latter 2 classifications was clearly activated (Figs. 3, 4). In one non-precocious animal no graft thyroid was found. Thus the normal thyroid glands of these animals showed the inactive condition characteristic of the gland in the normal tadpoles of this age whereas the grafted thyroid is clearly increased in size and activity. That the mere grafting of thyroids does not result in activation has already been shown by Allen[4] and others.

The graft thyroids were rather widely distributed, several lying in contact with the anterior part of the forebrain, some in the basicranial cartilage, but in all cases touching or lying in a space that borders the meninges lining the cranial cavity (Fig. 2).

These results are interpreted as indicating that approximation of these glands brought about by the transplantation of either one induces a precocious activation of the thyroid. This activation was morphologically apparent in nearly all cases and physiologically demonstrated by precocious hind leg growth in most cases. The absence of metamorphic activity in some instances where the thyroid appeared activated morphologically may be attributed to the early stage at which the animals were sacrificed.

It is thought that this experiment demonstrates that the pituitary of an immature animal produces and releases into its neighborhood effective concentrations of thyrotropic hormone. Such secretions are somehow rendered ineffective for the normal thyroid whether by reason of dilution in the blood stream or otherwise.

It would appear from this experiment that the precocity observed with multiple pituitaries as previously reported[3] was due to the position of the grafts and not to the excess tissue *per se*.

8680 C

Effect of Various Amino Acids on Motility of Excised Segments of the Small Intestine.

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In the course of some unpublished work by Weinstein and Rettger on the effects of alkaline bacterial cultures it was deemed ad-

4 Allen, B. M., *Anat. Rec.*, 1929, **44**, 207; *Contributions to Marine Biology*, Stanford U. Press, 1930.

visable to determine whether or not a depressant action on intestinal motility which had been noted was caused by the presence of amino acids in the cultures. Tests were therefore made using pure amino acids to determine whether an effect similar to that of the bacterial cultures could be elicited.

Hirschfelder and Cantwell[1] reported an investigation on the effect of various amino acids on the movements of excised segments of intestine of cats and rabbits. Using aspartic acid, glutamic acid, glycocoll, tyrosine, histidine hydrochloride and cystine in M/100 concentration, they were able to demonstrate a depressant effect. This inhibition, however, was correlated with a lowering of the pH of the medium in which the intestine was allowed to contract. Asparagin was found by these investigators to exert a slightly stimulating action.

In the present study cats were used as the experimental animals. They were killed by stunning and pieces of the duodenum, jejunum and ileum immediately removed and immersed in Ringer-Locke solution. The segments were kept in the ice box until used, although no piece of intestine was preserved longer than 48 hours. In carrying out each experiment the intestinal segments were immersed in a bath of oxygenated Ringer-Locke solution. The purest amino acids obtainable were used and were added to the suspending medium in such amounts as to give known concentrations. Determinations were made of the pH of the Ringer-Locke solution before and after adding the amino acids. All of the experiments were repeated on intestinal segments from at least four cats.

Aspartic and glutamic acids in a dilution of 1:2,000 were found to depress the tone and movement of segments of the duodenum, jejunum and ileum; the molar concentrations of these acids were M/266 and M/294 respectively. Alanine and phenylalanine in dilutions of 1:1,000 (M/89) and 1:2,000 (M/330) respectively were found to exert only a slight temporary decrease in tone and rhythm of the intestine. This inhibition was quickly followed by a return to the normal type of contraction. Tyrosine in 1:2,000 (M/362) was without any effect. Leucine in a dilution of 1:5,000 (M/655) and tryptophane (1:2,000 or M/408) caused a slight increase in tone and rate of contraction of the excised segments of duodenum, jejunum and ileum.

Summary and Conclusions. The results with aspartic and glutamic acids are the same as those reported by Hirschfelder and

[1] Hirschfelder, A. D., and Cantwell, W., *J. Pharm. and Exp. Therap.*, 1918, **11**, 178.

Cantwell even though much weaker solutions were used in our experiments. Their explanation, that the depressant action is probably due to a decrease in pH was checked and found to hold also for the present work. Alanine and phenylalanine exerted only a slight temporary depressing action despite the fact that the molar concentration of the alanine was much higher than that of either aspartic or glutamic acid.

Since the bacterial cultures used in the previous work by Weinstein and Rettger were alkaline in reaction and the amino acids, when neutralized, had no effect on intestinal motility, as judged by experiments of the type here described, it must be concluded that the depressant action of the bacterial cultures was not due to their content of amino acids.

8681 P

Effect of Tannic Acid on Intranasal Infection with Pneumococci.

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It has been shown[1, 2] that certain viruses are infective for mice when instilled into the nares and that this capacity to invade the body of the mouse through the mucosa of the nose can be greatly diminished by preliminary intranasal treatments with tannic acid or alum-solutions. It has also been shown[3] that certain strains of pneumococci are infective for mice by the nasal route and that, under the conditions of the experiment, invasion takes place both through the nasal mucosa and through the pulmonary alveolar walls.[4]

The present experiments were planned to test whether this nasal infectivity of pneumococcus strains is modified by preliminary tannic-acid treatments. For this purpose, 5 experiments were undertaken using groups of young (3 to 6 weeks old) Swiss mice. In each experiment 15 mice were treated with weak solutions of tannic acid for 3 or 4 days before the infecting inoculation was

1 Olitsky, P. K., and Cox, H. R., *Science*, 1934, **80**, 566.

2 Armstrong, C., *Pub. Health Rep.*, 1935, **50**, 43.

3 Webster, L. T., and Clow, A. D., *J. Exp. Med.*, 1935, **58**, 465.

4 Rake, G., *J. Exp. Med.*, 1936, **63**, 191.