COMMUNICATION

Bacterial Formation of Benzoic Acid in Milk

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Takao NISHIMOTO*, Masahiko UYETA*, Sakae TAUE*
and Ikuo TAKEBAYASHI*

(Kochi Pref. Public Health Lab.: Kochi, Japan)

Recently, microbial formation of aromatic acids such as *trans* cinnamic acid from phenylalanine¹⁾, *p*-cumaric acid from tyrosine²⁾ has been reported. It has been also known for a long time that salicylic acid was formed from indol, alkyl benzene, naphthalene, anthracene and phenanthrene by microorganisms³⁾, however, bacterial formation of benzoic acid in milk has not been reported yet. In the course of our investigation on the benzoic acid in ferment milk⁴⁾, it was found that some strains of *Lactobacillus* species were able to produce benzoic acid in milk medium

Cultivation was carried out for 5 days at 37°C in the medium of 15% dry skim milk solution. The time course of culturing of *Lact. acidophilus* and *Lact. bulgaricus* in skim milk medium was

Fig. 1. Time course of *Lact. acidophilus* (○—○) and *Lact. bulgaricus* (×—×) cultured in skim milk medium

shown in Fig. 1. Both strains of *Lactobacillus* were found to produce approximately 30 ppm of benzoic acid at logarithmic phase of the growth.

Benzoic acid produced in the medium was determined by gas chromatography⁵⁾ and isolated in fine crystals after extraction and identified by melting point (121.0~121.8°C) and infrared absorption spectra. The gas chromatograms of extract of medium were shown in Fig. 2 and the infrared spectra of isolated products were shown in Fig. 3.

The precursor of benzoic acid in milk medium and formation of benzoic acid by another bacteria has not been found at present. These problems are now under investigation.

Fig. 2. Gas chromatograms of extract of medium, before and after cultivation
A-1: before culture of *L. acidophilus*
A-2: after culture of *L. acidophilus* for 24hr
B-1: before culture of *L. bulgaricus*
B-2: after culture of *L. bulgaricus* for 24hr

* 西本孝男, 上田雅彦, 田植栄, 竹林生夫 (高知県衛生研究所)

Fig. 3. Infrared spectra of benzoic acid and isolated products

Isolated product-A: extracted from the culture medium of *L. acidophilus*

Isolated product-B: extracted from the culture medium of *L. bulgaricus*

References

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