Extracellular cellulose breakdown in wetlands
（湿地帯生物の体外セルロース分解機構の解明）

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**Purpose:** To validate the difference in cellulase activity level among rivers, cellulase activities of sediments collected from wetlands of the Chikugo River (Fukuoka Prefecture), Midori River (Kumamoto Prefecture), Hamado River (Kumamoto Prefecture), Yodo River (Osaka Prefecture), and Tanaka River (Mie Prefecture) were compared. In addition, to evaluate the contribution of microorganisms to cellulose degradation in sediments, activity level in the presence and absence of antibiotics were examined.

**Method:** Somogyi-Nelson method was used to quantify cellulase activities. After filtering through a 42mm mesh to remove macro and meiobenthos, sediments were added with 40mg/g chloramphenicol to suppress microorganisms. To investigate the cellulase binding abilities, sediments of rivers were autoclaved and bound with Aspergillus niger cellulase. Remaining cellulase activities were measured after the sediments were washed twice with water. To verify the plant residue concentrations of sediments, ignition loss was measured by burning at 600 °C for 3 h.

**Results:** Sediments collected from all five rivers exhibited cellulase activities. However, the activity levels differed among rivers. Specifically, sediments from the Yodo River showed significantly higher activity than those from the Hamado River, Midori River and Tanaka River, while those from the Chikugo River had higher values than those from the Midori River and Tanaka River. Sediments from the Hamado River showed significantly higher activity than those from the Tanaka River. Chloramphenicol exhibited no effect on the cellulase activity of sediment from the Midori River, while it showed a partially inhibiting effect on that of the Tanaka River. These findings suggest that cellulases secreted from organisms would directly bind to sediments under natural condition. To validate this, sediments collected from all five rivers were examined to have fungal cellulase binding ability. The sediments from Tanaka River showed significantly lower binding ability than those from Hamado River and Chikugo River, while those from Yodo River showed lower binding ability than those from Chikugo River. On the other hand, comparison of the binding ability of clay and plant residues revealed that plant residues had significantly higher abilities to bind cellulase. This finding was supported by the fact that there was a strong correlation between the organic matter content in the sediment and the cellulase binding ability ($R = 0.66$). According to these results, sediment complexes harboring cellulases might be function as a bioreactor to degrade cellulose in wetlands.