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**The Effect of Glucose on the Oxidation of Alcohol *in vitro*.**

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The metabolism of alcohol has been the subject of numerous recent publications in which it has been suggested that the oxidation of alcohol may be catalyzed by the simultaneous oxidation of carbohydrate. The ingestion of food (Southgate<sup>1</sup>) or glucose (Bornstein and Loewy<sup>2</sup>) along with alcohol resulted in a lower blood concentration of alcohol. Carpenter and Lee<sup>3</sup> found that after the ingestion of glucose or fructose with alcohol, the alcohol was present in the expired air for a shorter period. Clark and Morrissey<sup>4</sup> measured the rate of disappearance of alcohol from the blood of dogs given doses of 3 g per kilo. They found that the administration of insulin and glucose accelerated the disappearance of alcohol. More recently Clark, Morrissey and Fazekas<sup>5</sup> have shown that the liver of depancreatized cats could not oxidize alcohol in the Warburg apparatus. In this respect the metabolism of alcohol in the body resembles that of the acetone substances. Shaffer<sup>6</sup> showed that the oxidation of acetoacetic acid in alkaline solution by hydrogen peroxide was accelerated when glucose was simultaneously oxidized. We are here reporting similar experiments on the effect of glucose on the *in vitro* oxidation of alcohol.

The control solution contained 100 mg % of alcohol, 20 milliequivalents percent of hydrogen peroxide, 1% sodium hydroxide, and 1 mg % ferric ammonium citrate. The experimental solution contained 1% glucose in addition. The reaction was studied at 25°C. Alcohol analyses were made at various intervals during the following 24 hours by the macro-method of Abels.<sup>7</sup> The accuracy of the method was estimated from a series of analyses of 39 known solutions ranging from 30 to 110 mg %, in which the average error was 5.1 mg %. In 34 instances the error was less than 10 mg %, while in the remaining 5 it was 15 mg %.

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<sup>1</sup> Southgate, H. W., *Biochem. J.*, 1925, **19**, 737.

<sup>2</sup> Bornstein, A., and Loewy, A., *Biochem. Z.*, 1927, **191**, 271.

<sup>3</sup> Carpenter, T. M., and Lee, R. C., *J. Pharm. and Exp. Therap.*, 1937, **60**, 264, 286.

<sup>4</sup> Clark, B. B., and Morrissey, R. W., *Am. J. Physiol. (proc.)*, 1938, **123**, 37.

<sup>5</sup> Clark, B. B., Morrissey, R. W., and Fazekas, J. F., *Science*, 1938, **88**, 285.

<sup>6</sup> Shaffer, P. A., *J. Biol. Chem.*, 1921, **47**, 433.

<sup>7</sup> Abels, J. C., *Proc. Soc. Exp. Biol. and Med.*, 1936, **34**, 346.

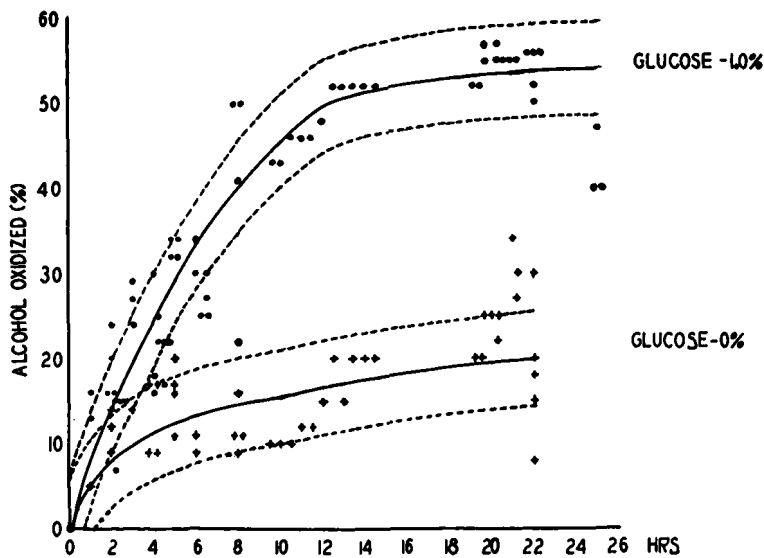


FIG. 1.

The effect of glucose on the oxidation of alcohol *in vitro*.

The data are presented in Fig. 1. The dotted lines enclose an area about each curve equal to plus and minus the estimated average error of the analytical method, 5.5 mg %. It may be seen that the large majority of the points fall within these areas. The curve for the rate of oxidation of alcohol appears to approach a maximum after 12 hours, and we have analyzed this maximum statistically. The average amount of alcohol oxidized in the control solution was 22 mg %, with a probable error of  $\pm 0.97$ . When glucose was present in solution the average amount oxidized was  $52 \pm 0.67$  mg %. The difference with its probable error was  $30 \pm 0.60$ . This statistically significant difference indicates that the presence of glucose resulted in a marked acceleration of the oxidation of alcohol. We are unable to explain this apparent catalytic effect of glucose on the oxidation of alcohol *in vitro*.