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Isolation and Characterization of Bacteria That Assimilate Bisphenol A

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Bisphenol A, one of the over 67 kinds of chemicals that have been reported as endocrine disrupting chemicals, is employed as a major industrial ingredient of polycarbonate plastic, or epoxy plastic, which is used as a covering material for canned inner walls, tablewares, nursing bottles and so forth. However, a small quantity of this chemical has been found to be released into food or milk from these plastics. This paper presents the results of a study on the biodegradation of bisphenol A, revealing the isolation and characterization of bacteria that assimilate bisphenol A as a carbon and energy source.

To isolate the bacterial strains that assimilated bisphenol A as a sole carbon and energy source, soil samples, bark samples and avian dung were collected from several districts in Hokkaido, Aomori, Chiba, Nagano, and Shikoku Island Japan. A small portion of these samples was placed in an enrichment culture that included 0.3% bisphenol A as the sole carbon source. After incubation at 300C with shaking, 64 cultures were obtained.

LB plates were used to purify the bacterial cells, and 40 bacterial strains were isolated, showing that a wide distribution of bacteria had assimilated bisphenol A. The bacterial growth profiles of these 40 strains in a bisphenol A-minimal media were continuously monitored using a Bio Scanner (Ohtake Seisakusho Ltd. Japan) and then analyzed by comparing the time length of the lag phases, maximum growth rates and the optical density in the stationary growth phase. Out of the 40 strains, 10 were selected based on their growth profiles and identified as *Pseudomonas putida, Pseudomonas fluorescens*, and *Pseudomonas lutelola* using API 2ONE and API 20E (bioMerieux-Vitek Japan, Ltd.).

The amounts of bisphenol A assimilated were determined using TLC plates: 51 to 71 % of the bisphenol A contained in the 0.3% media was consumed after two weeks cultivation. The consumption of bisphenol A was particularly high in the OS05 strain. This strain was then subcultured in bisphenol A-minimum media and the growth profile was again monitored in the same manner as previously, revealing that the assimilation of bisphenol A was inducible.

These isolates are now being assessed for the biodegradation of bisphenol A.