

2.4.13 Laboratory : Molecular Marine Microbiology

Member:	Professor	Sako, Yoshihiko, Dr. Agric. Sci.
	Associate Professor	Yoshida, Takashi, Dr. Agric. Sci.
	Assistant Professor	Yoshinaga, Ikuo, Dr. Agric. Sci.
	Doctor's program	8
	Master's Program	9
	Undergraduate	4
	Other	1

A. Research Activities (2009.4-2010.3)

A-1. Main Subjects

a) Molecular Marine Microbiology

In the aquatic environments, there are many different environmental conditions such as open ocean, deep sea, hydrothermal vents, polar circles, red tide sea, coastal area, lakes, where many kinds of marine microbes (phage, bacteria, archaea, cyanobacteria and microalgae) live. We study their diversity and strategies how to live and survive and their mutual relationships in such conditions. We, further, aim to develop the genetic resources from these aquatic microbes.

Our main themes are as follows:

b) Studies on novel marine hyperthermophilic microorganisms and their development of genetic resources

(1) Physiological and ecological studies on thermophilic microorganisms thriving at marine hydrothermal environments

(2) Isolation and characterization of novel hyperthermophilic microbes from marine hydrothermal vents

(3) Search for the useful genes and enzymes from hyperthermophilic microbes

c) Ecology of microbes in the marine environments

(1) Bioremediation for marine environments by using coastal marine bacteria

(2) Molecular ecological studies on novel denitrifying bacteria and in coastal area

d) Ecological and molecular biological studies on the harmful algae

- (1) Molecular ecological studies of toxic cyanobacteria
- (2) Genomics and molecular biology of cyanophage infecting toxic cyanobacteria

A-2.Publications and presentations

a) Publications

Original Papers

- Kuno,S., R.Kamikawa, S.Yoshimatsu, T.Sagara, S.Nishio and Y.Sako : Genetic diversity of Gambierdiscus spp.(Gonyaulacales,Dinophyceae) in Japanese coastal areas. Phycological Research 58;44-52,2010
- Yokobori,S., T.Itoh, S.Yoshinari, N.Nomura, Y.Sako, A.Yamagishi, T.Oshima, K.Kita and Y.Watanabe : Gain and loss of an intron in a protein-coding gene in Archaea : the case of an archaeal RNA pseudouridine synthase gene. BMC Evolutionary Biology 9;198,2009
- Chiba,Y., T.Yoshida, N. Ito, H. Nishimura,C. Imada, H. Yasuda and Y.Sako : Isolation of bacterium possessing a haloacid dehalogenase from a marine sediment core. Microbes Environments 24(3);276-279,2009
- Kamikawa,R., F.G.Sanchez-Perez, Y,Sako, A. J.Roger and Y.Inagaki : Expanded phylogenies of canonical and non-canonical types of methionine adenosyltransferases reveal a complex history of these gene families in eukaryotes. Molecular Phylogenetics and Evolution 53;565-570,2009
- Nishimura,H and Sako,Y : Purification and characterization of the oxygen-thermostable hydrogenase from the aerobic hyperthermophilic archaeon Aeropyrum camini. J.Biosci. Bioeng. 108;299-303,2009
- Kamikawa,R. I.Masuda, M.Demura, K.Oyama, S.Yoshimatsu, M.Kawachi and Y.Sako : Mitochondrial Group II Introns in the Raphidophycean Flagellate Chattonella ssp. Suggest a Diatom-to-Chattonella Lateral Group II Inton Transfer. Protist 160;364-375,2009

Reviews

- Yoshinaga I., T.Amano and Y Suwa : Nitrogen cycling and anammox bacteria: Diversity of anammox bacteria and their habitat-segregation. Kagaku to Seibutsu 47;82-84,2009

Reports

- Sako,Y.and Yoshida T. Development of molecular identification method of harmful diatoms (in Japanese). Reports of counterplanning for protection of red tide damage (Ministry of Agriculture), 2009.

- Nishimura H., E.Iwata, Y.Nomura and Y.Sako: Study of thermo-oxygen tolerance H2ases from Marine(hyper)thermophiles. p.1-2, 2009, In Proceedings of the 5th World Fisheries Congress(the WFC 2008).
- Shiraishi T., S.Hiroishi, R.Kamikawa, Y.Sako, S.Taino, T.Ishikawa, I.Imai: Population dynamics of the shellfish-killing dinoflagellate *Heterocapsa circularisquama* monitored by an indirect fluorescent antibody technique and a real-time PCR assay in Uranouchi Inlet, Kochi Prefecture, Japan. In Proceedings of the 5th World Fisheries Congress(the WFC 2008).
- Nagasaki, K., Y. Tomaru, T.Yoshida. Viral impacts on harmful algal blooms - possible tools for aquatic bioremediation. *Phycologia* (Supplement) 48; 88, 2009.

b) Conference and seminar papers presented

- The 2009 Annual Meeting of the Japanese Society of Fisheries Science: general presentation 9
- The 2009 Kinki regional meeting of the Japanese Society of Fisheries Science: 2
- The 12th Meeting of the Japanese Society of Marine Biotechnology: 2
- The 24th Annual Meeting of the Japanese Society of Microbial Ecology: 6
- Molecular biology of Cyanobacteria (CYANO) 2009: 4
- The 1st Korea-Japan Symposium on Microbial Ecology (Jeju, Korea):1

A-3.Off-campus activities

Membership in academic societies

- Sako, Yoshihiko : Japanese Society of Fisheries Science (Director, Chairman of Kinki Branch, Trustee in Kinki Branch), Japanese Society of Microbial Ecology (Trustee), Japan Society for Archaea (Executive Committee Member), Japanese Society of Marine Biotechnology(Trustee)
- Yoshida, Takashi : Japanese Society of Fisheries Science (Secretary in Kinki Branch)
- Yoshinaga, Ikuo : Japanese Society of Microbial Ecology (Trustee)

Research grants

1. Grants-in-aid for Scientific Research(KAKENHI)

- Scientific Research (A) : Sako, Yoshihiko : Study on oil-independent production of next-generation energy and new materials based on deep-sea hydrothermal ecosystem

- Scientific Research (B) : Yoshida, Takashi : Research on the control of toxic cyanobacteria for water quality conservation using natural bacteriophages
- Challenging Exploratory Research : Sako, Yoshihiko : Construction of the system for biodegradation of persistent plastics and production of useful matters using marine hyperthermophilic archaea

2. Other Research Grants

- Entrust Research Grant by Ministry of Agriculture, Forestry and Fisheries : Sako, Yoshihiko : Technical development in molecular detection of harmful diatoms
- Research Grant by Geo Biotechnology Development Organization : Sako, Yoshihiko : Study on useful new microbes from marine sediments and cores
- Research Aid from the NPO Foundation Institute for Fermentation, Osaka : Morisaki, Hisao (Ritsumei University) (contributor : Sako, Yoshihiko; Ikuo Yoshinaga) : Studies on water quality and purification in Lake Biwa : Understanding the roles of reed communities and microorganisms in the reed surface

A-4. International cooperation and overseas activities

International joint research, overseas research surveys

- Sako, Yoshihiko : Studies on isolation and characterization of hyperthermophilic archaea virus (Institut Pasteur, France)
- Yoshida, Takashi : Studies on diversity of cyanophage (CNRS, France)

B. Educational Activities(2009.4-2010.3)

B-1. On-campus teaching

a) Courses given

- Undergraduate level: Marine Microbiology I (Sako), Marine Microbiology II (Yoshida), Seminar of Marine Microbiology (Sako, Yoshida), Laboratory Course in Bioresource Science I, II (Sako, Yoshida, Yoshinaga, partaker), Fundamentals for Laboratory Course in Bioresource Science (Yoshida, Yoshinaga, partaker), Cell Biology III (Yoshida, partaker), Biotechnology - New Strategies in Agriculture- (Sako, partaker), Outline of Bioresource Science III (Sako, Yoshida partaker), Microbiology (Sako, partaker)
- Graduate level: Current Topics in Marine Microbiology (Sako), Seminar in Marine

Microbiology (Sako, Yoshida), Laboratory Course in Marine
Microbiology (Sako, Yoshida)

B-2.Off-campus teaching etc.

Part-time lecturer

- Yoshihiio Sako: Nishinomiya High School (Specially Science Class)

Open lectures, etc.

- Yoshihiko Sako: Open seminar of Kyoto Chemist Club, The Speech in Rotary Club of
Kyoto-East

C.Other Remarks

- Sako Yoshihiio: Member of Research Promotion Committee of Research activities Kinki
Agri.High Technol.(Director), Member of Research administrative committee of Geo
Biotechnology Development Organization (Director), Assessment committee of
Grants-in-Aid for Scientific Research, Japan Society for the Promotion of Science , Referee of
Global COE Program