2.10 Endowed Chair

2.10.1 Industrial Microbiology

Staff	Professor:	Yokozeki, Kenzo, Dr. Agric. Sci.
	Associate Professor:	Hagishita, Tairo, Dr. Agric. Sci.
	Assistant Professor:	Makoto Hibi Dr. Sci.
	Assistant Professor:	Shigenobu Kishino Dr. Agric. Sci.
	JSPS Research Fellow:	Nobuyuki Horinouchi Dr. Agric. Sci.
Students and research fellows		
	Master's program: (7)	

A. Research Activities (2008.4-2009.3)

A-1. Main subjects

Our laboratory aims at creating industrial innovation by the application of novel functions being involved in microorganisms. It is important to find out something new while closely looking at nature without prejudice. Approach for the finding of novel and useful potential being involved in microorganisms is a key component.

a) Efficient method for the production of peptides

We successfully developed a new enzymatic method producing peptides from unprotected starting materials. Our newly developed system brought about a simple and high yield process without protection and deprotection steps, and is applied to industrial production. Our recent discovery of enzyme potential would create innovation beyond common knowledge and attract big attention. Further work is in progress to explore a novel enzyme that can be widely use for the production of peptides

b) Industrial application of novel microbial aldolase

From a standpoint of manufacturing technology, the condensation reaction for the carbon-carbon bond formation that is extremely difficult by organic synthesis is very attractive reaction. Under this background, we are exploring novel aldolase that can catalyze the condensing reaction of carbon-carbon coupling to develop the production process of N- acetylneuraminic acid.

c) The industrial production of sugar alcohols

We work toward production of xylitol by the direct fermentation that assumed glucose the starting materials. We developed an efficient method (glucose → D-alabitol → xylitol) for the production of xylitol via D-alabitol, which can be accumulated from glucose. To remove a rate-limiting factor, the attempt at the enhancement of cofactor supplies is currently in progress.

d) Screening for novel enzymes synthesizing hydroxylated amino acids

The hydroxyisoleucine that is slightly extracted from a plant seed is receiving particular attention as an anti-obesity drug. There are eight kinds of isomers to the hydroxyisoleucine. If novel enzymes catalyzing asymmetrical reaction were found, an epoch-making method would be built. We are exploring various kinds of enzymes participating in hydroxyisoleucine production widely.

e) Selective formation of functional fatty acids by microorganism

We are developing the conjugated fatty acids having various kinds of useful physiology. We are making research in microorganisms for the production of functional fatty acids, and found that lactic acid bacteria produce conjugated linoleic acids. Studies on purification, characterization and expression system of the enzymes involved in each reaction are also carried out. Further development of conjugated fatty acids production by lactic acid bacteria is going on.

f) Novel microbial oxidizing enzyme and its application

A variety of microbial oxidases, such as peroxidases and laccases, are screened and its applicabilities are evaluated. This study was aimed at the development of laccase-mediator reaction systems, which could catalyze the oxidation of various compounds when there was a certain low molecular compound. We are exploring the mediator from natural.

g) The microbial conversion useful for the production of steroids

Attention has been focused on the microbial conversion of cholesterol as the supply method of a steroid hormone. We are exploring various kinds of microorganisms producing novel useful enzymes responsible for the modification of the side chain in the sterol backbone. The microbial production of steroid hormones having an acetylated residue at the 17th carbon position on cholesterol has recently become a subject of considerable interest.

h) Efficient microbial production of deoxyribonucleoside useful for genetic engineering

There will be a need for 2'-deoxyribonucleoside (dNS) in order to be increasing demand in new medical and biotechnology field in near future. The current dNS sources hydrolyzed herring and salmon sperm DNA, which are not suitable sources for sudden high demand. Microbial production of dNS from cheap sugar materials by reverse reactions of nucleoside degradation is investigated.

A-2. Publications and presentations

a) Publications

Books

Yokozeki, K.: Development of the industrial production of oligopeptides that use the novel enzyme. - Microbial Bioconversion and Bioproduction—Development of White Biotechnology beyond Chemical Synthesis— (edited by Ueda et al.), pp.178-186, CMC Press, Tokyo, 2008 (in Japanese)

Yokozeki, K.: Amino-acid fermentation. Encyclopedia of protein. (edited by Ikai et al.), Asakura Publishing, Tokyo, 2008 (in Japanese)

Ogawa, J., S. Kishino, E. Sakuradani and S. Shimizu: Microbial production of unsaturated fatty acid and conjugated fatty acid-containing fats and oils. - Microbial Bioconversion and Bioproduction—Development of White Biotechnology beyond Chemical Synthesis— (edited by Ueda et al.), pp.85-91, CMC Press, Tokyo, 2008 (in Japanese)

Ogawa, J., S. Kishino, E. Sakuradani K. Yokozeki and S. Shimizu: Creation of Functional Food that uses microorganism function. Frontiers of Nutrition study. (edited by Japanese Society of Nutrition and Food Science), pp.151-165, Kenpakusya, Tokyo, 2008 (in Japanese)

Original papers

Ando, A., J. Ogawa, S. Kishino, T. Ito, N. Shirasaka, E. Sakuradani, K. Yokozeki and S. Shimizu: Fatty acid desaturation and elongation reactions of *Trichoderma* sp. 1-OH-2-3. J. Am. Oil Chem. Soc., 86; 227-233, 2009

Nozaki, H., S. Kuroda, K. Watanabe, K. Yokozeki: Gene cloning of α-methylserine aldolase from *Variovorax paradoxus* and purification and characterization of the recombinant enzyme. Biosci. Biotechnol. Biochem., 72; 2580-2588, 2008

Nozaki, H., S. Kuroda, K. Watanabe, K. Yokozeki: Purification and gene cloning of α-methylserine aldolase from *Ralstonia* sp. strain AJ110405 and application of the enzyme in the synthesis of α-methyl-L-serine. Appl. Environ. Microbiol., 74; 7596-7599, 2008

Nozaki, H., S. Kuroda, K. Watanabe, K. Yokozeki: Cloning of the gene encoding α-methylserine hydroxymethyltransferase from *Aminobacter* sp. AJ110403 and *Ensifer* sp. AJ110404 and characterization of the recombinant enzyme. Biosci. Biotechnol. Biochem., 72; 3002-3005, 2008

Nozaki, H., S. Kuroda, K. Watanabe, K. Yokozeki: Screening of microorganisms producing α-methylserine hydroxymethyltransferase, purification of the enzyme, gene cloning, and application to the enzymatic synthesis of α-methyl-L-serine. J. Mol. Catal., B Enzym., 56; 221-226, 2008

Reviews

Yokozeki, K.: The originality that rooted in Japanese original nature / culture. Career Path (The way for biotechnologist to go). Seibutsu-Kogaku Kaishi 86;493-494, 2008 (in Japanese)

Yokozeki, K.: A Novel and efficient enzymatic method for the industrial production of peptides by a novel enzyme, Gekkan Fine Chemical, 37; 57-66 2008 (in Japanese)

Kishino, S. and S. Shimizu: The further possibility of the lactic acid bacteria. Onkochishin. 45; 24-39, 2008 (in Japanese)

Ogawa, J., S. Kishino, K. Yokozeki and S. Shimizu: Enzymatic Synthesis of conjugated fatty acids

by lactic acid bacteria. Bioscience and Industry, 66; 54-59 2008 (in Japanese)

Ogawa, J., S. Kishino and S. Shimizu: Enzymatic synthesis of conjugated fatty acids. Gekkan Fine Chemical, 37; 5-7 2008 (in Japanese)

b) Conference and seminar presented

Annual Meeting of Japan Society for Lactic Acid Bacteria 2008: 1 report

8th Industry-government-academia Young Researcher Meeting of Japanese Society for Bioscience, Biotechnology and Agrochemistry: 2 reports

Society for Industrial Microbiology Annual Meeting Program: 1 report

Annual Meeting of the Society for Fermentation and Bioengineering, Japan 2008: 2 reports

The International Health Food Symposium: 1 report

10th Meeting of Conjugated Linoleic Acid: 1 report

7th Lipid Research Seminar: 1 report

The 458th Meeting of Kansai Branches of Japan Society for Bioscience, Biotechnology, and Agrochemistry: 1 report

Annual Meeting of Japan Society for Bioscience, Biotechnology, and Agrochemistry 2009: 8 reports

2008 Annual Meeting of the Society for Actinomycetes Japan: 1 report

30th Anniversary Symposium of Japanese Society of Enzyme Engineering: 1 report

The 2nd Annual Meeting of the Chemical Society of Japan Kanto Branch: 1 report

A-3. Off-campus activities

Membership in academic societies (roles)

Yokozeki, K.: Japan Society for Bioscience, Biotechnology, and Agrochemistry (delegate); The Society for Fermentation and Bioengineering, Japan (councilor); The Society of Enzyme Engineering (honorary member)

Research grants

Monbukagakusyo Research Grant: Young Scientist Research (B) Screening and characterization of anaerobic bacteria for the production of novel fatty acids (Kishino)

Scientist Research (A) Creation of novel functional lipids by using multi-use of microbial functions (Hagishita, Hibi, Kishino)

Research project funded by New Energy and Industrial Technology Development Organization (NEDO): Selective formation of functional fatty acids by microorganism (Kishino)

A-4. International cooperations and overseas activities

International meetings (roles)

The 11th Swiss-Japan Joint Meeting on Biotechnology and Bioprocess Development, Minusio,

Switzerland (invited speaker)

B. Educational Activities

B-1. On-campus teaching

a) Courses given

Undergraduate level: Industrial Microbiology (Yokozeki), Laboratory course in applied microbiology (Hagishita, Hibi, Kishino)

Graduate level: Industrial Microbiology (Yokozeki), Industrial Microbiology Seminar (Yokozeki, Hagishita, Hibi, Kishino), Experimental Course of Industrial Microbiology (Yokozeki, Hagishita, Hibi, Kishino)

B-2. Off-campus teaching, etc.

Part-time lecturer

Yokozeki, K.: University of Tokyo; Kyusyu University; Kyoto Gakuen University; Soka University; Iwate University; Toyama Prefectural University.

2.10 Endowed Chair

2.10.2 AJINOMOTO Integrative Research for Advanced Dieting

Staff	*Professor*	*Nishiyama, Tohru*
	Associate Professor	*Nonaka, Masahiko*
	Assistant Professor	*Yamazaki, Hanae*
	Assistant Professor	*Ito, Hiroaki*
	Postdoctoral fellow	*Matsunaga, Tetsuro*

A. Research Activities (2008.4-2009.3)

A-1. Main subjects

a) Physiological importance of Japanese traditional dried bonito broth

Our goal is to propose Japanese styles and concepts for healthy dieting based upon scientific evidence. In this study, we focused on Katsuo-Dashi (dried bonito broth) which is widely served in Japanese cuisine, its efficacy on health hasn't been authenticated. We've been investigating the antidiabetic effect of Katsuo-Dashi by using diabetic mice with feeding Katsuo-Dashi for short or long term. So far, it has been suggested that Katsuo-Dashi intake can enhance carbohydrate utilization as an energy substrate.

b) Association among genetic factors, nutrition, and autonomic nervous system.

Genetic polymorphism, dietary habit, and their interactions are involved in the autonomic nervous system (ANS) function and its abnormality. The aim of this study is to investigate the essential association of genetic factors of lifestyle-related diseases and dietary habit with ANS function in young, healthy Japanese. The present study indicated that the estrogen receptor-α PvuII and XbaI polymorphisms have the potential pole in BP and body weight variation, as well as the attenuation of cardiac autonomic nervous activity.

c) Fundamental research for developing new processed foods and stockpiling foods

Some plant species, for example, *Helichrysum bracteatum* have aesthetic values without wilting

or discoloration for many years. The mechanisms of structural maintenance and color stabilization could be applicable to improve the quality of dehydrated vegetables. In this research, cell walls of scarious floral leaf cells in seven plant species were observed under a transmission electron microscope (TEM), a scanning electron microscope (SEM) and a polarization microscope. Generally, floral leaves are composed of parenchyma cells with only primary cell walls. However, it was clarified that there were secondary cell walls showing orientation of cellulose microfibrils for all cells of scarious floral leaves in the seven plant species investigated. The fine structures of secondary cell walls were classified into some types. When the secondary cell walls did not become thickened, the floral leaves wilted. It was indicated that the secondary cell walls function in maintaining its tissue structure.

A-2. Publications and presentations

a) Publications

Books

None

Original papers

T. Matsunaga, N. Gu, H. Yamazaki, M. Tsuda, T. Adachi, K. Yasuda, T. Moritani, K. Tsuda, M. Nonaka, T. Nishiyama: Association of UCP2 and UCP3 polymorphisms with heart rate variability in Japanese men. J Hypertens. 27 (2): 305-313, 2009

N. Gu, M. Tsuda, T. Matsunaga, T. Adachi, K. Yasuda, A. Ishihara, K. Tsuda: Glucose regulation of dipeptidyl peptidase IV gene expression is mediated by hepatocyte nuclear factor-1alpha in epithelial intestinal cells. Clin Exp Pharmacol Physiol. 35 (12): 1433-1439, 2008

Zawalich WS, Yamazaki H, Zawalich KC (2008). " Biphasic insulin secretion from freshly isolated or cultured, perifused rodent islets: comparative studies with rats and mice. " Metabolism. **57**(1) : 30-9.

H. Ito, S. Yazawa, T. Nishiyama, and M. Nonaka: In vitro inhibition of *Helicobacter pylori* by
several dietary plant agents. Int J Antimicobial agent**32**: 95-96, 2008

K. Nishikawa, H. Ito, T. Awano, M. Hosokawa and S. Yazawa: Characteristic thickened

cell walls of the bracts of the 'eternal flower' *Helichrysum bracteatum*. Annals of Botany **102**: 31-37, 2008

Patents

None

Reviews

None

Reports

None

b) Conference and seminar papers presented

Biochemistry and Molecular Biology 2008

Annual meeting of the Japanese society of horticultural science 2008

Annual meeting of the Japan society of bioscience, biotechnology, and Agriculture 2009

A-3. Off-campus activities

Research grant

Matsunaga, T：Grant-in-aid for Young Scientists (start-up) provided by the Ministry of Education, Culture, Sports, Science and Technology, Japan. Association of genetic polymorphisms for lifestyle-relayed disease and nutrition with autonomic nervous system function. (Representative of the research)

Ito, H：Grant-in-aid for Young Scientists (B) provided by the Ministry of Education, Culture, Sports, Science and Technology, Japan. The role of characteristic thickened cell walls contributing to the super-prolongation of flower ornamental periods. (Representative of the research

A-4. International cooperations and overseas activities

None

B. Educational Activities (2008.4-2009.3)

Pocket seminar: Future strategy for advanced dieting

C. Other remarks

Social event: Tasting “Da-shi” is a essential culture, at Kyoto univ.

2.10 Endowed Chair

2.10.3 Food and Agricultural Safety and Ethics

Staff Associate Professor: Hosono, Hiromi, D. Agric. Sci.
Assistant Professor: Kudo, Haruyo, D. Agric. Sci.

A. Research Activities

A-1. Main subjects

a) The food-derived risk management system

In these days, food safety and environmental problems have become international issues and the economic and social globalization adds to the problem. It is now globally recognized that risk management should based on scientific evidence. And to decide on a policy or regulation, we should compare cost-benefit balance of the options regarding social, cultural and economic factors. In our laboratory, we develop the guidance of risk management (according to planning, decision and evaluation of policy options) and study animal health economics basic to that. We also explore to develop evaluation method of the process of risk analysis.

b) Food, risk and science communication

Owing to the globalization of human activities and application of high technology, the situation around foods become more complex and access of process/quality information become more difficult.

Under this situation, it is essential to formulate common platform among scientists, citizen and administrator to solve food related problems. To enable this, we think not only information provisions, but also interactive communication is necessary. To achieve this, we try to establish concept and method of communication on risk, science, food and agriculture.

c) Agricultural, corporate and professional ethics

High technologies are applied also to agricultural sector, so it is required to establish ethics in agriculture as in medical science and in engineering.

And in the face of a series of food scandals, we think it is important to consider the ethics of food-businesses, technicians/ professionals in agriculture/livestock industry.

We explore and develop the guidance of agricultural, corporate and professional ethics.

A-2. Publications and presentations

a) Publications

Reports and Reviews

Hiromi Hosono, "Rapid development of Vietnamese dairy sector, 1" Dairyman, Vol.59 No.2, Feb.2009.

Hiromi Hosono, "Rapid development of Vietnamese dairy sector, 2" Dairyman, Vol.59 No.2, Feb.2009.

Haruyo Kudo, “A Case study of quality management and –assurance system in food industry” Agriculture and Economics, Vol.74,No.11, September 2008

Hiromi Hosono, "Food purchasing behavior and consumers' consciousness/knowledge on food, agriculture and farming community" Interim report of food safety administration based on science/Establishment of risk analysis, profession and professional ethics, Feb. 2009.

Haruyo Kudo,” research trend on business ethics” Interim report of food safety administration based on science/Establishment of risk analysis, profession and professional ethics, Feb. 2009.

Yoko Niiyama, Hiromi Hosono, Ritsuko Kawamura, Akiko Kiyohara, Haruyo Kudo, Yayoi Kito, "Preliminary study on consumers' food risk perception; comparative analysis in Japan, Korea and USA", Interim report of food safety administration based on science/Establishment of risk analysis, profession and professional ethics, Feb. 2009

b) Conference and seminar papers presented

Hiromi Hosono, Nguyen Thi Minh Hoa, Shigeru Ito,"Evaluating the economic performance of new pig breed among small scale farmers in rural Vietnam", 6th ASAE International Conference, Manila, Philippines, Aug. 28-30, 2008.

Hiromi Hosono, Hiroichi Kono, Shigeru Ito, "A sero-epidemiological study of Toxoplasma gondii in cats and pigs from T.T.Hue Province in Vietnam", Asian-Australian Association for Animal Production International Conference, Hanoi, Vietnam, Sep. 22-26, 2008.

Yoko Niiyama, Hiromi Hosono, Ritsuko Kawamura, Akiko Kiyohara, Haruyo Kudo, Yayoi Kito, "Re-investigating the factors affecting consumers' food-related risk perception: a cross-national case study applying laddering method, Dec.10,2008.

Hiromi Hosono, "Reviewing the ideal risk communication with consumers" Food system

research association Kanto branch workshop, Dec.13, 2008.

Yoko Niiyama, Hiromi Hosono, Ritsuko Kawamura, Akiko Kiyohara, Haruyo Kudo, Yayoi Kito, Keiko Tanaka" A Study on the Structure of Public Perception of Food －related Risks in Japan"

The Agricultural Economics Society of Japan (29th March 2009)

A-3. Off-campus activities

Research grant

Hosono, H. : Grant-in-Aid for Scientific Research, Encouragement of Young Scientists (B): the role of social environmental factors in the prevalence process of animal health policies.

Kudo, H.: Grant-in-Aid for Scientific Research, Encouragement of Young Scientists (B):a comparative study of consumer policy making process in Japan and Germany.

Hosono,H and Kudo,H.: Grant-in-Aid for Scientific Research (A):Food safety administration based on science/Establishment of risk analysis, profession and professional ethics (Co-Researcher)

Hosono H: practical technology development project to promote new policy for agriculture, forestry and fishery: Research on animal infectious disease surveillance in Japan (Co-Researcher)

A-4. International cooperations and overseas activities

International meetings(role)

Hosono H.：Workshop for Risk Governance; Society for Risk Analysis Annual Meeting, Boston, USA, Dec.8, 2008, (participant)

Hosono H.：Session for Visual Tools; Society for Risk Analysis Annual Meeting, Boston, USA, Dec. 10, 2008, (chair)

International joint researches, overseas research surveys

Animal health surveillance study in Vietnam（Hosono）

Study on development of food safety policy in Vietnam (Hosono)

Animal disease surveillance study in Australia (Hosono)

Food safety policy research in Europa (Hosono, Kudo)

B. Educational Activities

B-1. On-campus teaching

a) Courses given

Undergraduate level :Risk Management (Hosono/Kudo), Food Safety Ⅱ（Hosono）, Food and Agriculture Ethics (Hosono/Kudo)

Graduate level: Advanced Risk Management ⅠⅡ（Hosono/Kudo）

B-2.Off-campus teaching, etc.

Part-time lecturer

Kyoto Notre Dame University (Kudo)

holding of symposiums

First symposium on Food and Agricultural Safety and Ethics," examining food safety from many angles", Kyoto University, April 26th ,2008

Second symposium on Food and Agricultural Safety and Ethics," crisis management: learning from the food contamination incidents ", Kyoto University, October 13th ,2008

Third symposium on Food and Agricultural Safety and Ethics," Agriculture as food producing industry : reviewing ethics from the point of production ", Kyoto University, February 28th ,2009

C. Other remarks.

Hosono, H.: The Council of second central wholesale market in Kyoto City

Kudo,H. : Reviewing Committee member for food safety and labeling system in foreign countries