

When supported in this way, a decapitate dog resembles a decerebrate dog. The Stütz-tonus is so strong that the hind quarters of the animal can be lifted off the hammock by pressure against the pads of the hind feet, and the legs will bear the body weight for a minute or more. We believe that the pressure of the hammock upon the skin of the abdomen and groin reinforces the support reaction in the hind legs. If the animal is placed upon its back the rigidity disappears. This reinforcement seems to be sufficient in the dog. In the decapitate cat, additional reinforcement from pinching the tail is required; but when reinforced in this way, the support reaction becomes strong and steady and enables the hind legs to carry the body weight for minutes at a time.

In chronic spinal cats with transections at various levels from the third lumbar to the fourth thoracic segments the support reaction becomes within a few days after the operation sufficiently strong to enable the animal to stand. The hind legs bear the weight of the posterior half of the body when the animal is out of the hammock and standing on a table. In our experiments, the length of time which the hind legs of chronic spinal cats have been able to bear the body weight in the standing posture has varied from 30 seconds to 3 minutes and 20 seconds. Standing of a similar sort was seen by Sherrington⁴ in chronic spinal dogs.

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Production of Lenticular Opacities by Ultraviolet Radiation in the Presence of Certain Salts.

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The results of Hess¹ were confirmed by the production of a surface destruction of the lens epithelium following exposure of the eyes of frogs to ultraviolet radiation. Burge² showed that lens material in a test tube was more readily coagulated if salts or sugar were present, because the lens protein was so modified that radiations of short wave-length could precipitate it. He was also able to produce cataracts in the eyes of fish which had been kept in salt

⁴ Sherrington, C. S., *J. Physiol.*, 1910, **xl**, 28.

¹ Hess, C., *Arch. f. Augenheilk.*, 1907, **lvii**, 185.

² Burge, W. E., *Am. J. Physiol.*, 1914, **xxxvi**, 21.

solutions for varying periods of time before they were exposed to ultraviolet radiation. (Burge.³)

In our experiments, 3 types of procedure were followed: exposure of excised lenses in salt solutions, exposure of the eyes of intact living frogs to direct radiation, in some cases, following the injection of salt solutions into the dorsal lymph sac, and exposure of the lenses of developing chick embryos. In each case, the unscreened radiation of a Cooper-Hewitt quartz mercury-vapor arc was used.

In the first series, the excised lenses of dogs, chickens, and a frog, were exposed directly to the radiation in 0.1% and 1.0% solutions of NaCl and CaCl₂. Controls of lenses exposed in Ringer's solution and of unexposed lenses in salt solution were used. The results of these experiments may be summed up as follows: the lenses of dogs exposed for 22-50 minutes at a distance of 25 cm. from the center of the arc, in 1.0% NaCl showed no change in opacity, but slight surface degeneration appeared. (These dogs had been anesthetized for use in other experiments.) The chick material consisted of lenses of young chicks and adult hens, and was used immediately after removal from the animals, except in 2 cases where the material was kept on ice for a few hours before exposures could be made. These lenses were not as reactive as fresh material. Exposures were made in solutions of 0.1% and 1.0% of NaCl and CaCl₂ for periods of 5-23 minutes, at a distance of 20 cm. It was found that Ca was more effective in producing opacity than Na. Frog lenses similarly exposed showed opacity and surface destruction of epithelium.

In the second series of experiments, the left eyes of frogs were exposed for 3-5 minutes at 20 cm. distance from the arc. Frogs were killed and lenses examined at varying intervals after exposure. Examinations were made in tap water, in Ringer, and in salt solutions. In tap water, no opacity appeared at first, although prolonged immersion in tap water, (30-45 min.) often showed a difference in opacity between exposed and unexposed lenses. Such a difference appears in lenses shown in Fig. 1.

If solutions of salts in concentrations of 0.1%-1.0% are added, opacity appears more rapidly in the radiated lenses. It was also found that the effects of radiation did not appear during the first day, and that they became progressively more marked as time after radiation increased, up to within 10 days after exposure.

A modification of the above method involved the injection of 2 cc. of the same concentrations of salt solutions into the dorsal lymph sac of the frog about 30 minutes before exposure of the left

³ Burge, W. E., *Abstract Bull., Nela Res. Lab.*, 1917, i, 290.

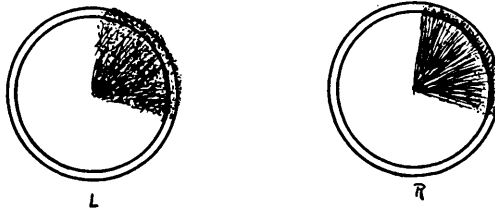


FIG. 1.

Left (L) and Right (R) lenses kept in tap water for 30 min. following exposure of left eye of frog to ultraviolet radiation. Note loss of striations in radiation left eye, as well as destructive action on lens epithelium.

eye to radiation. Controls, uninjected, and some injected with Ringer were used. It was found that the controls showed a surface effect of radiation on the lens epithelium, and that the difference in opacity could be shown by immersing both eyes in salt solutions. Radiated eyes showed more opaque lenses. However, the exposed lenses of frogs injected with salt solutions showed varying degrees of opacity detectable by gross and microscopic examinations and by the ability to focus a beam of light directed through them. Fig. 2 shows a less severe opacity but greater localized surface destruction.

The experiments with chick embryos involve the use of "point" radiation focussed through a quartz rod. A window is cut in the shell and shell membrane of the egg, and exposures are made by placing the tip of the rod directly over the developing lens. After the exposure has been made, the shell window is replaced, and sealed with paraffin. The egg is then placed in the incubator for further development. These experiments are not yet completed, but on the basis of results so far obtained (involving about 12 doz. eggs) it may be said that lens development may be inhibited. Operated and unoperated unexposed controls are used in these experiments.

In the first 2 series of experiments, involving the use of excised lenses, and of eyes of intact living frogs, it appears that opacity is due to the combined action of radiation and the combination of salts

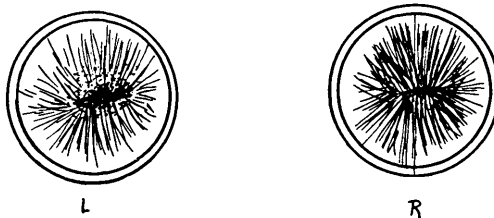


FIG. 2.

Left (L) and Right (R) lenses of frog which had been injected with 1 cc. of a 0.1% solution of CaCl. Left eye exposed 3 min. at 23 cm. Note localized area of destruction.

and lens proteins. On the basis of work done in this laboratory, and elsewhere, it seems highly probable that the primary effect of radiation is a surface phenomenon which involves the change in permeability to salts or their ions, with a subsequent precipitation of lens proteins.

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Roentgen Ray Visualization of Spleen Following Injection of Emulsions of Halogenated Oils.*

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In view of the well known phagocytic properties of the cells of the reticulo endothelial system for finely divided foreign materials injected into the blood stream an attempt was made to visualize organs containing these cells by injecting particulate matter which was relatively opaque to roentgen rays.

Using gum acacia as an emulsifying agent an emulsion of lipiodol was prepared. A few of the droplets of oil were larger than erythrocytes in the best emulsion which could be prepared by trituration in a mortar. This emulsion was diluted with 5% gum acacia solution and injected into one of the tail veins of white rats. Doses varying from $\frac{1}{2}$ cc. to 4 cc. of oil per kilo body weight were given. Seven rats were so injected. Four receiving smaller amounts survived indefinitely. One died about 36 hours after injection and one died within one minute of injection. The third was killed when in a dying condition. Because of the more recent findings of Crandall and Walsh¹ we subsequently used a gum acacia-water emulsion of the bromidized esters of olive oil. This emulsion was very kindly supplied by the Abbott Laboratories.

Eleven rats weighting from 200 to 300 gm. have received intravenous doses of this material in amounts varying from $\frac{1}{2}$ cc. to

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¹ Crandall and Walsh, *Radiol.*, 1929, xii, 499; unpublished work.