# 2.4.15 Laboratory: Technology of Marine Bio-products

Member:	Professor	Hirata, Takashi, Dr. Agric. Sci.	
	Associate Professor	Sugawara, Tatsuya, Dr.Agric.Sci.	
	Doctor's program	3	
	Master's Program	9	
	Undergraduate	2	
	Other	1	
	Post-Doctoral fellow	2	

## A. Research Activities (2009.4-2010.3)

## A-1. Main Subjects

a) Studies on functional components extracted from oceanic lives

Oceanic life has adapted itself to the specific environment different from land. For this adaptation, various bio-active substance are incorporated into or biosynthesized in their bodies. The objectives of this work are to screen these components and to elucidate their functions for human use. The progress hitherto made is summarized as follows; (1) We found that pigment-proteins from Porphyra sp. ,carotenoids from brown algae, and glcosamine possess anti-inflammatory activities. We've been trying to elucidate their mechanisms. (2)We found, for the first time, that siphonaxanthin from green algae has a strong anti-angiogenesis activity. (3) To elucidate the effect of natural compounds on skin functions, anti-photoaging effect of fucoxanthin and skin barrier effect of dietary sphingolipids were evaluated. b) Studies on the mechanism of intestinal absorption of lipophilic functional compounds for regulation of their functions in vivo. We demonstrated that sphingoid bases originated from plant sphingolipids can be absorped from lymph and evaluated whether the sphingoid bases reached in skin. In addition, we examined the bioavailabilities of siphonaxanthin and astaxanthin.

c) Studies on post-harvest development of melanogenesis cascade in crustaceans. Invertebrates including crustaceans lack acquired immunity system. And a phenoloxidase system, which is non-inducibly present, is one candidate for recognition of foreign materials. However, this cascade system is often triggered during post-mortem storage, resulting in black spot development and seriously reducing the market quality of crustaceans. So far we suggested that hemocyanin-related phenoloxidase activity plays an important role in the black spot development, and that pheoloxidase activity of hemocyanin-like protein in kuruma prawn is effectively suppressed by carbon dioxide. The amino acid alignment of hemocyanin-like protein was partly clarified.

### **A-2.Publications and presentations**

## a) Publications

### **Books**

- Sugawara, T. and Hirata, T.: Physiolosical functions of marine carotenoids, New Food Industry, 51(5), 19-26, 2009. (in Japanese)

- Aida, K. and Sugawara, T.: Food functions and intestinal absorption of plant glucosylceramides, The Cell, 41(5), 42-44, 2009. (in Japanese)

- Sugawara, T.: Compounds of taste and flavor, Functional chemistry of Food, 85-94, 2010. (in Japanese)

#### Original Papers

- Kinoshita, M., K. Aida, Y. Tokuji, T. Sugawara and M. Ohnishi: Effects of dietary plant cerebroside on gene expression in the large intestine of 1,2-dimethylhydrazine (DMH)-treated mice determined by DNA microarray analysis. J. Food Lipids, 16; 200-208, 2009.

- Sakai, S., T. Sugawara, K. Matsubara and T. Hirata, T.: Inhibitory effect of carotenoids on the degranulation of mast cells via suppression of antigen-induced aggregation of high affinity IgE receptor. J. Biol. Chem. 284; 28172-28179, 2009.

- Sakai, S., T. Sugawara, T. Kishi, K. Yanagimoto and T. Hirata: Effect of glucosamine and related compounds on the degranulation of mast cells and ear swelling induced by dinitrofluorobenzene in mice. Life Sci. 86; 337-343, 2010.

- Kinoshita, M., G. Okamoto, T. Hirata, A. Shinomiya, T. Kobayashi, Y. Kubo, H. Hori, and A. Kanamori : Transgenic Medaka Enables Easy Oocytes Detection in Live Fish, Molecular Reproduction and Development, 76, 202-207, 2009

## b) Conference and seminar papers presented

- The 63th Annual Scientific Meeting of Japanese Society of Nutrition and Food Science:

2 presentations

- The 56th Annual Meeting of the Japanese Society for Food and Technolgy: 4

presentations

- The 2ndst Annual Meeting of the Japanese Society for Ceramides: 1 presentation
- The 48th Annual Meeting of the Japan Oil Chemists' Society: 1 presentations
- Kinki branch meeting of the Society of Scientific Fisheries: 1 presentaiton
- Annual Meeting of the Japan Society for Bioscience, Biotechnology, and Agrochemistry, 2010: 3 presentations
- Annual Meeting of the Society of Scientific Fisheries, 2009, spring: 3 presentations
- 100th AOCS Annual Meeting & Expo: 3 presentations
- The 1st International Conference on Lipid Hydroperoxide Biology and Medicine Sendai: 1 presentation
- International Symposium on Seafood Processing Technology and Safety Control
  System : 3 presentations

### A-3.Off-campus activities

#### Membership in academic societies

- Hirata, Takashi, Dr. Agric. Sci. : The Japanese Society of Fisheries Science (Councilor of Kinki branch), The Fall Meeting of The Japanese Society of Fisheries Science 2010 (President), The Society of Packaging Science and Technology (President), The Japanese Society for Food Science and Technology (Director), Japanese Society of Food Machines (Direcotr)

- Tatsuya, Dr.Agric.Sci. : The Conference on Lipid Peroxide Biology and Medicine (Executive Committee Member), The Japanese Society of Fisheries Science (Fisheries science education committee )

Membership in Science Council of Japan, etc.

Tatsuya, Dr.Agric.Sci. : Annual Meeting of the Japan Society for Bioscience,
 Biotechnology, and Agrochemistry, 2010, Symposium(symposiast), The 12th Annual
 Meeting of the Japanese Society for Marine Biotechnology, Symposium(symposiast)

## Research grants

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

- Scientific Research (A) : Hirata, Takashi : Studies on the inactivation mechanism of the melanin synthetic enzyme in crustaceans during post-harvest distribution by inert gases

2. Other Research Grants

- The Program for Promotion of Basic and Applied Researches for Innovations in Bio-oriented Industry: Sugawara, Tatsuya: Studies on sphingolipids as functional food components

- Japan Science and Technology Agency Seeds Innovation Study: Sugawara, Tatsuya: Novel agonists for fatty acid receptor as new pharmaceutical agents

- Towa Research Fundation: Sugawara, Tatsuya: Enhancement of food functions of nori by heat-treatment

- Uragami Food and Culture Fundation: Sugawara, Tatsuya: Evaluation of prebiotics effect of dietary glycolipids

### A-4.International cooperation and overseas activities

Membership in academic societies

- Hirata, Takashi: Journal of Aquatic Food Product Technology (Editor)

International meetings(country,roles)

- Hirata, Takashi: International Symposium on Seafood Processing Technology and Safety Control System, China, (Invited speaker, Committee member), 2nd International Congress on Seafood Technology (USA, Committee member)

## **B.Educational Activities**(2009.4-2010.3)

### **B-1.On-campus teaching**

a) Courses given

- Undergraduate level :	Outline of Bioresource Science II (Hirata), Fundamentals for the
	experiments of Bioresource Science (Sugawara), Biochemistry of
	Marine Biological Resources (Hirata), Introduction to Foreign
	Literature in Bioresource Science III (Hirata), Food Safety II
	(Hirata), Seminar in Marine Bio-production (Hirata, Sugawara),
	Laboratory in Bioresource Science I, II (Hirata, Sugawara),
	Practical Course in Marine Bioscience and Technology III (Hirata),
	Technology of Marine Biological System (Sugawara), Basic
	Bioresource Science (Sugawara)
- Graduate level:	Laboratory Course in Technology of Aquatic Biological Products
	(Hirata, Sugawara), Seminar in Technology of Aquatic Biological
	Products (Hirata, Sugawara), Technology of Aquatic Biological

## Products (Hirata), Biochemistry of Aquatic Animals (Sugawara)

## **B-2.Off-campus teaching etc.**

Part-time lecturer

- Hirata, Takashi,: Fukui Prefectural University (Special lecture II on marine bioresources, Faculty of marine bioscience )

Open lectures, etc.

- Hirata, Takashi: Packaging manager course (Lecturer), Japan Packaging Institute

## **B-3.**Overseas teaching

International students

- International students : Master 1 (China) Doctral 2 (China 1, India 1) Research Students 1 (China)

Lectures and seminars

- Hirata, Takashi, Dr. Agric. Sci.

Guest Professor, Shanghai Ocean University : China

## **C.Other Remarks**

- Hirata, Takashi, Dr. Agric. Sci. : Kinki Agri. High Technology (Technological Councilor, Director of Fisheries Department)