黄砂によって長距離輸送されるコスモポリタン型細菌群の種組成解析

Characteristics of cosmopolitan microbial communities transported by Asian desert dust (KOSA)

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- 1) Objectives: The microbial communities transported by Asian desert dust (KOSA) events have attracted much attention as bioaerosols, because the transported microorganisms are thought to influence the downwind ecosystems in Korea and Japan. The microbial diversity in the atmosphere has been investigated using several atmospheric-sampling technique such as balloon, aircraft and snow-cover research, for clarifying the transport of microorganisms by KOSA dust. However, there is little information available on the effects of KOSA bioaerosol on the human food culture. In this study, the species compositions of atmospheric-transport microorganisms were phylogenetically analyzed using isolates and the microbial roles on human life were investigated by culture experiments.
- 2) Materials and Methods: The KOSA-aerosol samples were collected at high altitudes within the KOSA source and arrival area using a tethered balloon and aircraft and from the mountain-show covers recording aerosols. The bioaerosol samples were amended with a liquid culture medium including NaCl at concentrations of 0 %, 3 %, 10 %, and 15 %. We effectively analyzed the atmospheric bacteria in the bioaerosol samples by investigating the halotolerant bacterial population, which are known to withstand atmospheric environmental stressors as well as high salinities. The NaCl-amended cultures and environmental bioaerosol samples were investigated by denaturing gradient gel electrophoresis (DGGE) analysis using 16S rRNA genes (16S rDNA). Moreover, after the isolates were obtained from the samples, the isolate species were phylogenetically compared using 16S rDNA and gyr-B sequences. Fluorescence *in situ* hybridization (FISH) targeting B. subtilis cells was used for the observation and counts of bacterial cells on the KOSA mineral particles. Some strains of isolates have been used for the produce experiment of natto.
- 3) Findings: The growth of halotolerant microorganisms were confirmed in media containing up to 15 % NaCl. Almost bacterial species belonged to the gram-positive bacterial group and some species were expected to contribute the production of Japanese health foods such as natto and ishiru. In particular, the isolates belonging to *Bacillus subtilis* group were similar

between the KOSA source and arrival area. Fluorescence in situ hybridization (FISH) indicated that B. subtilis cells dominantly appeared to localize on the KOSA mineral particles collected from the snow cover. These results suggested that an atmospheric bacterial population of B. subtilis between the KOSA source and arrival areas would derive from a common origin in resent. The cosmopolitan such as B. subtilis would expected to be transported by KOSA events. The isolates of B. subtilis obtained from the atmospheric areas and the snow-cover samples were demonstrated to produce natto. Therefore, the atmospheric transport of the B. subtilis group might have some influences on traditional-food cultures.

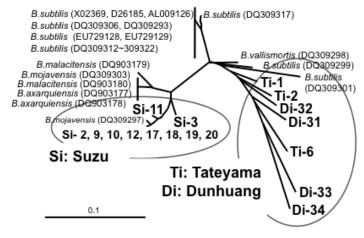


Figure 1. Phylogenetic tree including the partial sequences of gyrase B gene of *B. subtilis* group.

References

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