

The age of children ranged from 1 to 16 years. The highest incidence was found among children between 7 to 9 years old, and the lowest between 1 and 3. The incidence of the infections was much higher among boys than among girls.

Judging from this study, we are inclined to believe that, irrespective of the general state of health of individuals, they may become carriers, if sufficiently exposed to an infection by ingestion of cysts or trophozoites with food or drink. As a matter of fact, among the healthy children in one of the orphanages where the personal hygiene was not sufficiently stressed, the incidence was higher than among sick children temporarily confined in the hospital. On the other hand, in the other orphanage where a rigid hygiene was enforced upon children, there was a very low incidence.

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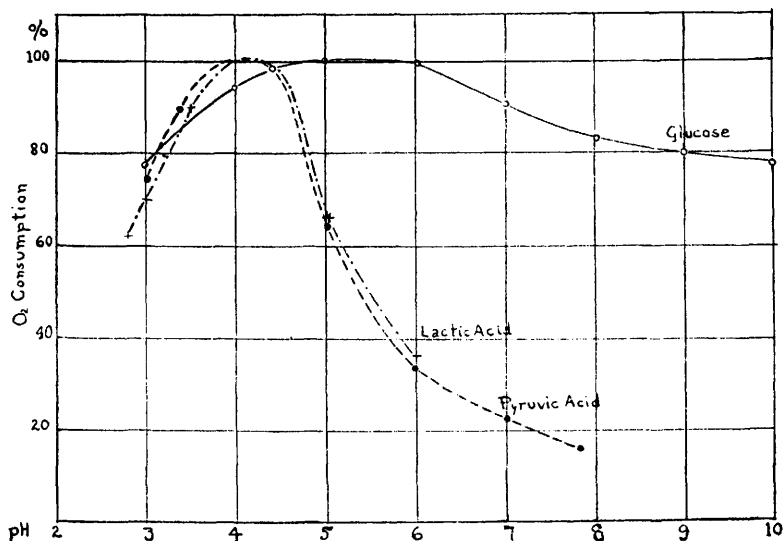
**Variations in Optimum pH for Oxidation by Yeast of Substrates,
Glucose, Pyruvic Acid and Lactic Acid.**

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The rate of oxygen uptake by yeast in buffer solutions containing the metabolites, glucose, lactate (r.) or pyruvate, is markedly influenced by the buffer pH. The curves of the accompanying figure show average results for 120 minute periods with the 3 substrates at different pH levels. Washed Fleischman yeast, in phosphate, phthalate or citrate buffers of 0.15 M was used with the Warburg manometric apparatus (Temp. 37.5°), the CO₂ being absorbed by NaOH. The pH of the buffer solutions was determined by the quinhydrone electrode, and that of yeast mixtures, colorimetrically.

With glucose as a substrate the maximum of oxygen uptake occurs in buffers having initial pH values from 4.5 to 6.0. With lactate and pyruvate the maximum lies at a pH between 4.0 and 4.5. On the acid side of the optimum, since the oxidation of all 3 substrates is depressed to a similar degree, the glucose curve may be taken as representing the effect of pH on the ability of yeast to oxidize these substances. On the alkaline side of the optimum, the curves of lactic and pyruvic acid fall off more rapidly than that of glucose. The maximum rate of glucose oxidation extends over a



wide range, as was observed by Rona and Grassheim¹ using yeast without added substrate. This difference in the depression of oxygen consumption with different substrates may be related to the fact that beyond pH 4.5, a large part of the pyruvate and lactate are in the form of salts and dissociated as ions, while glucose is in a non-ionized state. The percentage of undissociated acid and salt molecules is approximately proportional to the oxygen consumption at different pH values on the alkaline side of 4.5. These observations might be explained by the inability of ions to penetrate yeast cells.

Changes in pH are accompanied by variation in the completeness of pyruvic and lactic oxidation. From ratios of moles of acid disappearing to moles of oxygen consumed, it can be shown that pyruvic is completely oxidized at its optimum pH, but at a pH of 6 the ratio falls from 2.5 to 1.5 or 1.25. At the optimum of lactic acid oxidation the ratio is 1.5 instead of 3 (showing incomplete oxidation) and falls to 1.25 at a pH of 6, and to 0.734 at a pH of 7.8.

¹ Rona and Grassheim, *Biochem. Z.*, 1923, **134**, 151.