Fluorescence of suspensions of green sulphur bacteria

WASSINK *et al.*[1] did extensive research on the fluorescence shown by suspensions of *Chromatium* strain D under various experimental conditions. Since then, methods for growing another anaerobic bacterium, *Chlorobium*, have been improved, allowing its use in similar studies.

Fluorescence of the bacterial suspensions was measured during irradiation by a series of light intensities under anaerobic conditions. The effect of several concentrations of carbon dioxide, hydrogen (as hydrogen donor), and two poisons, sodium azide and potassium cyanide, was determined. The apparatus was similar to that of WASSINK *et al.*, except that the present suspensions were contained in cuvettes with gassing and sidearm attachments instead of in Warburg vessels. Suspensions of *Chlorobium limicola* were prepared in 0.01 *M* potassium phosphate buffer at pH 7.0, with about 5 mg wet weight per ml. Fluorescence of *Chromatium D* was determined under the same conditions, and the results in general agreed with those obtained by WASSINK *et al.* for this organism.

The *Chlorobium* suspensions showed only about ¼ the fluorescence of *Chromatium* suspensions having the same wet weight concentration. *Chlorobium* had no pronounced induction period, the stationary value of fluorescence being reached almost immediately under all experimental conditions. The stationary value of *Chromatium* fluorescence was preceded by an induction period of about ½ minute, the speed and pattern of the changes in fluorescence during this period depending on the concentrations of the four experimental agents.

The type of change produced by these agents on the stationary value of fluorescence was the same for *Chlorobium* as for *Chromatium*, but the effect on *Chlorobium* was markedly smaller. A summary of the action of these compounds is as follows.

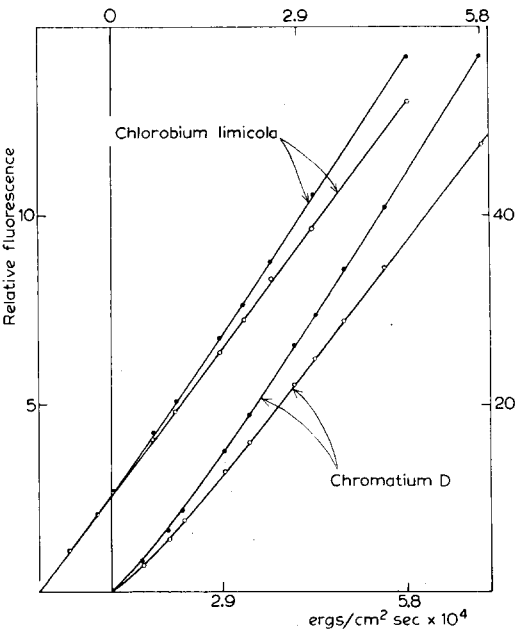

Fig. 1. Fluorescence of *Chlorobium* and *Chromatium*. ● Without hydrogen donor. ○ With 20% H_2.

Addition of 10–30% H_2, in N_2 or N_2 plus 5% CO_2, decreased fluorescence at all light intensities with *Chromatium*, but only at medium and high intensities with *Chlorobium*. Without hydrogen donor, 5% CO_2 caused no pronounced change; with 20% H_2, 5% CO_2 decreased fluorescence at all light intensities.

Addition of 0.05% KCN decreased fluorescence of *Chromatium* at all intensities, the percentage decrease being greater with hydrogen donor than without. This concentration of KCN had little effect on the fluorescence of *Chlorobium*, but 0.1% KCN decreased the fluorescence of the latter organism at all light intensities.

With and without hydrogen donor, addition of 0.02–0.4% NaN_3 caused a lower fluorescence of *Chromatium* at all light intensities, the decrease becoming greater as the concentration of azide was increased. Concentrations of azide below 0.2% did not significantly affect fluorescence of *Chlorobium*; the higher concentrations caused a decrease at all light intensities, or in some tests, at only medium and high intensities.

Fig. 1 shows typical curves with and without H_2 as hydrogen donor. The curves for *Chlorobium* are straighter, particularly at the lower light intensities.

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[1] E. C. WASSINK, E. KATZ AND R. DORRESTEIN, *Enzymologia*, 10 (1941) 285.

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