Correlation of Cell Numbers with Catalase Activities of Pure Strains of Bacteria

The enzyme catalase is known to be present in all obligatory aerobic bacteria (Callow 1923; Mc. Carthy & Hinshelwood, 1959). The role of this enzyme is to destroy the hydrogen peroxide formed as a metabolic end product, the accumulation of which is toxic to the organisms.

The present investigation is an attempt to correlate the catalase production with the actual number of aerobic cells generating the enzyme. The cultures chosen were those isolated from the surface of fresh marine fish which harbour a high proportion of aerobic bacteria.

The pure cultures so isolated and labelled S16, S18, S20, S25, S50 and S74 were grown in seawater agar (SWA) slants at room temperature (28±2°C) for 24 h. The cells were washed out into clean sterile test tubes using sterile phosphate buffer (0.01 M, pH 6.8). Suitable decimal dilutions in phosphate buffer were made and the count of bacteria/ml was determined by pour plate method using SWA giving an incubation period of 48 h at room temperature. Simultaneously as soon as the dilutions were made, the catalase activity in the first four dilutions was determined by the method of Herbert (1955). 1 ml of 0.01 N sodium thiosulphate is equivalent to 5 μ mol of H_2O_2 (Yona Yoshpe-Purer & Henis, 1976) and catlase activity expressed as μ ml H_2O_2 decomposed by 1 ml of the bacterial suspension.

The log of bacterial count was plotted against log μ mol of H_2O_2 decomposed (catalase activity). The regression equation and the coefficient of correlation for each bacterial culture are also given in Fig. 1. The significance of the correlation coefficient ranged between 5% and 0.01% for the different bacterial strains.

The present study indicates that a linear correlation between log of catalase activity

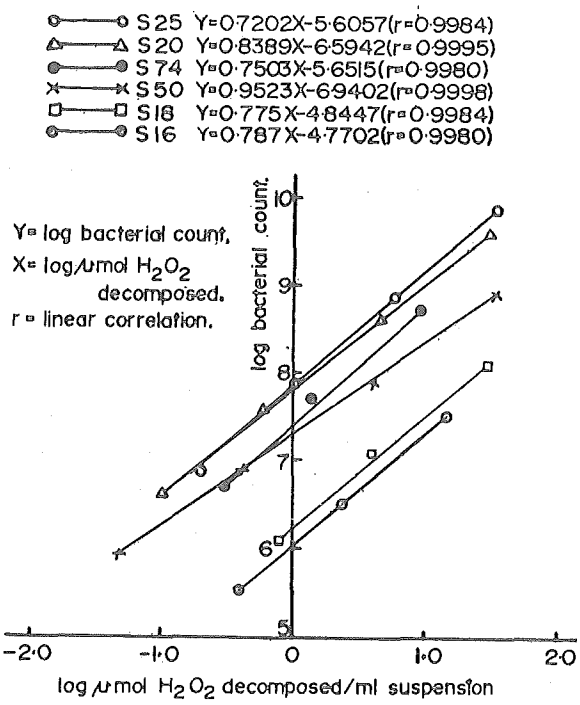

Fig. 1. Relationship between log bacterial count and log μ mol of H_2O_2 decomposed for different cultures of bacteria

and log of bacterial count exists for single cultures. The figure also shows that the catalase activity differs with different strains. However, at least for pure strains of bacteria, the correlation can be made use of for rapid estimation of cell numbers.

References

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