Mem. Fac. Lit. & Sci., Shimane Univ.,
Nat. Sci., **11**, pp. 73–74 Dec. 20, 1977

Short Communication

Discoloration of Carotenoid Pigments of *Rhodotorula bronchialis* by Oleic Acid

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(Received September 5, 1977)

The ability to form carotenoid pigments is used as a simple index for the identification of yeasts (1). But this ability varies widely by change of culture conditions. Bonner and his co-workers found that light has an influence upon the pigment formation ability of yeast (2). Mackinney described the variation of carotenoid formation ability of yeast by temperature. According to him, cells grown at 25°C make red pigment. However, the cells grown at 5°C produce only yellow pigment (3). Fromageot and Tchang found that a particular yeast formed pigment on a gelatin-glycerol medium, but not on a gelatin-glucose medium (4). *Rhodotorula bronchialis* has also a changeable ability of formation of carotenoid. This yeast formed much

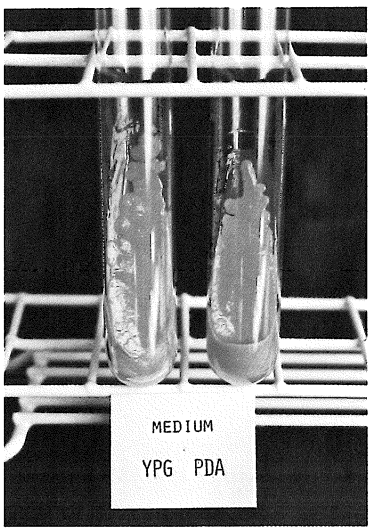

Fig. 1. Variation of carotenoid formation ability of *Rhodotorula bronchialis* on the PDA and the YPG medium.

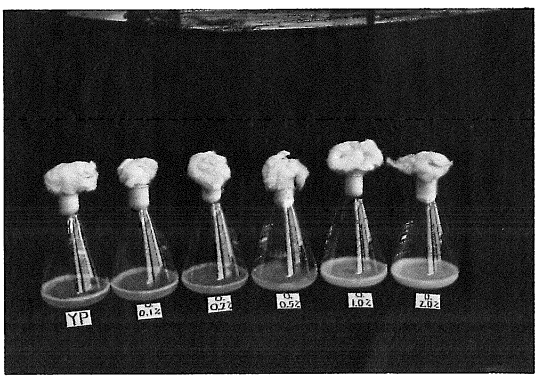

Fig. 2. Discoloration of carotenoid pigments of *Rodotorula bronchialis* grown in the YP and the YPO medium. The concentrations of oleic acid in the YPO medium were varied from 0.1% to 2.0%w/v.

carotenoid on the PDA medium. However, on the YPG medium the yeast showed vermilion-red color (Fig. 1). Still more, it was found that the vermilion-red color varies with exogenous oleic acid.

The composition of the medium used in this experiment is as follows: YP medium: 3 g yeast extract, 10 g peptone, 1000 ml distilled water. YPO medium: 3 g yeast extract, 10 g peptone, varied amount of oleic acid. PDA medium: Potato Dextrose Agar medium, DIFCO Lab., USA. A reciprocating shaker was used for cultures with liquid medium. The organism was grown at 30°C. The pH value of the medium was 5.6. Oleic acid was applied as sodium salt. The concentrations of oleic acid in YPO medium were varied from 0.1% to 2.0% w/v.

In the medium without main carbon source (YP medium) the color of the cells faded to thin vermilion-red. The discoloration was not recovered by addition of oleic acid, although oleic acid could stimulate the growth of this organism in moderate concentration. Further discoloration was seen by the addition of a higher concentration (1.0–2.0% w/v) of oleic acid (Fig. 2). The color of the cells now became almost white.

By many workers the mechanism of inhibition of fatty acids on the growth of bacteria has been studied (5, 7). Lea and his coworkers thought that free fatty acids inhibit the activity of glycolytic enzymes (5). Weber and his coworkers observed also a similar inhibition in liver (6). Although the inhibitory mechanism of oleic acid on the formation of carotenoid is not explained in this report, it will be possible, that oleic acid inhibits yeast pigment formation by a similar mechanism as in bacteria. However, these inhibitory effects are seen only on addition of more concentrated exogenous oleic acid than in the bacterial case. This difference will be caused by the thick cell wall of yeast. Further investigations should be done on the inhibitory mechanism of oleic acid for the growth of yeast.

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