

Sung-Keun Rhee, Ph.D.

Microbial Genomics and Ecology Group
Environmental Sciences Division
Oak Ridge National Laboratory
Bldg. 1505, Room 308, MS 6038
Oak Ridge, TN 37831
Ph: 865-574-7379, Fax: 865-576-8646, E-mail: rhees@ornl.gov

Education

Korea Advanced Institute of Science and Technology (KAIST), South Korea

Ph.D. (1997.2) Environmental Microbiology

Dissertational title: Biodegradation of Pyridine by Aerobic *Nocardioides* sp. OS4 and Denitrifying *Azoarcus evansii* pF6.

Korea Advanced Institute of Science and Technology (KAIST), South Korea

M.S. (1993.2) Environmental Microbiology

Biodegradation of pyridine by *Pimelobacter* sp. OS4

Kyungpook National University, South Korea

B.S. (1991.2) General Microbiology

Professional Experiences

Research Associate. Microbial Genomics and Ecology Group, Environmental Sciences Division, Oak Ridge National Laboratory (2002.3-), (Dr. Zizhong Zhou)

Projects:

- 1) Functional Metagenomics (Environmental Genomics): development of phylogenetic and functional gene-based oligonucleotide microarray for assessing microbial community composition and metabolic dynamics in contaminated environments,
- 2) Functional Genomics: starvation response regulation of a metal remediating bacterium *Shewanella oneidensis* MR-1

Research Associate. Institute of Marine and Coastal Sciences, Biotechnology Center for Agriculture and the Environment, Rutgers University, USA (2000.10-2002.2) (Max M Haggblom and Lee J Kerkhof)

Project:

- 1) Microbial community analysis of anaerobic reductive dehalogenation of halogenated compounds, 2-bromophenol, dioxin in marine/estuarine sediments – rRNA differential expression analysis,
- 2) Detection for dehalorespiration gene and analysis of diversity in the contaminated environment,

Research Associate . Institute fur Biologie II, Universitat Freiburg, Germany (1997.10 -1998.10), (Prof. Dr. Georg Fuchs)

Project:

Characterization of anaerobic biodegradation of aromatic compounds, phenylacetate; purification and characterization of new anaerobic alpha-oxidation of phenylacetyl-CoA in *Thaura aromatica*

Research Fellowship Awards

Alexander von Humbolt Foundation (AvHF) (Germany) (1998. 5-1999.1)

"Novel anaerobic alpha-oxidation of phenylacetyl-CoA in *Thaura aromatica*", in Institute fur Biologie II, Universitat Freiburg, Germany

Korea Science and Engineering Foundation (KOSEF) (Korea) (1997.10-1998.4)

"Anaerobic biodegradation of toxic aromatic compounds", in Institute fur Biologie II, Universitat Freiburg, Germany

Research Interests

Genomics approach in environmental microbiology and microbial ecology:

- 1) Functional metagenomics: diversity and regulation of metabolic pathway in the community.
- 2) Analysis of diversity and dynamics of microbial community using phylogenetic molecule-based microarray.
- 3) Comparative genomics of microbial community using BAC library analysis.
- 4) Identification and cultivation of biogeochemically (environmentally) important uncultivated (symbiotic) Microorganisms.

Publications

1. Donna E. Fennell, Sung-Keun Rhee, Max M. Häggblom and Lee J. Kerkhof (2002) Elucidation of the Role of Individual Phylotypes in a Dehalogenating Consortium by T-RFLP Analysis of Reverse Transcribed 16S rRNA. (In review).
2. Sung-Keun Rhee, Donna E. Fennell, Young-Beom Ahn, Lee J. Kerkhof and Max M. Häggblom (2002) *Desulfovibrio* sp. strain 2BP-48 is identified as the dehalogenating bacterium in a sulfidogenic 2-bromophenol-degrading enrichment. (In review).
3. Sung-Keun Rhee, Donna E. Fennell, Max M. Häggblom, and Lee J. Kerkhof (2002) Detection by PCR of reductive dehalogenase-like(?) motifs in a sulfidogenic 2-bromophenol-degrading consortium enriched from estuarine sediment. *FEMS Microbiol. Ecol.* (In press)
4. Bae, Jin-Woo, Sung-Keun Rhee, Am Jang, In Su Kim, and Sung-Taik Lee (2002) Copper Ion Toxicity Causes Discrepancy Between Acetate Degradation and Methane Production in Granular Sludge. *J. Microbiol. Biotechnol.* (In press)
5. M.-H. Sung, H. Kim, J.-W. Bae, S.-K. Rhee, C. O. Jeon, K. Kim, J.-J. Kim, S.-P. Hong, S.-G. Lee, J.-H. Yoon, Y.-H. Park, D.-H. Baek (2002) *Geobacillus toebii* sp. nov., a new thermophilic bacterium isolated from hay compost. *Int. J. Syst. Evol. Microbiol.* (<http://www.sgm.ac.uk/IJSEM/PiP/ijsem02181.pdf>)

6. Sung-Keun Rhee, Che Ok Jeon, Jin-Woo Bae, Kwang Kim, Jae Jun Song, Joong-Jae Kim, Seung-Goo Lee, Hong-Ik Kim, Seung-Pyo Hong, Yoon-Ho Choi, Su-Mi Kim, Moon-Hee Sung (2002) Characterization of *Symbiobacterium toebii*, an obligate commensal thermophile isolated from compost. *Extremophiles* 6:57–64.
7. Jay J. Lee, Sung-Keun Rhee, and Sung-Taik Lee (2001) Degradation of 3-methylpyridine and 3-ethylpyridine by *Gordonia nitida* LE31. *Appl. Environ. Microbiol.* **67**: 4342-4345.
8. Sung-Keun Rhee, Seung-Pyo Hong, Jin-Woo Bae, Che Ok Jeon, Seung-Goo Lee, and Moon-Hee Sung (2001) Estimation of Distribution of a Commensal Thermophile in Soil by a Competitive Quantitative PCR and Terminal Restriction Fragment Length Polymorphism Analysis. *J. Microbiol. Biotechnol.* 11:940-946.
9. Seung-Pyo Hong, Jong-Hoon Park, Yong-Sung Kim, Hae-Jun Hwang, Sung-Keun Rhee, Seung-Goo Lee, Nobuyoshi Esaki, And Moon-Hee Sung (2000) Analysis of the genome of *Symbiobacterium toebii* by pulsed-field gel electrophoresis. *J. Microbiol. Biotechnol.* **10**: 405-409.
10. Jin-Woo Bae, Sung-Keun Rhee, Seung-Hoon Hyun, In S. Kim, and Sung-Taik Lee (2000) Layered structure of granules in upflow anaerobic sludge blanket reactor gives microbial population resistance to metals. *Biotechnol Lett* **22**: 1935-1940.
11. Young-Gyun Cho, Sung-Keun Rhee, and Sung-Taik Lee (2000) Effect of soil moisture on the bioremediation of chlorophenols-contaminated soils. *Biotechnol Lett* **22**: 915-919.
12. Young-Gyun Cho, Sung-Keun Rhee, and Sung-Taik Lee (2000) Influence of phenol on the degradation of *p*-nitrophenol by freely suspended and immobilized *Nocardioides* sp. NSP41, *Biodegradation* **11**: 21-28
13. Sung-Keun Rhee, Seung-Goo Lee, Seung-Pyo Hong, Yoon-Ho Choi, Jong-Hoon Park, Chul-Joong Kim, and Moon-Hee Sung (2000) A novel microbial interaction: obligate commensalism between a new gram-negative thermophile strain SC-1 and a thermophilic *Bacillus* strain, *Extremophiles* **4**:131-136
14. Sung-Keun Rhee, and Georg Fuchs. (1999) Phenylacetyl-CoA:acceptor oxidoreductase, a membrane-bound molybdenum-iron-sulfur enzyme involved in anaerobic metabolism of phenylalanine in the denitrifying bacterium. *Thauera aromatica*. *Eur. J. Biochem.* **262**: 507-515.
15. Chang, Jae Hwan, Sung-Keun Rhee, Yong Keun Chang, and Ho-Nam Chang. (1998) Desulfurization of diesel oils by a newly isolated dibenzothiophene-degrading *Nocardia* sp. S train CYKS2. *Biotechnol. Prog.* **14**: 851-855.
16. Sung-Keun Rhee, Jae Hwan Chang, Yong Keun Chang, and Ho-Nam Chang (1998) Biodesulfurization of diesel oils by newly isolated *Gordonia* sp. CYKS1. *Appl. Environ. Microbiol.* **64**:2327-2331

17. Jung-Hoon Yoon, Sung-Keun Rhee, Jung-Sook Lee, Sung-Taik Lee, Yong-Ha Park (1997) Description of *Nocardioides pyriliticus* sp. nov., a pyridine-degrading bacterium isolated from the oxic zone of the oil shale column. *Int. J. Syst. Bacteriol.* **47**:933-938
18. Sung-Keun Rhee, Gyun-Min Lee, Jung-Hoon Yoon, Youg-Ha Park, Hee-Sung Bae, and Sung-Taik Lee (1997) Anaerobic and aerobic degradation of pyridine by a newly isolated denitrifying bacterium. *Appl. Environ. Microbiol.* **23**:2578-2585
19. Sung-Keun Rhee, Jay J. Lee, Sung-Taik Lee (1997) Nitrite accumulation in sequencing batch reactor during the aerobic stage of biological nitrogen removal. *Biotechnol. Lett.* **19**:195-198
20. Sung-Keun Rhee, Ki-Young Lee, Jae-Chun Chung, and Sung-Taik Lee (1997) Degradation of pyridine by *Nocardioides* sp. OS4 isolated from the oxic zone of spent shale column. *Can. J. Microbiol.* **43**:205-209
21. Hee-Sung Bae, Sung-Keun Rhee, Young-Kyun Cho, Jong-Ki Hong, and Sung-Taik Lee (1997) Two different pathways (a chlorocatechol and Hydroquinone Pathway) for the degradation of 4-Chlorocatechol Degradation in Two Isolated Bacterial Strains. *J. Microbiol. Biotechnol.* **7**(4):237-241
22. Sung-Keun Rhee, Gyun-Min Lee, Young-Bae Kim, and Sung-Taik Lee (1996) Effect of pyridine on the fatty acid composition of *Pimelobacter* sp. *FEMS Microbiol. Lett.* **141**:139-143
23. Sung-Keun Rhee, Sung-Taik Lee, and Gyun-Min Lee (1996) Influence of supplemental carbon sources on the biodegradation of pyridine in freely suspended and immobilized *Pimelobacter* sp. *Appl. Microbiol. Biotechnol.* **44**:806-822
24. Sung-Taik Lee, Sung-Keun Rhee, and Gyun-Min Lee. (1994) Biodegradation of pyridine by freely suspended and immobilized *Pimelobacter* sp. *Appl. Microbiol. Biotechnol.* **41**:652-657
25. Young-gyun Cho, Sung-Keun Rhee, and Sung-Taik Lee (2000) Influence of environmental parameters on bioremediation of chlorophenol contaminated soil by indigenous microorganisms *Kor. Soc. Environ Engineers* **5**:165-173
26. Young-Gyun Cho, Sung-Keun Rhee, and Sung-Taik Lee (1997) Phytoremediation of contaminated soils *J. KoSES* **2**(1): 3-12