10151

Effect of Light on Uptake of Water by Frogs Injected with Posterior Pituitary Extract.

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Evidence pro and con has been offered that light may affect the amount of hormones produced by the anterior, middle and posterior lobes of the hypophysis. The extensive and involved literature on this subject has been recently reviewed by Bissonnette.[1] In addition, Boyd and Brown[2] have shown that when an extract of the posterior hypophysis is injected into the dorsal lymph sac of frogs kept in water, the animals take up from 15 to 20% of their weight of water in 3 to 4 hours and the uptake of water is greater when the experiment is performed in the dark room. The present investigation was an extension of these latter experiments.

It is necessary to review briefly the technic of Boyd and Brown.[2] Leopard frogs *(Rana pipiens)* were placed in 400 cc beakers containing 75 cc of water and covered with weighted screen tops. One group of frogs was used as controls and the other injected with extract of the posterior pituitary gland and all the animals were dried and reweighed every hour or at shorter or longer intervals as indicated by the changes recorded. To find the effect of light, Boyd and Brown assembled one group of animals in the dark room and another group in daylight in an open laboratory. From the results so obtained it was possible to show that there was statistically a significantly lower uptake of water in daylight than in the dark and the conclusion was made that light depressed the reaction.

The original purpose of the present experiments was to study the effect of light of varying intensities and varying wave lengths. The frogs were assembled as before in a dark room, which was a small, windowless and unventilated room, and were subjected to increasing intensities of light emanating from electric lamps increasing in intensity from 15 to 250 watts on successive days and stationed at measured lengths from the beakers containing the frogs. To assure a uniform temperature, the beakers were placed in a water bath and throughout the experiment the temperature of the bath was maintained at 21°C. In each experiment, 18 frogs were injected with 0.5

[1] Bissonnette, T. H., The Pituitary Gland, Williams and Wilkins, Baltimore, 1938, Chap. 19.

[2] Boyd, E. M., and Brown, G. M., *Am. J. Physiol.*, 1938, **122**, 191.

international units of Pituitrin Surgical (generously supplied by Dr. E. A. Sharp of Parke, Davis and Company) per 10 g body weight and 6 frogs were used as uninjected controls. This dose of extract had been found by Boyd and Brown[2] to be more than sufficient to produce the maximum increase in body weight from water uptake.

After performing numerous such experiments with frequent repetitions of several intensities of light, it became obvious finally that the intensity of light had no significant correlation with the percentage uptake of water. The curves obtained were all similar to those of Boyd and Brown[2] at the same temperature except that they were about 6% higher at the peak, which is what might be expected at this temperature in experiments performed in the dark.

Fifteen experiments, each consisting of 20 injected frogs, were then performed in daylight in an open laboratory and the maximum percentage uptake of water was 5 to 10 points lower than in experiments in the dark room. From a statistical analysis of the resulting data, it was again apparent that the percentage uptake of water by injected frogs was significantly lower in daylight than in all of the experiments in the dark room irrespective of the intensity of light. Further experiments similarly demonstrated that there was no significant difference in the maximal uptake of water in experiments performed in complete darkness in the dark room as compared with those in the dark room with electric light of equal intensity to daylight in the open laboratory.

It then became obvious that the significant factor in the results of Boyd and Brown[2] and in the present experiments was the dark room and not darkness or intensity of light. Why the results should be greater in one room (the dark room) than in another room (the lighted and open laboratory) was then investigated. To be brief, the explanation was finally demonstrated as being the relatively greater ventilation in the open laboratory. When the beakers containing the frogs were covered with glass tops instead of screen tops, the maximum percentage uptake of water was always 5 to 10 points higher in the open laboratory than when the experiment was performed with screen tops but the type of cover of the beakers made no difference in the dark room.

These results were interpreted as indicating that the extra circulation of air in the open laboratory through the screen tops of the beakers had caused sufficient evaporation of absorbed water from the partially exposed surface of the frogs to prevent them from showing as great an uptake of water as in glass-covered beakers or in the unventilated dark room. While our results have confirmed

the observations of Boyd and Brown,[2] they have further demonstrated the fallacy in the interpretation of these authors that light depresses the uptake of water in frogs injected with an extract of the posterior hypophysis.

Conclusion. The greater uptake of water by frogs injected with extract of the posterior hypophysis in the dark room observed by Boyd and Brown[2] has been shown due to the decreased circulation of air in the unventilated dark room rather than to darkness. There is no evidence to date that light has any effect upon this property of posterior pituitary extracts.

10152

Gonadotropic Action of Testosterone Propionate on the Immature Mouse Ovary.

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Vaginal introitus and estrus have been produced in the normal infantile rat with testosterone.[1, 2, 3] Little consideration has been given to the effect of this hormone on the ovary. Hohlweg[4] reported that luteinization without estrus resulted with large dosages in the rat. Recently, Salmon[5] demonstrated a gonadotropic effect with this hormone on the immature rat ovary by means of a single injection of 1 to 5 mg. Follicle stimulation resulted as the initial effect in 60 to 72 hours and corpora lutea were found after 96 hours. It was, therefore, of interest to investigate a possible gonadotropic effect of single injections of testosterone propionate on the immature mouse.

In these experiments, 148 albino mice of the "Hygenic Strain"[6] were used, of which 29 were controls. Litter-mate controls were used in all instances. Mice between 18 and 21 days of age were injected subcutaneously with dosages of 0.5, 1.0, 1.5, and 2.0 mg of

1 Butenandt, A., and Kudszus, H., *Z. physiol. chem.*, 1935, **237**, 75.

2 Tschopp, E., *Arch. int. Pharm. et de Therap.*, 1936, **52**, 381.

3 Deanesly, R., and Parkes, A. S., *Brit. Med. J.*, 1936, **1**, 257.

4 Hohlweg, W., *Klin. Wchnschr.*, 1937, **16**, 586.

5 Salmon, U. J., PROC. SOC. EXP. BIOL. AND MED., 1938, **38**, 352.

6 Starkey, W. F., and Schmidt, E. C. H., *Endocrinology*, 1938, in press.