a constant excess of hormone secretion bringing about the results described. The constant secretion is indicated by pigmentation changes and vasoconstriction which are maintained. Since this takes place during the development of the structures involved there is an adjustment which tends to establish a balance at the high pituitary level.

The glomerulus of the mesonephros in all the 15 triple pituitary animals examined shows certain changes which are characteristic of the hypertensive glomerulus in man. As shown by either Mallory's stain or by azocarmine the basement membrane of the capillary tuft of the normal animal is roughly 1 to 2 micra thick while that of the triple pituitary animals may exceed 8 micra. This membrane may exhibit lighter areas which appear to be small cracks or pores and is similar to that of hypertension in man especially when associated with lipoid nephrosis. Many of the capillaries are closed. The glomerulus is small in respect to the capsule which it does not fill to the normal degree. There are accompanying changes in the tubules which are associated with glomeruli that are most affected. These changes are progressive with age. The degree of involvement is directly proportional to the amount of pituitary excess as measured by the degree of response in such characters as pigment increase.

This is the first time the basement membrane change has been produced experimentally and shows that here hypertension is the cause and not the result of the thickening as it develops early. In these animals the hypertensive glomerulus is definitely associated with pituitary excess. An attempt is being made to produce similar changes in the metanephros of the mammal by the administration of posterior pituitary hormone.

7803 P

Vitamin C Content of Tissues of Laboratory Animals Under Various Pathological Conditions.

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We have studied the vitamin C content of the adrenals of laboratory animals injected with bacterial toxins, or viruses, or dying from spontaneous infections, using a silver nitrate solution or the

indicator 2:6 dichlorophenol-indophenol (technique of Birch, Harris and Ray[1]). By this latter method, we have also examined the tissues of guinea pigs apparently completely recovered from sub-lethal injections of diphtheria or tetanus toxins and fed excess vitamin C.

Determination by silver nitrate. Having found the adrenals of guinea pigs dying of diphtheria toxin did not reduce silver nitrate, while those of the control animals were rapidly blackened,[2] we applied this method to the adrenals of animals fed a complete diet showing various pathological conditions with the following results.*

A positive reaction was found in rabies-fixed virus (4 rabbits); in infection with human tubercle bacilli of moderate virulence (3 guinea pigs), killed 2 months after inoculation, showing slight lesions; and after injections of toxin of dysentery of dysentery bacilli (3 rabbits) dead in 18 to 48 hours.

A diminution, more or less marked, of the reducing power of the adrenals, especially the cortex, occurred after a lethal injection of tetanus toxin (5 guinea pigs); of dysentery toxin (4 mice, dying in 3 to 5 days); in mouse typhoid (4 mice infected *per os* and dying in 4 to 6 days); and after repeated injections of histamine-hydrochloride† (4 guinea pigs and 3 mice).

In yellow fever the reactions gave irregular results in mice dying after intracerebral inoculations. In one case rapid blackening occurred; in 2 others the reaction was incomplete.

Determination by 2,6-dichlorophenolindophenol titrations. By this method the tissues of supposedly normal guinea pigs (200-300 gm.) were examined. These animals were bought in the open market and their previous diet was unknown. The ascorbic acid content of their organs varied greatly. The figures are given in mg. per gm., adrenals 0.27-0.66, liver, 0.05-0.12. Variations were also noted in the tissues of guinea pigs fed carrots, hay and oats for 10 days, adrenals 0.15-0.30, liver 0.02-0.04.

Eleven animals dying from diphtheria toxin gave the following values: adrenals 0.06-0.15, liver 0.03-0.06.

Seven guinea pigs having recovered from sub-lethal injections of diphtheria toxin, were fed a diet containing excess spinach or cab-

[1] Birch, T. W., Harris, L. I., and Ray, S. N., *Biochem. J.*, 1933, **27**, 590.

[2] Harde, E., *C. R. de l'Acad. des Sc.*, 1934, **199**, 618.

* This work was done at the Pasteur Institute, Paris, during the spring and summer months. The animals were fed abundant green, hay, oats or bread.

† Adrenals and gastrointestinal tracts are congested and occasionally there are gastric ulcers and hemorrhages after these injections.

bage. High values of Vitamin C were found in the tissues of 2 of these animals which had shown but a slight reaction, adrenals 0.77-0.68, liver 0.24-0.11, pancreas 0.27-0.20. In 5 other guinea pigs having shown a severe reaction a lowered content was found, adrenals, 0.13-0.47, liver 0.04-0.15.

Three guinea pigs dying from a spontaneous infection, (marked lesions in lungs and liver) gave low values, even though the diet contained excess vitamin C, adrenals 0.08-0.10, liver 0.07-0.05.

For purposes of record we may also note the ascorbic acid content found in the tissues of 2 rhesus monkeys infected with poliomyelitis‡ (paralyzed and killed), adrenals 0.45 and 0.23, liver, 0.18 and 0.11. With silver nitrate the reaction was slow and incomplete.

Thus, in the tissues of laboratory animals we have found a reduction in the ascorbic acid content in many infections and intoxications.

Recently Yavorsky, Almaden and King[3] studied quantitatively ascorbic acid in tissues of humans having died of various causes. These authors note a diminution of vitamin C in the majority of cases of general infection.

Worringer and Sala[4] reported that, among other infections, diphtheria gave rise to infantile scurvy. They also cite 4 cases of whooping cough in children, followed by scurvy, and cured by the juice of fresh fruits.

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Action of Thallium in Experimental Animals.*

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A number of investigators of thallium poisoning have attributed some of the changes in poisoned animals to disturbance in function of the endocrine glands and the sympathetic nervous system. In support of this relationship Buschke and his associates[1] have re-

‡ These were kindly supplied to us by Dr. Brodie.

[3] Yavorsky, M., Almaden, P., and King, C. G., *J. Biol. Chem.*, 1934, **106**, 525.

[4] Worringer, J., and Sala, A., *Rev. Franc. de Pediat.*, 1928, **33**, 809.

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[1] Buschke, A., and Berman, L., *Münch. Med. Wchnschr.*, 1927, **74**, 969. Buschke, A., Zondek, B., and Berman, L., *Klin. Wchnschr.*, 1927, **6**, 683. Bickel, L., and Buschke, A., *Klin. Wchnschr.*, 1932, **11**, 679.