

Chemiluminescence of Alcaptonuric Urines.*

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That light is given off during the oxidation of homogentisic acid in alcaptonuric urines has not been reported previously. This peculiarity of alcaptonuria may be of importance as a possible explanation of instances of luminous urine mentioned in the older literature.^{1, 2, 3} The luminescence of two different alcaptonuric urines, as well as of the homogentisic acid and lead homogentisate isolated from these urines, is described in this paper. The urines were those of 2 Negro children reported in an earlier study.⁴

When alcaptonuric urine is made alkaline, homogentisic acid is rapidly oxidized by the air and forms a brownish-black substance. It is during this oxidation that light is emitted. The observations were made in a completely dark (photographic) room after allowing 15 minutes for dark adaptation. To 5 cc of urine, 1 cc of 10% sodium hydroxide is added. The test tube is then covered with the thumb and shaken vertically with vigor. Only a faint glow usually comes on shaking the first time. On the second shaking, however, a white glow appears a fraction of a second after the shaking is stopped. The glow is especially strong in the froth layer but permeates the whole solution. The light fades rather rapidly, but there is an after-glow for some seconds after shaking. The urine can then be shaken again and the glow will return, and fade. This can be repeated 4 or 5 times. Apparently as long as some homogentisic acid remains unoxidized, luminescence will reappear on shaking.

Both alcaptonuric urines exhibited this phenomenon, the one containing the higher concentration of homogentisic acid giving the more luminescence. Normal urines, either fresh or old, did not luminesce when treated similarly. The oxidation of homogentisic acid by air takes place rapidly only in alkaline solutions.

Similar results were obtained with normal urines to which either

* The author is indebted to Professor E. Newton Harvey of Princeton University for suggesting that observations for luminescence be made on alcaptonuric urines.

¹ McDermott, F. A., *J. Am. Chem. Soc.*, 1913, **35**, 824.

² Harvey, E. N., *The Nature of Animal Light*, J. B. Lippincott Co., 1920, p. 17.

³ Harvey, E. N., *Living Light*, Princeton University Press, 1940, p. 21.

⁴ Abbott, L. D., Jr., *Science*, 1941, **94**, 365.

homogentisic acid or lead homogentisate had been added. Water solutions of these compounds likewise luminesce. Since there is no froth layer when water solutions are shaken, the addition of several drops of a froth-producing substance (*e. g.*, 2% egg albumin) greatly facilitates observation of the phenomenon as the froth layer, where the greatest oxidation no doubt occurs, gives off the most brilliant light.

It is also of interest that hydroquinone, which likewise oxidizes and blackens when treated in a similar manner, emits no light when treated similarly and thus differs in behavior from the substituted hydroquinone, homogentisic acid (hydroquinone acetic acid).

Summary. Alcaptonuric urines, as well as solutions of homogentisic acid or lead homogentisate, give off light when made alkaline and shaken with air.

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Effect of Congo Red on Plasma Prothrombin.*

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Congo red has been widely used as a hemostatic agent, but its mode of action remains obscure.¹ Wedekind, Becker and Wienert² first observed that Congo red injected intravenously had a hemostatic effect. The coagulation time was shortened. Blood platelets were increased 2 or 3 times the initial number by the 5th or 6th day and returned to the initial figure in 3 weeks. It has been suggested¹ that "the hemostatic action of Congo red may be related to a limitation of the function of the spleen, with resultant elevation of platelets in the blood." However, there are apparently no experimental studies that support such an opinion concerning the effect of Congo red.

Because of the reported beneficial results in controlling hemorrhage with Congo red, its effect on the level of plasma prothrombin was studied and compared to that of 2-methyl-1,4-naphthoquinone.

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¹ Arons, I., and Sokoloff, B., *Am. J. Roent. and Rad. Ther.*, 1939, **41**, 834.

² Wedekind, T., Becker, J., and Wienert, B., *Munchen Med. Wchnschr.*, 1930, **77**, 2049.