anterior end of the head. Insufficiency of the hypophyseal hormones is clearly expressed in the light color of most of the posterior animals. That they are not entirely lacking is evidenced, on the other hand, by the growth of the thyroid and the normal progress of metamorphosis. Control experiments show that hypophysectomy in 4 month old larvae results in a distinct underdevelopment of the testes after only a few months, while the ovaries are little or not at all retarded during the first year.

(3) Chains composed of an anterior male and a posterior female, show a nearly normal condition of the testes while the ovaries are always very rudimentary and in most cases completely sterile.

(4) If, on the contrary, the first animal is a female and the second one a male, one finds more varied results. In most cases the female has well developed ovaries with large ovocytes while the testes of the male are rudimentary. In a few cases both ovaries and testes are poorly developed, duplicating thus the status generally found in the parabiotic twins. In one case the testes of the hind animal are much stronger developed than the nearly sterile ovaries of its frontal parabiont.

It is evident that the sexual antagonism observed in male-female parabiosis of the newt *Triturus torosus* as a rule attains a lesser expression if the animals are arranged in chains than if grafted side by side like Siamese twins. This difference is largely due to the slower development of the sex glands of the posterior member of the chains, but partly also to a less efficient transfusion of hormones in this combination.

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Some Observations on Ferric Chloride Addition to the Diet.

M. W. TAYLOR AND V. E. NELSON.

From the Department of Chemistry, Iowa State College, Ames.

A specific vitamin for reproduction is well recognized at the present time. This investigation forms a part of a general study of the effect on metabolism of diets lacking, or extremely deficient, in vitamin E.

Waddell and Steenbock[1] state that vitamin E may be destroyed very completely by the addition of 1% of ferric chloride to the diet.

[1] Waddell, J., and Steenbock, H., *J. Biol. Chem.*, 1928, lxxx, 431.

Vitamin A was not destroyed by this treatment nor, apparently, did the ferric chloride have any other detrimental effect.

We have found that growth and reproduction are normal on a ration of casein 18.0, salt mixture 185, 3.7, cod liver oil (Squibb) 5.0, wheat embryo 12.0, and dextrin 61.3. Rats remain fertile on this ration for at least 2 years. When 1% of ferric chloride is added to this ration growth is not normal. The results on growth depend on how the ferric chloride is added to the ration. There is practically no gain in weight from the beginning if added in powdered form. Half of the rats were dead at 6 weeks. Many of the animals showed sore eyes suggestive of destruction of vitamin A. When the ferric chloride is added to the ration by means of an ether solution, some growth occurs, but it is decidedly below normal.

Waddell and Steenbock's ration consists of the following: yellow corn 71.5, linseed oil meal 15.0, crude casein 5.0, alfalfa meal 2.0, butter fat 5.0, bone ash 1.0, and sodium chloride 0.5. To 5 parts of this mixture was added 1 part of whole milk powder. When ferric chloride in ether solution was added to this ration so as to give a concentration of 1% of ferric chloride, growth again was decidedly below the normal. The normal or control results were obtained on the same ration without ferric chloride.

We next used a ration in which cod liver oil had been treated with ferric chloride. Twenty grams of ferric chloride dissolved in about one liter of ether were added to 100 gm. of cod liver oil. This mixture was placed on 2000 gm. of dextrin in an open vessel and allowed to stand for 3 or 4 days. The mixture of cod liver oil and ferric chloride was then extracted from the dextrin with anhydrous ether for 24 hours. The ferric chloride was removed from the ether solution by repeated washing with distilled water in a separatory funnel until the wash water gave no reaction for iron by the thiocyanate or ferrocyanide tests. The ether was evaporated from the oil which latter possessed a dark color and a slight abnormal odor. Five parts of this oil were added to casein 18.0, salts 185, 3.7, extracted wheat embryo 12.0, and dextrin 61.3. Growth was fair but considerably below the normal. The normal results were obtained on the same ration containing cod liver oil treated as above except that no ferric chloride was added.

Wheat embryo oil was treated with ferric chloride in the same manner as the cod liver oil except that 60 gm. of wheat embryo oil were used in place of 100 gm. of cod liver oil. Three parts of this oil were added to casein 18.0, salts 185, 3.7, extracted wheat embryo 12.0, butter fat 5.0, and dextrin 58.3. Growth was very poor com-

pared with the control. Several rats had inflamed and swollen eyes. The condition of the eyes improved with the feeding of a fresh batch of the ration. The wheat embryo oil after washing still contained 0.3% of Fe. The controls received wheat embryo oil which had an identical treatment except that no ferric chloride was added.

Bakers analyzed C. P. ferric chloride was used. Rats of 50 to 55 gm. weight were employed in all of the experiments.

The results indicate either a destruction of some unknown substance, other than vitamin E, which is necessary for normal metabolism, toxicity of $FeCl_3$—or products produced by it—destruction of some of the known components of the ration, or that ferric chloride completely destroys vitamin E; and that this latter vitamin must be classed as a growth-promoting vitamin, but only very small amounts are needed for normal growth.

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The Effect of Experimental Hyperphosphatemia on Calcium and Phosphorus Excretion.

J. D. BOYD, H. M. HINES AND GENEVIEVE STEARNS.

From the Departments of Pediatrics and Physiology, State University of Iowa, Iowa City.

Abnormal levels of serum phosphorus are found in association with various metabolic disturbances, such as renal insufficiency, hyper- and hypo-parathyroidism, rickets and osteomalacia. In this study, we have attempted to determine the effect of experimental hyperphosphatemia upon some of the other constituents of the serum, and upon the urinary constituents. The work was planned to supply values which could be used as standards of comparison for future studies, using animals that will be subjected to various procedures which might be expected to alter their mineral metabolism.

Sodium glycerophosphate injections were used to raise the serum phosphate level. The glycerophosphate was chosen because it was thought that it would be tolerated in larger amounts than the inorganic salt, and because of the growing opinion that phosphate esters may play an important rôle in the metabolism of calcium and phosphorus.

Dogs were given intravenous injections of 50% solution of sodium glycerophosphate, in amounts equivalent to 0.1 gm., 0.25 gm.,