**S05-3**

Dissolution of arsenic from paddy soils by a newly isolated arsenate-reducing *Geobacter* sp.

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ヒ酸呼吸能を持つ新規 *Geobacter* 属細菌による水田土壌からのヒ素の溶出

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**Key word**: arsenic, arsenate, dissolution, *Geobacter*, *arrA*

Arsenic is released from flooded paddy soils mainly as As(III) (arsenite). In this study, we enriched As(V) (arsenate)-reducing bacteria from paddy soils, and successfully isolated three strains with capacities for growing on As(V) as the sole electron acceptor. One of these strains (strain OR-1) was phylogenetically closely related with *Geobacter pelophilus*, and coupled the oxidation of acetate with the reduction of As(V) stoichiometrically. OR-1 also used soluble ferric iron, oxides of iron and manganese, nitrate and fumarate as terminal electron acceptors. A putative As(V)-respiratory reductase gene (*arrA*) was amplified, and its predicted amino acid sequence showed 90% and 86% similarity with those found in the genomes of *G. uraniireducens* RF4 and *G. lovleyi* SZ, respectively. Inoculation of washed cells of OR-1 into sterilized paddy soil successfully restored As(III) dissolution. Analysis of putative ArrA sequences in natural paddy soils strongly suggested that *Geobacteraceae*-related bacteria, including those closely related with OR-1, play an important role in arsenic release from paddy soils. Since OR-1 is a first As(V)-reducing bacterial isolate belonging to *Geobacteraceae*, it could be a model organism that potentially impacts mobilization of arsenic in soils and aquifers.

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**S05-4**

Bioremedial potential of microbial arsenic and selenium reduction

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微生物によるヒ素・セレン還元を利用した環境浄化

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**Key word**: arsenate reduction, selenate reduction, metal-reducing bacteria, anaerobic respiration

Until recently, microbial-based techniques for environmental restoration have primarily focused on degradation of organic contaminants to carbon dioxide. As for metal(loid)s, microorganisms can only alter the speciation, and therefore, the investigations for use of microbial processes in bioremediation have been less-advanced. However, microbially mediated changes of the speciation and following mobilization/immobilization are elementary processes of biogeochemical cycles for metal(loid)s. This imply that microorganisms have great potential for removal of toxic metal(loid)s from contaminated water and soil by using them wisely. As an example, we will outline a dissimilatory arsenate- and selenate-reducing bacterium isolated from Se-contaminated sediment. Reduction of arsenate to arsenite can increase the mobility of As. In contrast, reduction of selenate to elemental Se via selenite can immobilize Se. How can we use these microbial redox transformations wisely? Their applicability for remediation of As-contaminated soil and Se-containing wastewater will be also discussed.