

**DEPARTMENT OF CHEMISTRY AND ENVIRONMENTAL SCIENCE**  
**SEMINAR SERIES**  
**SPRING 2018**

**DATE: TUESDAY, APRIL 17, 2018**

**WHERE: CENTRAL KING BUILDING - 320**

**TIME: 1:00 PM**

**GUEST SPEAKER**

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Rutgers, The State University of New Jersey  
New Brunswick, NJ

**TOPIC**

Elucidating the Activity of Anaerobic Dehalogenating Bacteria: From Marine Sponges to Contaminated Sediments

**ABSTRACT**

Organohalide compounds are widespread in the environment as a result of both anthropogenic activities and natural production. While aquatic sediments as significant sinks for halogenated organic pollutants, the marine environment is also a rich source of biogenic organohalides produced by a diversity of marine organisms. Microorganisms appear to have evolved a variety of metabolic strategies for cleaving the carbon-halogen bond. One of the most intriguing metabolisms is the process of respiratory reductive dehalogenation in which the organohalide serves as the electron acceptor for anaerobic respiration. Reductive dehalogenation is thought to be an important process in the overall cycling of these organohalogen compounds. Understanding the microbial processes that control the fate and effects of organohalide compounds will lay the foundation for harnessing the activities of dehalogenating bacteria in the development of novel bioremediation strategies. For example, stimulating anaerobic biological dehalogenation offers one of the most promising approaches towards eventual detoxification and complete degradation of halogenated contaminant mixtures.

**Committee members:**

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## **BIO**

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### **Professional Preparation:**

B.S. Biology, 1985, University of Helsinki, Helsinki, Finland

M.S. General Microbiology, 1986, University of Helsinki

Ph.D. General Microbiology, 1989, University of Helsinki

Post-Doctoral Associate, Environmental Microbiology, 1988-1991, NYU Medical Center, New York

### **Appointments:**

Chair, Department of Biochemistry and Microbiology, 2008-present; Distinguished Professor, 2011-present; Professor 2003-2011; Associate Professor, 1999-2003; Assistant Professor, 1998-1999; Department of Biochemistry and Microbiology, Rutgers, The State University of New Jersey.

Visiting Professor, Chinese Academy of Sciences Institute of Urban Environment, Xiamen, 2010-pres.

Visiting Scientist, Natural Resources Institute Finland, 2017-pres.

Visiting Professor, Dept. of Applied Chemistry and Microbiology, University of Helsinki, Finland 8/2000-2/2001.

Associate Research Professor, 1997-1998; Assistant Research Professor, 1993-1997; Biotechnology Center for Agriculture and the Environment, Rutgers, The State University of New Jersey.

Research Assistant Professor, 1991-1993; Adjunct Assistant Professor 1993-1996; Institute of Environmental Medicine, New York University Medical Center.

Docent (Environmental Microbiology), University of Jyväskylä, Jyväskylä, Finland, 1996-pres.

Docent (Applied Microbiology), University of Helsinki, Helsinki, Finland, 1991-pres.

Assistant Research Scientist, Department of Microbiology, NYU Medical Center, 1988-1991.

Chief Editor, FEMS Microbiology Ecology, 2011-present (previously: Editor, 2003-2010).

Chair, Gordon Research Conference on Applied and Environmental Microbiology, 2011.

### **Major Research Interests:**

Environmental Microbiology and Microbial Ecology: linking ecosystem functions with microbial diversity; microbial bioprospecting - isolation, characterization and taxonomy of novel bacteria; microbial metabolism of toxic and environmental pollutants (biodegradation of halogenated aromatic compounds, biodegradation of petroleum hydrocarbons and gasoline additives); bacterial respiration of selenium and arsenic; microbial ecology of Arctic tundra soils. Environmental Biotechnology: development of bioremediation methods for treatment of contaminated soil, groundwater and sediment.

## Honors and Awards:

Young Scientist's Fellowship, University of Helsinki, 1987-1988.

Rutgers University Board of Trustees Research Fellowship for Scholarly Excellence, 1999.

Cook College / New Jersey Agricultural Experiment Station Sustained Research Excellence Award, 2003.

American Society for Microbiology US-Indo Professorship, 2009.

Waksman Honorary Lectureship Award, Theobald Smith Society, American Society for Microbiology New Jersey Branch, 2010.

Visiting Professorship for Senior International Scientists of the Chinese Academy of Sciences, 2010.

Elected Fellow, American Academy of Microbiology, 2011. 2 w

Waksman Outstanding Teaching Award, Society for Industrial Microbiology and Biotechnology, 2014.

Vietnam Education Foundation U.S. Faculty Scholar 2016-2017.

School of Environmental and Biological Sciences International Excellence Award, 2017.

Selected Publications: (from over 180 publications and patents)

Tchernov D, Gorbunov MY, de Vargas C, Yadav SN, Milligan AJ, Häggblom M, Falkowski PG (2004) Membrane lipids of symbiotic algae are diagnostic of sensitivity to thermal bleaching in corals. *Proc. Natl. Acad. Sci. USA* 101:13531-13535.

Männistö MK, Tirola M, Häggblom MM (2009) Effect of freeze-thaw cycles on bacterial communities of Arctic tundra soil. *Microbial Ecology* 58:621-631.

Youngster LKG, Kerkhof LJ, Häggblom MM (2010) Community characterization of anaerobic methyl tert-butyl ether (MTBE) degrading enrichment cultures. *FEMS Microbiol. Ecol.* 72:279-288.

Rauschenbach I, Yee N, Häggblom MM, Bini E (2011) Energy metabolism and multiple respiratory pathways revealed by genome sequencing of *Desulfurispirillum indicum* strain S5. *Environmental Microbiology* 13:1611-1621.

Rawat S, Männistö MK, Bromberg Y, Häggblom MM (2012) Comparative genomic and physiological analysis provides insights into the role of *Acidobacteria* in organic carbon utilization in Arctic tundra soils. *FEMS Microbiology Ecology* 82:341-355. DOI:10.1111/j.1574-6941.2012.01381.x

Männistö MK, Kurhela E, Tirola M, Häggblom MM (2013) *Acidobacteria* dominate the active bacterial communities of sub-Arctic tundra with widely divergent winter-time snow accumulation and soil temperatures. *FEMS Microbiology Ecology*. 84:47-59. DOI:10.1111/1574-6941.12035

Rawat SR, Männistö MK, Starovoytov V, Goodwin L, Nolan M, Hauser LJ, Land M, Davenport KW, Woyke T, Häggblom MM (2014) Complete genome sequence of *Granulicella tundricola* type strain MP5ACTX9T, an *Acidobacteria* from tundra soil. *Standards in Genomic Sciences* 9:449-461.

Tuorto SJ, Darias P, McGuinness LR, Panikov N, Zhang T, Häggblom MM, Kerkhof LJ (2014) Bacterial genome replication at subzero temperatures in permafrost. *ISME Journal* 8:139-149.

Stark S, Männistö MK, Ganzert L, Tirola M, Häggblom MM (2015) Grazing intensity in subarctic tundra affects the temperature adaptation of soil microbial communities. *Soil Biol. Biochemistry* 84:147-157.

Zanaroli G, Negroni A, Häggblom MM, Fava F (2015) Microbial dehalogenation of organohalides in marine and estuarine environments. *Curr. Opin. Biotechnol.* 33:287-295.

Sun W, Li Y, McGuinness L; Luo S, Huang W, Kerkhof L, Mack E, Häggblom M, Fennell D (2015) Identification of anaerobic aniline-degrading bacteria at a contaminated industrial site. *Environ. Sci. Technol.* 49:11079-11088. doi: 10.1021/acs.est.5b02166.

Liu T, Ahn H, Sun W, McGuinness LR, Kerkhof LJ, Häggblom MM (2016) Identification of a Ruminococcaceae species as the methyl tert-butyl ether (MTBE) degrading bacterium in a methanogenic consortium. *Environ. Sci. Technol.* 50:1455–1464. DOI: 10.1021/acs.est.5b04731

Männistö MK, Ganzert L, Tirola M, Häggblom MM, Stark S (2016) Do shifts in life strategies explain microbial community responses to increasing nitrogen in tundra soil? *Soil Biol. Biochem.* 96: 216-228

Sohn SY, Häggblom MM (2016) Reductive dehalogenation activity by indigenous microorganism in sediments of the Hackensack River, New Jersey. *Environmental Pollution* 214:374-383.

Harel, A, Häggblom MM, Falkowski PG, Yee, N (2016) Evolution of prokaryotic respiratory molybdoenzymes and the frequency of their genomic co-occurrence. *FEMS Microbiol Ecol* 92:fiw187.

Nikrad MP, Kerkhof LJ, Häggblom MM (2016) The subzero microbiome: Microbial activity in frozen and thawing soils. *FEMS Microbiol. Ecol.* 92:fiw081.

Kerkhof LJ, Dillon KP, Häggblom, MM, McGuinness LR (2017) Profiling bacterial communities by MinION sequencing of ribosomal operons. *Microbiome* 5:116 DOI 10.1186/s40168-017-0336-9

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