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.

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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.,

0.5 gm., and 1.0 gm. per kilo of body weight. The preparation contained 11% of phosphorus, and gave no test for inorganic phosphate. In control experiments on the same animals, phosphate was given as the sodium salt, pH 7.4, in amount equivalent to 0.5 gm. of sodium glycerophosphate per kilo. The animals were catheterized before, ½ hour and 1 hour after injection. The pH of the urine was estimated, and the specimens were analyzed for calcium, and for inorganic and total phosphorus. The serum studies included the determination of alkali reserve, chloride, calcium and inorganic phosphorus. Nine animals were used; 76 injections were made in all. The earlier determinations served to establish the normal resting excretion of calcium and phosphorus, and the duration of the post-injection period which was significant for study. The data presented in the accompanying table are the average values of 36 injections.

TABLE I.

Dosage mg. P per kg.	Average Excretion During ½ Hour and 1 Hour After Injection.							
	Calcium		Total Phosphorus % of total injection			Organic Phosphorus % total excretion	
	1st ½ hr. (mg./kg.)	Total 1st hr. (mg./kg.)	1st ½ hr.	Total 1 hr.	2nd ½ h. / 1st ½ h.	1st ½ hr.	Total 1st hr.
Sodium Glycerophosphate:							
11	.028	.032	37.5	57.5	53.6	20.4	13.1
27.5	.045	.045	27.0	39.4	45.7	52.5	43.5
55	.229	.274	26.3	39.3	42.0	67.5	54.6
110	1.050	1.364	35.9	52.6	50.7	87.7	72.5
Buffered Sodium Phosphate:							
55	.197	.286	34.3	53.7	56.6	—	—
Normal Resting Excretion:							
none	—	.042	—	.48 mg.	—	—	—

It will be noted that regardless of the size of the dose, from 40 to 60% of the injected phosphorus was eliminated within an hour after injection. Two-thirds of this was eliminated during the first half hour. Even with the smaller doses, part of this was excreted as an organic compound; the amount so eliminated increased with the dosage, most of it appearing in the organic form when the dose was large. The organic excretion was constantly greater during the first half hour than during the remainder of the hour.

There was a definite increase in urinary calcium coincident with the phosphate excretion. The elimination of calcium was roughly proportional to the amount of phosphorus administered, no matter whether given as the organic or inorganic phosphate. With the

smaller doses the amount of calcium excreted was so small that the significance of the results in those analyses is open to question. The values were greater, however, than the normal resting values. With larger doses of glycerophosphate, the calcium excretion was greatly increased.

With the larger doses, the serum calcium was definitely depressed. Evidence of moderate or severe tetany was noted when inorganic phosphate equivalent to 0.5 gm. sodium glycerophosphate per kilo was given, yet twice this amount of the sodium glycerophosphate could be given before similar symptoms were evoked. The alkali reserve and serum chloride values showed no significant deviations from normal levels.