental interference with carbohydrate metabolism leads to the elimination of creatine. After phlorhizin diabetes, which depletes the store of carbohydrates, and during phosphorus poisoning, which disturbs the glycogenic functions, the output of creatine in dogs is decidedly increased.

An increase in the output of creatine plus creatinine (total creatinine) is always accompanied by an increase in total nitrogen elimination. This parallelism in inanition and with nitrogen-free diets, is ascribed to a common source,—namely, true tissue or endogenous metabolism. The metabolism of exogenous or reserve proteins is not accompanied by the production of creatine or creatinine.

Coincident with the increased elimination of total creatinine during fasting, a significant increase in the creatine content of muscle occurs in rabbits and hens. This indicates an increased production of creatine during the accelerated catabolic processes.

Creatine is a normal constituent of the urine of the young until the age of puberty. Possibly this is due to insufficient glycogenic functions. Though no direct evidence for such an assumption has been obtained, still the ease with which children develop

glycosuria and acidosis, and the rapidity with which they succumb to diabetes, renders such an explanation probable. It is conceivable also that during the period of growth the demand for carbohydrates for the histogenetic processes may be so great that the cells are left in partial carbohydrate hunger, and are unable to perform the "endo-catabolic" activities as perfectly as in later life.

*Without question the metabolism of creatine is intimately associated with carbohydrate metabolism.*

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## The rate of tumor growth in underfed hosts.

By **PEYTON ROUS.**

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Workers with transmissible neoplasms have had frequent occasion to observe that sick or emaciated animals are relatively resistant as hosts for implanted tumor. It does not develop in them with the same readiness as in healthy individuals. A kindred phenomenon has been noted by Moreschi[1] in studying the relation of nutrition to tumor growth. He found that in mice losing weight on a low diet an engrafted sarcoma survived with less frequency and grew more slowly than in the well-fed controls. Indeed these controls died of their tumor sooner than did the fasting animals.

This being so might it not be possible to delay by food-restriction the course of inoperable tumors? And might not the development of metastasis after excision of a primary growth be hindered by the same means? In an attempt to answer these questions the author has performed a series of experiments with the Flexner-Jobling adeno-carcinoma of the rat. This neoplasm in its invasive spread and tendency to metastasize has a striking likeness to some of the cancers of human beings.

A bread compounded of oatmeal, rye-flour, corn-meal, milk and sugar, was baked in large quantity, dried, ground, and, with sufficient milk to moisten it, was used as the sole food of the

[1] C. Moreschi, *Zeitschr. f. Immunitätsforsch.*, 1909, VI., 651.