suspension has evoked larger local reactions than ordinary suspensions of apparently the same density.

Toxins were titrated on subjects who responded with bright, 20 mm. reactions. Estimates of the skin-test dose (STD) are considered accurate only within 50%. The potency of toxin "B",[2] also produced by this strain, was measured and found to parallel that of the Dick toxin ("A") except that in lot II after 8 hours it rapidly declined and at 20 hours there were less than 100 STD/ml of "B" toxin remaining. This behavior affords an additional criterion of differentiation between "A" and "B" toxins. The stability of toxins prepared as in lot I does not appear to differ markedly from that of toxins prepared in the ordinary way; after 3 months there was about a 50% loss in potency.

Among other things the observations indicate a connection between rapidity of growth and toxigenesis. They do not suggest identity of hemotoxin with erythrogenic toxin.

6666

Attempts to Produce Hyperplasia of Thyroid Gland by Infection and by Injury to the Adrenal Gland.

HOWARD R. MAHORNER. (Introduced by Alton Ochsner.)

From the Department of Surgery, Tulane University School of Medicine.

The etiology of exophthalmic goiter is still unknown. However, we do know one change that occurs regularly in typical exophthalmic goiter—hyperplasia of the thyroid gland. Various theories have been proposed as to the basic factor underlying this hyperplasia. In these experiments I have been interested in two: (1) Infection; (2) Disordered action of the adrenals.

Halsted[1] found hyperplasia of the thyroid gland after producing in dogs a low grade peritonitis by the intraperitoneal injection of staphylococci. Later he thought he could attribute certain hyperplastic changes in the thyroid to infection of the wound. Cole and Womack[2] described hyperplasia of the thyroid occurring after the implantation of infected foreign bodies into the neck muscles of dogs.

[2] Hooker, S. B., and Follensby, E. M., *J. Immunol.*, 1928, **15**, 601.

[1] Halsted, *Am. J. Med. Sc.*, 1914, **147**, 56.

[2] Cole, and Womack, *J. Am. Med. Assn.*, 1929, **92**, 453.

Marine and Baumann[3] found an increase in the basal metabolic rate in some instances after removal of or freezing the adrenal glands of rabbits.

Dogs were used in my experiments. At a preliminary operation I exposed the thyroid lobes, measured them, and took a piece of tissue, 2x2 mm., from the anterior border of the right lobe. Controls showed that no hyperplasia resulted from the removal of this much gland.

In the experiments on the effect of infection on the gland, I implanted foreign bodies contaminated with a culture of staphylococci or with a mixed culture of organism obtained from a fecal fistula into the neck muscles of 8 dogs. These dogs were sacrificed subsequently at periods varying from 4 to 64 days. All except one showed inflammatory reaction around the foreign body. On comparing the necropsy specimen of the thyroid grossly and microscopically with the thyroid at the time of the first operation, no definite evidence of hyperplasia could be observed. I previously reported[4] hyperplasia in 50% of the instances after infection. I have reviewed these slides and now do not think there is any definite evidence of hyperplasia.

In other series of dogs, after removing in a preliminary operation a small 2x2 mm. piece of tissue from the lobe of the thyroid, the adrenals were crushed, destroying from one to 1½ of the 2 adrenals. These dogs looked weak and apathetic and just the opposite to the nervous stimulated dogs who have received thyroid extract over a period of time. Observations made on 11 dogs in comparing the sections from the preliminary operation with sections removed at periods varying between 4 and 127 days after injury to the adrenals showed no evidence whatsoever of any hyperplasia, except in one instance where there was only a suggestion, not at all definite, of some slight hyperplastic change. In the early stages the adrenals were partially destroyed, but regenerated after the longer periods.

Similar experiments made upon 7 dogs from 4 to 85 days after freezing the adrenals thoroughly with ethyl chloride showed no evidence of hyperplasia in the thyroid. In the earlier periods there was evidence of hemorrhage and necrosis in the adrenals; later repair was complete.

These results differ from the observations of other authors on

[3] Marine and Baumann, *Am. J. Physiol.*, 1921, **57**, 135.

[4] Mahorner, H. R., PROC. SOC. EXP. BIOL. AND MED., 1932, **29**, 1076.

the effect of infection on the thyroid and would not substantiate the view that increased basal metabolic rate after injury to the adrenals was the result of hyperactivity of the thyroid gland. I am not aware that any former observers have removed a piece of the thyroid at a preliminary operation in their animals to compare subsequent sections with. It is easily conceivable that the appearances which they observed were not changes from the original state of the thyroid but were present before the experiment began. The results of my experiments seem to show that definite evidence of hyperplasia in the thyroid does not follow the introduction of infection in animals or injury of the adrenal glands by freezing or crushing.

6667

Ulceration in Digestive Tract Following Experimental Lesions in Brain-Stem.*

A. D. KELLER, W. K. HARE AND M. C. D'AMOUR.

From the Department of Physiology and Pharmacology, University of Alabama School of Medicine.

The relation of gastro-intestinal ulceration to lesions of the central nervous system has been reviewed by Cushing[1] and Light.[2]

In our series of 50 cats and 40 dogs having experimental lesions in the upper brain-stem, acute gastro-intestinal changes have occurred in a relatively small number. The other animals have exhibited normal guts or slight changes that are difficult to evaluate. Lesions have varied considerably in extent and location. Apart from 3 chronic mid-brain cats in which erosions were found in the stomach, the changes have followed lesions accompanied by hemorrhage into the ventricles or transverse lesions at the level of the chiasm unassociated with intraventricular hemorrhage. This report is confined to a description of maximum reactions noted.

Hyperemia and Hemorrhage. Marked hyperemia of the stomach has been encountered in 12 dogs at death—7 to 24 hours after operation—confined in most instances to the body (Fig. 1). Associated

* This investigation is being aided by a grant from the Committee on Scientific Research of the American Medical Association.

[1] Cushing, H., *Surg. Gynec. and Obstet.*, 1932, **55**, 1.

[2] Light, *J. Pharm. and Exp. Ther.*, 1932, **45**, 227.