added, and insulin was injected. Two hours and 5 hours after the feeding cholecystograms were made to study the emptying time of the gall bladder.

The results were as follows: 18 hours after the injection of the dye, well defined cholecystograms were obtained in all of the dogs, demonstrating good concentration. After feeding, the shadow of the gall bladder diminished in size and density or disappeared completely, indicating partial or complete removal of the dye. These results are well within the range of the variations found in the functional activity of the gall bladder in normal dogs and demonstrate that removal of the pancreas does not alter the function of the gall bladder as determined by the dye method.

7016 C

Phosphatase Studies. IV. Serum Phosphatase of Non-osseous Origin. Significance of the Variations of Serum Phosphatase in Jaundice.

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In view of the wide occurrence of phosphatase in other tissues than bone, the possibility of non-osseous origin of *some* of the serum phosphatase deserves examination. It receives support from the evidence of the great decrease of serum phosphatase after prolonged fasting[1] and its great increase after ingestion of dextrin.[2] The significance of phenomena of normal physiology has frequently been suggested by a disturbance of the function of a given organ or tissue; we believe that the increase of serum phosphatase in jaundice is of similar importance and indicates that liver is a source of serum phosphatase, normally as well as pathologically.

The procedure for determination of serum phosphatase has been described.[3]* The icteric index was determined by Meulengracht's method.

[1] Bodansky, A., and Jaffe, H. L., PROC. SOC. EXP. BIOL. AND MED., 1931, **29**, 199.

[2] Bodansky, A., unpublished data.

[3] Bodansky, A., *J. Biol. Chem.*, 1933, **101**, 93.

* About 2.6 and 7.5 units of phosphatase per 100 cc. are the average normal figures for adults and children, respectively (normal range for adults, 1.5 to 4.0 units; normal range for children, 5.0 to 13.0 units).

Results. Serum phosphatase was increased in about 50 observed cases of jaundice, *with the exception of some cases of anemia.*

In acute catarrhal jaundice bile pigments elaborated in the liver, and phosphatase, presumably of the same origin, were found in the serum in increased quantities. Yielding readily to treatment, this condition was particularly suitable for a demonstration of the decline of the serum phosphatase from its high initial values (Table I). Other clinical conditions associated with jaundice and high serum phosphatase were not equally suitable for a study from the physiological standpoint.

TABLE I
Serum Phosphatase in Treated Cases with Catarrhal Jaundice and Hepatitis.

No.	Age	Sex	Per 100 cc. serum Phosphatase units	Icteric Index	Notes	Days later
1	10	F	19.0	57	Infect. catarr. jaund.	10
			9.2	13		
2	12	F	23.8	20	" " "	
			13.6	7		6
			9.7	5		7
3	7	F	22.8	27	" " "	
			13.3	13		6
			9.9	6		7
4	5	F	13.1	8	" " "	
			10.1	7		4
5	9	F	10.4	58	Acute " "	
			7.6	7		11
6	8	F	22.1	20	" " "	
			8.0	Normal		15
7	60	M	18.5	13	" " "	
			10.0	10	" " "	5
8	9	M	9.8	33	" " "	
			6.6	13		12
			4.8	6	" " "	10
			6.9	10	" " "	53
9	17	M	14.9	>50	Subacute hepatitis	
			12.6	9		10
			8.1	8		8

The decrease of the icteric index during treatment corresponded with the clinical improvement. The figures in Table I show that serum phosphatase decreased with the icteric index. It may be noted in Case 8 that not only did serum phosphatase decrease as the case improved, but that it increased during relapse.

Robison has stated that the production of bone phosphatase formed "a part of those cellular activities leading to the formation of bone,"[4] and Kay demonstrated the increase of plasma phosphatase in certain bone diseases.[5] It has been held since that increase

[4] Robison, R., *Ergebnisse der Enzymforschung,* 1932, **1**, 280.

[5] Kay, H. D., *J. Biol. Chem.,* 1930, **89**, 249.

of plasma phosphatase "is confined almost exclusively to cases of bone disease,"[4] although Roberts had demonstrated increased plasma phosphatase in jaundice,[6] and plasma or serum phosphatase has been stated to be almost exclusively of osseous origin.

It seems timely to point out the hepatogenous origin of some of the serum phosphatase as indicated by the high serum phosphatase found in jaundice (with the exception of some cases of anemia) and by the decrease of serum phosphatase in the course of successful treatment of catarrhal jaundice and hepatitis. The seeming exception of normal serum phosphatase figures in cases of jaundice with anemia confirms our view and emphasizes the hepatogenous rather than the hematogenous factor in jaundice as a source of increased phosphatase. It may be assumed, furthermore, that some of the serum phosphatase originates in the liver even under normal conditions.

7017 P

Factors Influencing Rate of Reduction of Potassium Ferricyanide by "Resting" Escherischia coli.

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It has been shown[1] that broth cultures of *Staphylococcus aureus* in the maximum stationary phase reduce potassium ferricyanide at a rate in the neighborhood of 6.6×10^{-14} millimols per cell per minute. Further work with cultures of *Escherischia coli* (K-12) gave similar results and will be reported elsewhere. The experiments to be reported here were designed to measure quantitatively the rate of reduction of potassium ferricyanide by "resting" *Esch. coli* under carefully controlled environmental conditions.

Forty-eight hour cultures of *Esch. coli,* grown on nutrient agar at 37.5° C., were suspended in saline and washed 3 times by centrifugation. The organisms were then diluted with a mixture of equal parts of M/15 phosphate buffer, pH 7.5, and physiological saline solution to a standard turbidity corresponding to a total count of approximately 20×10^9 cells per cubic centimeter.

[6] Roberts, W. M., *Brit. J. Exp. Path.*, 1930, **11**, 90.

[1] Clifton, C. E., *J. Bact.*, 1933, **25**, 495.