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Experimental study of action of hyoscine hydrobromide on development of the nervous system of amblystoma.

H. S. BURR and MARION E. SNAVELY.

[*From the Department of Anatomy, Yale University School of Medicine, New Haven, Conn.*]

The success attendant upon the treatment of post-encephalitis by hyoscine hydrobromide at various clinics, has given rise to considerable speculation as to just how the drug acts. Various suggestions will be found in the literature; the majority of which suggest the action of the drug on the basal ganglia. The careful studies of Coghill[1] on the development of the nervous system of *Amblystoma punctatum* have given us an excellent tool for studying the effect of drugs on the nervous system. By subjecting growing embryos to a solution of the drug it is possible to determine, with a considerable degree of accuracy, the portion of the nervous system upon which the drug acts. The experimental evidence here reported shows that the site of action of the drug can be quite sharply delimited. Young embryos of *Amblystoma* in the premotile stage were placed in solution of hyoscine hydrobromide in concentrations varying from 1:3,000, 1:5000, and 1:10,000. A selected series of embryos was also placed in tap water as controls. At frequent intervals, varying in length from two hours to twelve hours, the embryos were stimulated gently with a single hair. The normal progression in the development of the reflexes, as shown by Coghill,[2] occurred in both the controls and hyoscinized embryos up to the stage of the development of the swimming movement. At this time, the hyoscinized embryos either failed to respond by the usual swimming movement or gave only a flick of the tail. The controls, on the other hand, developed the swimming movements normally. Coghill's researches have correlated the functional stages in motor response to stimulation with anatomical findings in the development of the nervous system. The failure of the response of the hyoscinized embryos by swimming movements, and their

[1] Coghill, G. E., *J. Comp. Neur.*, 1924, xxxvii, 37.

[2] Coghill, G. E., *J. Comp. Neur.*, 1924, xxxvii, 37.

almost perfect response to early reflexes, indicates beyond a doubt that the action of the drug is not on the neuro muscular mechanism, nor in the spinal cord reflex pathways, nor in the association centers in the medulla, but rather its action is on the integrative mechanism cephalad to the medulla, which controls the swimming movements. The evidence, then, points to the action of the drug upon the basal ganglia.

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Penetration into valonia of oxidation-reduction indicators; estimation of the reduction-potential of the sap.

MATILDA MOLDENHAUER BROOKS.

[*From the Division of Pharmacology, Hygienic Laboratory, Washington, D. C.*]*

The penetration of 2,- 6,- dibromo phenol indophenol into *Valonia* was observed when the external pH was varied from 5 to 9, and when the internal pH was changed from normal (6.4) to 5.2 and to 9.0. It was found that when the pH of the sap was normal, the penetration of the dye into the sap follows the course of a bimolecular reaction curve, and the amount of dye in the sap at equilibrium is proportional to the amount of undissociated dye in the external solution. When the sap is made more acid than normal, there is more dye present; when the sap is more alkaline there is less dye present. At higher temperature and lower concentrations, the curves follow a course like that for two consecutice unimolecular reactions. 2,- 6,- dibromo phenol indophenol was found in the sap only in a completely reduced form. Its concentration was estimated colorimetrically after it had been reoxidized *in vitro*.

Methylene blue was found to penetrate into the sap in an oxidized form. This dye is a very strong base and is completely dissociated at all pH values used in these experiments. The amount found in the sap did not vary with external nor with internal changes in pH from 5 to 9.

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