# 主　論　文　要　旨

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論文題名

## Seasonal changes of nutrient ion concentrations and bacterial community structure in biofilms on the surface of reeds (*Phragmites australis*)

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主論文要旨

Microorganisms attach to surfaces and form biofilms (BFs) in aquatic environments. BFs are ubiquitous in natural environment, and important research subject to understand microbial ecology. In order to understand BF as microbial habitat, the author studied the concentrations of nutrient ions (ammonium, nitrate, nitrite, and phosphate) and bacterial community structure in the BF on the surface of reeds (*Phragmites australis*) for several years in Lake Biwa by comparing them with surrounding lake water.

The nutrient ion concentrations in the BF changed seasonally synchronizing with the change in the lake water, whereas the concentrations in the BF were hundreds to thousands of times higher than those in the lake water in any seasons. The BF-constituting polymer probably has electric charges and accumulates ions by an ion exchange process.

The dissolved-form N/P ratio in the BF was smaller than in the lake water. This may indicate the higher microbial activity such as denitrification in the BF.

The bacterial community structure in the BF differed from that in the lake water in any seasons. This seems to be due to the high nutrient ion concentrations in the BF.

The community structure in the lake water was similar in the same seasons of different years, corresponding to the similar environmental factors (i.e., temperature, dissolved oxygen, etc.) and nutrient ion concentrations in the same season. However, the community structure in the BF differed every year. The BF of different community structure may be formed on sprouted reeds every early summer. Despite the different community structure, the bacteria belonging to *Bacillus* and *Paenibacillus* were detected from the BF in any season. These bacteria may contribute to BF functions.

This study suggests that the same and/or different bacteria produce the polymer of the same property, resulting in the high nutrient ion concentrations in BFs in any seasons.