tion that even after 1 hour's exposure there were moderate signs of sensitization.

In view of the evidence that animals might become sensitized after 1 hour's exposure, we carried out another series of experiments on 37 animals. After intravenous injection, of 4 animals exposed for ¼ hour, 1 showed suggestive symptoms, 3 were negative; of 7 exposed for ½ hour, 4 showed moderate dyspnea, and 3 were negative; 5 exposed for 1 hour all died a typical anaphylactic death; of 4 exposed for 2 hours, 1 was negative and 3 died in typical anaphylaxis; of 9 animals exposed for 3 hours, 7 died in typical anaphylactic shock, 1 showed dyspnea, suffusion of the eyes, moderate collapse with recovery and 1 was negative; of 5 animals exposed for 4 hours, 4 died and 1 showed moderate anaphylaxis with recovery; all 3 animals exposed for 5 hours died in typical anaphylactic shock.

Therefore a suggestion of sensitiveness may be brought about by the inhalation method in as short an exposure as ¼ hour. Definite sensitization may be established by 1 hour's exposure in certain animals. Other animals apparently cannot be sensitized at all.

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Effect of Hydroquinone in Vitamin A Deficiency.

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Since the discovery about 1913 that a lack of vitamin A in the diet would cause ophthalmia in rats, attempts have been made to show that this pathological condition might also be due to other factors than the absence of this vitamin. The so-called "salt ophthalmia" of McCullom, Simmonds and Becker[1, 2] has been shown by McCullom, Simmonds and Becker[3] and Jones[4] to be due to an oxidative destruction of vitamin A in the diet by ferrous sulfate if the

[1] McCullom, E. V., Simmonds, N., and Becker, J. E., *J. Biol. Chem.*, 1922, liii, 313.

[2] McCullom, E. V., Simmonds, N., and Becker, J. E., *J. Biol. Chem.*, 1925, lxiv, 161.

[3] McCullom, E. V., Simmonds, N., and Becker, J. E., PROC. SOC. EXP. BIOL. AND MED., 1927, xxiv, 952.

[4] Jones, J. H., *J. Biol. Chem.*, 1927, lxxv, 139.

diets are not made up frequently. However, when the diet is made up daily, or every few days, no ophthalmia develops.

Recently Huston and Lightbody[5] have presented evidence to show that hydroquinone had a definite beneficial effect when used in a diet low or lacking in vitamin A. Huston, Lightbody and Ball[6] also concluded that hydroquinone had a definite anti-oxygenic effect on the vitamin A of milk fat and cod liver oil. If these views are correct, a very important physiological rôle must be attributed to this phenol.

In order to test out the hypothesis of Huston and Lightbody, we fed 2 groups of rats on a vitamin A free diet consisting of extracted and heated casein, 18 gm., corn starch, 51 gm., crisco, 23 gm., salt mixture (Osborne and Mendel), 5 gm., dried yeast, 3 gm., with 2 drops daily of a 5% solution of Vigantol to supply vitamin D. 0.05 and 0.1 gm. of hydroquinone per 100 gm. of the above diet were fed to the 2 groups of animals from the time of weaning. This diet was made up weekly. The 11 animals of these 2 groups all lost weight, developed ophthalmia and died.

When 1 part of a substance is included in 1000 parts of food the chances are very good that each animal will not receive a given amount of this small part each day. Hence a third group of rats were fed the above diet from the time of weaning and were given daily by mouth 5 drops of a solution of hydroquinone equivalent to 7 mg. of the phenol. The same results were obtained as described above. 3 animals of this group were cured of ophthalmia by cod liver oil.

In a study of the production of ophthalmia in mice we also gave hydroquinone without any beneficial effect. A control group of young mice were fed the following diet: edestin, 30 gm. corn starch, 63 gm., salt mixture (Osborne and Mendel), 7 gm., a 200 mg. yeast tablet and 1 drop of 5% Vigantol daily to supply vitamins B and D, respectively. The experimental group received this diet with the addition of 0.1 gm. hydroquinone per 100 gm. of food, from the time of weaning. Both groups developed ophthalmia and died from vitamin A deficiency in about 50 days.

From the above results we conclude that hydroquinone, when fed in the amounts stated above, has no beneficial effect in rats and mice suffering from a lack of vitamin A.

[5] Huston, R. C., and Lightbody, H. D., *J. Biol. Chem.*, 1928, lxxvi, 547.

[6] Huston, R. C., Lightbody, H. D., and Ball, C. D., Jr., *J. Biol. Chem.*, 1928, lxxix, 507.