mon bile duct. No case is included in which, at autopsy, there was evidence of the presence of any complication or any indication that stasis was not complete. The animals were maintained upon a diet of fresh raw scrap meat and milk. Serum bilirubin was determined by the method of van den Bergh and serum phosphatase by the method of Bodansky.[6]

The findings are presented in Table I. The control values ranged from 0.95 to 3.84 units of phosphatase. Of 45 determinations made upon 30 cats with total stasis, 41 during stasis of 2-21 days' duration were within the limits of the control values. Higher values were obtained in only 4 instances, as follows: 11.03, 5.92, 5.8 and 4.6 units, with stasis of 16, 29, 21 and 8 days' duration, respectively. There was no consistent relationship between serum phosphatase activity and either the duration of stasis or the degree of bilirubinemia.

These observations add another point of difference to those previously reported between the cat and other species in regard to the effects of total bile stasis upon the organism.[7] The fact that a species difference does appear to exist in this respect indicates that care must be exercised in attempting to explain the mechanism of increase of serum phosphatase activity in obstructive jaundice in man and in dogs.

8868 P

Parathyroid Function in Hyperthyroidism.

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That abnormalities of function of other glands as well as of the thyroid gland occur in patients with hyperthyroidism is generally recognized. Conclusive evidence on the functional status of the parathyroid glands in hyperthyroidism, however, has not been reported. For this reason studies of parathyroid function by means of the Hamilton and Highman[1] test in patients with hyperthyroidism have been undertaken, and our findings to date are here presented.

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

[7] Cantarow, A., and Stewart, H. L., *Am. J. Path.*, 1935, **11**, 561.

[1] Hamilton, B., and Highman, W. J., Jr., *J. Clin. Invest.*, 1936, **15**, 99.

The Hamilton and Highman[1] test for parathyroid function was performed in 6 patients with hyperthyroidism, and in 5 control subjects (Table I). In this test,[1] 30 cc. of blood from a patient are injected intramuscularly in a rabbit from which a blood sample has been drawn for measurement of the concentration of calcium in the serum. At regular intervals thereafter calcium chloride solution is administered to the rabbit by stomach tube and blood samples taken for measurement of calcium. Interpretation of the test is based on the magnitude of the increase in the calcium of the rabbit's serum. Studies of the basal metabolic rate and of the concentration of calcium, inorganic phosphorus, and protein of the serum and of the plasma phosphatase activity were made in the hyperthyroid cases. The bony calcification of the hands of each patient with hyperthyroidism was compared with that of a normal subject of approximately the same age by taking a roentgenogram of both simultaneously. Blood for injection in the rabbit and for chemical studies was drawn from all subjects after an over-night fast. Basal metabolic rate measurements and phosphorus, protein and calcium measurements were performed and calculated according to methods referred to in other papers from this laboratory.[2, 3] The method of Kay[4] was utilized to measure plasma phosphatase activity. In one patient with hyperthyroidism a course of 2 weeks of iodine therapy was terminated 4 days before study; tests were performed both before and 5 days after the institution of iodine therapy in another case.

The basal metabolic rates in the patients with hyperthyroidism varied from +5% (iodine therapy) to +55% of normal; these patients were not markedly toxic with the exception of case 6 (Table I). The concentration of calcium in the serum was between 9.7 and 10.9 mg. % in 4 of the hyperthyroid cases; in one instance (Case 6), a thyrocardiac subject, it was 8.1 mg. %. The concentrations of protein and of inorganic phosphate in the serum were normal in each patient; the plasma phosphatase varied from normal to approximately one and one-half times normal (Table I).

The maximum increase in the calcium of the rabbits' sera after injection of blood from the hyperthyroid patients was above 0.2 mM. in 6 of the 7 studies (Table I), whereas in only one of 38 studies in normal subjects made by Hamilton and Highman[1] and in none

2 Gilligan, D. R., Volk, M. C., Davis, D., and Blumgart, H. L., *Arch. Int. Med.*, 1934, **54**, 746.

3 Gilligan, D. R., Volk, M. C., and Altschule, M. D., *J. Biol. Chem.*, 1933, **103**, 745.

4 Kay, H. D., *J. Biol. Chem.*, 1930, **89**, 235.

TABLE I.
Results of Hamilton and Highman Test for Parathyroid Hormone in Blood.

Case No.	Age, yrs.	Basal Metabolic Rate, % deviation from standard normal	Plasma Phosphatase Activity, units	Serum Calcium of Rabbit, Maximum Increase, mM. per liter	Remarks
			Patients with Hyperthyroidism.		
1	12	+34	.34	.23	
2	23	+24	.24	.00*	
3	30	+34		.30	
4	24	+31	.11	.32	
4	24	+ 5		.70	Patient receiving Lugol's solution for 5 days before test.
5	19	+17	.28	.45	Patient had been receiving Lugol's solution 2 weeks; omitted this 4 days before test.
6	57	+55	.23	.48	
			Control Subjects.		
7	42	+12	.08	.18	Osteoporosis; etiology not known.
8	35			.00*	Normal subject.
9	27			.19	" "
10	25			.08	" "
11	24			.08	" "

*The concentration of calcium in the rabbit's serum both at the 3-hour and 5-hour sampling was less than that of the control specimen.

of the 5 control studies which we have made (Table I) was there an increase above 0.20 mM. The above results indicate abnormally large amounts of parathyroid hormone in the blood of 5 of the 6 patients with hyperthyroidism; the excess amount of parathyroid hormone can be quantitated only roughly in this small series of studies.[5]

That there are occasionally patients with hyperthyroidism who show marked generalized osteoporosis and that there exists a rather general tendency to increased calcium excretion in hyperthyroidism is well known.[6, 7] The mechanism through which these abnormalities in calcium metabolism occur has not been clarified;[7, 8] studies are being continued to evaluate the significance of increased parathyroid function as indicated by the findings here reported. There

[5] Hamilton, B., Dasef, L., Highman, W. J., Jr., and Schwartz, C., *J. Clin. Invest.*, 1936, **15**, 323.

[6] Aub, J. C., Bauer, W., Heath, C., and Ropes, M., *J. Clin. Invest.*, 1929, **7**, 97.

[7] Hansman, F. S., and Wilson,, F. H., *Med. J. Australia*, 1934, **1**, 37.

[8] Albright, F., Bauer, W., and Aub, J. C., *J. Clin. Invest.*, 1931, **10**, 187.

was no definite X-ray evidence of osteoporosis in any of the cases of hyperthyroidism in this study; the phosphatase results gave evidence of only slightly increased osteoblastic activity in some instances (Table I).

Summary. Studies with the Hamilton and Highman test[1] of parathyroid function have been performed in 6 patients with hyperthyroidism. The results compared with those obtained in normal subjects indicate increased circulating parathyroid hormone in the blood of 5 of the 6 thyrotoxic patients. This investigation is being continued to evaluate the significance of the findings.

8869 P

Liver as a Possible Site of the Emetic Action of Strophanthidin in Cats.

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Hanzlik and Wood[1] published an important paper on digitalis emesis in which they contend, with Hatcher and others, that the mechanism of the emesis is a reflex one. They conclude that the liver is probably the chief site of origin of the reaction but that other abdominal organs may be involved, at least experimentally, because in pigeons with the liver excluded from the circulation digitalis still produces vomiting. They agree with Dresbach and Waddell[2] that the heart has been pretty definitely excluded as the chief site of origin of this response.

In this laboratory the possible relation of the liver to strophanthidin emesis in the cat has been attacked by two methods. In one the attempt was made to denervate the liver as thoroughly as possible and in the other the organ was completely removed. Complete denervation of the liver by surgical means may prove to be an impossibility (a study of this problem is being made) but at least it can be deprived of the greater part of its nerve supply. We have used no new technic but have stripped the duodeno-hepatic artery, portal vein, and common bile duct of all accompanying nerve fibers, which were cut, together with all other structures entering the liver

1 Hanzlik, P. J., and Wood, D. A., *J. Pharm. and Exp. Therap.*, 1929, **37**, 67.

2 Dresbach, M., and Waddell, K. C., *J. Pharm. and Exp. Therap.*, 1926, **27**, 9; *ibid.*, 1928, **34**, 43.