Bacteria Inhabiting Mucus Layer of Bluegills (*Lepomis macrochirus*)

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The purposes of this study were to characterize the mucus layer on the surface of bluegills (*Lepomis macrochirus*)as a habitat for microbes with revealing the bacterial flora in the layer and the features of the mucus as a nutrient for the bacteria.

For the above purposes, the physicochemical features and seasonal changes of the mucus layer of the bluegills captured in Lake Biwa were examined. The bacterial flora in the mucus layer was also studied in comparison with that in the surrounding lake water. The features of the mucus as a nutrient for the isolates from mucus and lake water was investigated as well.

The layer of the mucus was characterized as 1) large enough to host microbes (ca. 76 μm thick), 2) a physically different environment from the surrounding lake water, and 3) rich in organic substances, which may be utilized as nutrients.

Based on DAPI staining and on the number of colonies, it was found, respectively, that ca. 10^3 times and 3 to 7 times the number of microbial cells were present in the mucus layer, as compared with the lake water. The bacterial flora of the mucus was greatly different from that of the lake water, according to a phylogenetic analysis. Almost all of the isolates from the mucus could metabolize glucose, whereas only half of the isolates from the lake water could do the same.

The features of mucus as a nutrient for the isolates were clarified. 1) The isolates from both the mucus and the lake water grew more in mucus than in lake water. 2) The isolates grew faster in mucus than in lake water, with greater enhancement in growth rate for the mucus isolates than the lake-water isolates.3) The growth yield in the mucus was ca. 70 times greater than that in the nutrient broth medium, on average. 4) The respiratory activity of the isolates was greatly enhanced by adding a small amount of mucus due to unknown factor(s).

As described above, the physicochemical features of the mucus layer of the bluegill was clarified. The bacterial flora in the mucus different from those in the surrounding water and a potential nutritional value and a possible respiratory activating function of fish mucus for heterotrophic bacteria in the mucus and lake water were revealed for the first time by the present study.