In other cells, mitochondria may be present in varying abundance although the blue granules have been depleted. These pituitaries show also the numerous small basophilic cells with prominent enlarged Golgi. They are believed to be newly formed basophiles which become active before reaching normal full size.

An additional feature of interest is the unfailing presence in our C.U. injected animals of branching areas of deeply-staining degenerate cell masses. These areas are greatest in our longest treated animals. Examination shows that these areas are made up to a large extent of angular, shrunken, basophilic cells with deep blue, pyknotic nuclei and a dense, granule-free, blue cytoplasm, against which the Golgi ring is prominently contrasted. Small branching areas of degenerating cells have been seen upon occasion in supposedly normal pituitaries, especially of older rats, but not to the extent that this condition occurs in the injected animals. The basophilic degranulation, as well as the large inclusions of degenerated basophile cells, correlates well with the greatly decreased potency of the pituitaries of C.U. injected rats and with previous potency and cytological findings on pituitaries of P.U. injected rats.

The large number of degranulated basophiles and the many small cells of definite basophilic character would, with many techniques, give the appearance of a proportional increase in chromophobes, a finding in our opinion not real, but apparent. The acidophiles are quite normal in size and character, but the impression of a reduction in their number, sometimes much more marked than at others, would doubtless be supported by a statistical study.

7492 P

Phosphatase Studies. VIII.
Increase of Serum Phosphatase After Bile Duct Ligation in Dog.

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Roberts has shown increased plasma phosphatase in obstructive jaundice.[1, 2] We have demonstrated an increase of serum phosphatase in a series of cases of catarrhal jaundice, and a return to normal values after their clinical improvement.[3] We interpreted

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

[2] Roberts, W. M., *Brit. Med. J.*, 1933, **1**, 734.

these data as supporting the assumption of a hepatogenic source of serum phosphatase. It seemed desirable to study the subject experimentally—by bile duct ligation in one group of experiments.

The operation was performed under amytal anesthesia upon a young adult female dog weighing 11.6 kilos. The dog made a good recovery. Observations covered a period of over 7 weeks. About 4 weeks after the operation, the dog having had repeated attacks of vomiting, it was decided to discontinue food for a few days and then to resume feeding with certain precautions. Advantage was taken of this period of fasting in order to compare the results with earlier observations on the effects of fasting on normal dogs.[4]

TABLE I.
Serum Inorganic Phosphorus, Phosphatase, Icteric Index and Bilirubin after Bile Duct Ligation.

Date 1934	P mg.	E units	Icteric Index	Bilirubin mg.	Notes
1/21	3.1	4			Operated
1/30	3.2	133	39	3.1	
2/18	4.3	200	49	5.6	Fast begun
2/19	4.6	188	45		Fast continued
2/20	4.6	187	55	4.3	" "
2/21	4.6	155	50	4.0	" "
2/23	4.0	139	57	4.6	Fast discontinued
2/28	3.8	193	48	3.6	
3/8	3.6	330	40	5.9	Bloody stools
3/10	11.0	320	40	7.9	Moribund

P—inorganic phosphorus (mg. per 100 cc.); E—phosphatase (units per 100 cc.).

At the time of the last analysis the inorganic phosphorus determination indicated impairment of kidney function. This indication was supported by the findings of 51.7 mg. of urea N per 100 cc. of blood and of 2.1 mg. of creatinine.

At the same time the uric acid content of the blood was 4.8 mg. per 100 cc.; in dogs with normal liver function the uric acid content of blood is too low to be determined. The dog was killed by administration of ether. Immediate necropsy revealed multiple areas of liver necrosis.

The rise of serum phosphatase was not parallel to the increase of the icteric index or of serum bilirubin. This, as well as other considerations, indicate that the increases of serum phosphatase, of the icteric index and of bilirubin represent disturbances of different functions of the liver. It is also to be noted in this connection that

[3] Bodansky, A., and Jaffe, H. L., PROC. SOC. EXP. BIOL. AND MED., 1933, **31**, 107.

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

during the period of fasting serum phosphatase decreased from 200 to 139 units; the changes of icteric index and of bilirubin were not parallel during the same period or subsequently.

The maximum phosphatase content was approximately 80 times the initial value. This is the highest value that we have obtained in any condition in any animal. It may well be near the possible maximum in the dog. The high value of serum phosphatase was all the more significant in view of the marked malnutrition toward the end of the experiment, associated with gastro-intestinal disturbances and hemorrhages (necropsy showed gastric and intestinal ulcers).

It would have been desirable to amplify this study with data of tissue phosphatase changes. Studies in this direction are in progress.

7493 P

Pattern Analysis in Plumage.* I. Curve of Barb Growth.

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Lillie and Juhn[1] reached the conclusion that "general physiological conditions produce morphological diversity in genetically identical feather germs, and . . . . the main cause of the diversity of action is definitely oriented, accurately regulated differences of growth rate within the germ." (p.177.) It was further pointed out that, since pattern is primarily differentiation in respect of barb level, the curve of barb growth rate becomes highly important in the interpretation of pattern. A curve given in the earlier study was believed to describe the growth of a barb from its origin at the ventral collar limit to its emergence on the rhachis. From this curve of barb growth it was concluded that the rate of barb growth decreased continuously from a maximum value at the point of origin to a minimum value at the dorsal limit of the collar. Differentials in growth rate are greatest through the ventral-most region of the collar and decrease progressively to the dorsal limit of the collar. Growth rate through the ventral-most quarter of the collar is, in terms of the curve of barb growth given, several times the rate of growth through the 2 dorsal fourths of the collar.

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[1] Lillie, Frank R., and Juhn, Mary, *Physiol. Zool.*, 1932, **5**, 124.