

These experiments demonstrate the existence of a definite stimulus attracting developing nerve fibers within the spinal cord.

The explanatory theories of Cajal, Kappers and his students and Child seem inadequate. It is hoped that further work on this problem, now under way, will give a decisive answer to this question.

164 (1911)

Methods of estimating the activity and intelligence of normal and thyroidectomized sheep.

By H. S. LIDDELL (by invitation).

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The attempt has been made to devise methods for investigating the activity and learning capacity of sheep following the extirpation of the thyroid glands. Their intelligence was tested by their ability to learn a simple labyrinth and the twin of each pair making the better record was thyroidectomized by Dr. Simpson. Later, when the operated lambs showed clearly the stigmata of cretinism the pairs were again tested in order, if possible, to demonstrate any influence of hypothyroidism on the intelligence of the operated lamb when compared with its normal twin. A labyrinth with a single cul de sac has been constructed in which, by a system of gates, the position of the cul de sac can be reversed. This arrangement makes possible the presentation of a number of problems so that the tests on a pair of lambs can be continued as long as may be necessary to determine the effect of the extirpation of the thyroid glands on the ability of the operated lamb to profit by experience.

The effect of thyroidectomy on the activity of the lambs was also sought for by comparison of each cretin lamb with its normal twin. It was found practicable to measure the activity of the sheep by attaching a pedometer to the fore leg and calibrating the instrument to measure the number of steps which the animal takes instead of the distance it covers. The pedometer is sufficiently delicate as an indicator of the animal's spontaneous ac-

tivity to demonstrate lethargy if it occurs following throidectomy. An apparatus has been constructed by which the cretin's capacity for muscular exertion can be compared with that of the normal lamb. It is essentially an inclined plane the angle of which can be altered at will. It is not difficult to induce the sheep to ascend the incline and so strong is the flock instinct that a sheep too weak to follow the others will continue its attempts until exhausted.

165 (1912)

The deleterious effect of sodium citrate on the blood with particular reference to the H-ion concentration.

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Experiments were undertaken to determine whether the effects recently reported by Unger¹ to result from the action of sodium citrate on the blood when added in the proportions used in transfusion might not be related in some way to the hydrogen-ion concentration of the solution used. These effects, as given by Unger, included the formation of a substance derived from the stroma of the red cells which is anticomplementary in the Wassermann reaction, the red cells being at the same time rendered more fragile, together with a direct interference with the action of complement, a practical destruction of the phagocytic activity of the leucocytes, and a reduction in the effect of opsonin.

Three sodium citrate solutions (2 per cent.) having P_H values of 4.1, 7.25 and 9.56 were added to blood in ratios of 1 : 2 and 1 : 9. With but an occasional exception the citrated plasmas thus obtained showed no anticomplementary power. With both whole blood and plasma a varying amount of precipitate usually appeared, which increased on inactivation. It was not present in citrated serum. The citrated extracts of washed red cells were not anticomplementary. Repeated tests of the citrated blood for red-cell fragility were negative, as indeed were the phagocytic indices of leucocytes exposed to citrate. In the main our results were diametrically opposite to those reported, regardless of the P_H of the solution

¹ Unger, L. J., *J. A. M. A.*, 1921, lxxvii, 2107.