

●Development Stage

(Fiscal Year 2006-2008)

Hakodate Area

Formation of Network of Local Industries with Marine Innovation

Hakodate Regional Industry Promotion Organization
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Framework for Project Promotion

- Project Director: Yoshiaki Maita (Vice-Director, Hakodate Regional Industry Promotion Organization)
- Chief Scientist: Akihiko Hara (Dean, Graduate School of Fisheries Sciences, Hokkaido University)
- Deputy Chief Scientist: Takuji Sawaya (Director, Research and Development Dept., Hokkaido Industrial Technology Center)
- Science and Technology Coordinator: Shigeru Ikeda (full-time), Hiroshi Dazai (part-time)

Core Research Organizations

- Graduate School of Fisheries Sciences Hokkaido University,
- Hokkaido Industrial Technology Center

Major Participating Research Organizations

- Academia: Graduate School of Fisheries Sciences Hokkaido University, Hakodate National College of Technology, FUTURE UNIVERSITY-HAKODATE, Kitami Institute of Technology, Asahikawa Medical College, Hokkaido University of Education HAKODATE, Kisarazu National College of Technology

- Industry: JARD, YAMAKYU ASAZUMA Inc., Alpha Hydraulic Engineering Consultants Co., Ltd., IKEMI SEIKYU-TEN CO., LTD., ISHIO SHOKUJIN CO., LTD., K. K. ISHIKARISUSAN, AIR WATER, INC. Hokkaido Branch, SEC CORPORATION LTD., SK-FOODS KIKAKU, MFC-POLYSACCHARIDE CO., LTD., Oshimaezou Co., Ltd., KAJIWARA KONBUTEN CO., LTD., GUTZ Co., Ltd., KANEJIN FOOD CO. LTD., Kanada Shouten Co., Ltd., Kamis-gun Fishermen's Cooperative Association, Kikuchi Foods Industry Co., Ltd., KITAHONOH KOUJIAN CONSULTANTS Co., Ltd., KYUNO CO., LTD., Kyowa Concrete Industry Co., Ltd., Toru Kudo (Fishery), MARUNAMA KOSBE CORPORATION Co., Inc., GOTOKEN CO., LTD., C&C Co., Ltd., SHIKOKUKAKOU Co., Ltd., SHOWA FREEZING PLANT CO., LTD., JOKKI CO., LTD., INST. OF FISHERIES MANAGEMENT TECHNOLOGY, SUGA CO., LTD., S.K.K. Co., Ltd., Screen-pro Shimoda, Inc., SEKANKANKO KAHATSU K. K., TAYO SESAKUSHO CO., LTD., TAKASE Inc., TAKAHASHI-SHOKUJIN, Inc., Tanaka PEKI Industry Ltd., TAMAMOYA, Inc., CHIKARAZUSI Co., Ltd., KANESEN CHBASUSAN CO., LTD., DEGUCHI SEMEN CO., LTD., TETSUGUMI UNDERWATER OPERATION CO., LTD., TERASHIMA SHOKUJAI CO., LTD., TENGUDOU TAKAPABUNE CO., LTD., Densai, Inc., DOHSUJI CO., LTD., DOUNAN SHOKUJIN CO., LTD., Towa Denki Sesakusho Co., Ltd., TOKIKANE TIKUHAN CO., LTD., TR-B Sapporo Inc., NAKAGO Boni-moriya, NAKAYAMA MEDICINES CO., LTD., ANTAROU HONPO, Nishino Baking Co., Ltd. (HAKODATE Office), Niko Ltd., Nissui Pharmaceutical Co., Ltd., NIPPON CHEMICAL FEED CO., LTD., Nippon Data Service Co., Ltd., Nihon Health Co., Ltd., North Civil Engineering Consultant Co., Notosusan, Inc., BIO CREATE CO., LTD., HAKODATE SANISO CO., LTD., Hakodate Sobaya Tomonoki Communications, Hakodate YANAGIYA Co., LTD., SAITOU, Inc., Handa Co., Ltd., Marine Products Higuchi, FUJII OCEAN WORKS CO., LTD., FUJIMA CO., LTD., Fujo Ocean Development & Engineering Co., Ltd., FURUTA SHOTEN CO., LTD., Hokuyo Co., Ltd., HOKKAI DO CONFECTIONARY CO., LTD., Hokkaijamaro Co., Ltd., MATSUNAGASHOUTEN Co., Ltd., MARUKICHI SHOKUJIN CO., LTD., Maruichi Muramatsu, Inc., MURASUSAN CO., LTD., KASZI MIZUNOYA, MICHIBA, YAMAICHI SHOKUJIN CO., LTD., YAMADA Foods Processing Co., Ltd., Yamatokatashi Co., Ltd., Hokkaido Kombu Museum, Yunokawa Kariko Hotel Co., Ltd., YUKI Co., Ltd., YOSHIDA SHOKUJIN, REAJUST, WAKI SHOUJI CO., LTD., WAKI SHOKUJIN CO., Ltd., WATANABE CO., LTD.

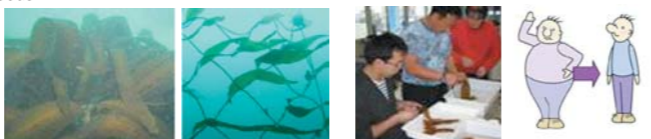
Aims of Project

The unification of the highly original science and technology related to the fisheries and the ocean in the Hakodate area and the promotion of the "Basic Stage" project, which was aimed at adding further value to kelp and squid, two representative ocean resources of this area, by strengthening their brand power and using them in advanced applications, had been realized. As a result, more than 50 companies were participating in the project for the creation of industries through industry-academia-government cooperation; this had rapidly increased the opportunities for new technological innovations and new project creation in the region. Against such a favorable background, within the "Development Stage" project, industry-academia-government cooperation in the region has been further strengthened. Furthermore, this project is aimed at developing, on the basis of revolutionary seeds and corporate needs, advanced uses of the exceptional fisheries resources of the region, technologies for the search, extraction and purification of specialized functional ingredients in order to enhance the added value of products, and technology for quality assurance, in order to realize an industrial center of innovative technology, both domestically and abroad, that is centered on the innovation of a regional integrated industry, from production to distribution and consumption, of mainly the fisheries and the food processing sectors.

Contents of Project

- No. 1.** Composition of special substances, genome analysis, and construction of sustainable Marine Garden System
- Clarification of functions and protection mechanisms against metabolic syndrome of special substances from algae
 - Development of medical and pharmaceutical materials and health foods

- Fucoidan
- Fucoxanthin
- Prostaglandin
- Development of sustainable production and propagation system for Gagome with high productivity of special substances
- New methods of underwater and land-based cultivation of Gagome (coexistence with abalone, etc.)



Point: Research to uncover further Gagome-like products

- No. 2.** Effective utilization of functional components as medical, pharmaceutical, fine chemical, and food materials
- Utilization of seaweed viscous polysaccharides in food and medical fields
 - Application as food supplement and wound-coating treatment material
 - Development of particle control technology for manufacturing high-quality squid ink
 - Advanced utilization of squid ink by developing high-quality edible biomaterial and enhancing UV absorption activity

Point: Advanced utilization of seaweed ingredients and squid-ink



- No. 3.** Food design system based on functionality and texture
- Development of processing technology that emphasizes taste and texture
 - Flavor and taste-control processing of products such as dried salmon and dried sardines
 - Processing of high-end Chinese foods such as dried abalone and dried sea cucumber
 - Processing to add functional ingredients and flavoring

Point: Control and design of quality of dried foods



Collaboration with Tokachi area (dry processing of farm products)

- No. 4.** Research on and application of function preservation technology for biological tissue
- Development of freshness-preservation technology for various fish and shellfish
 - Oxygenation, seawater immersion, and control of energy metabolism
 - Suspended animation and hibernation preservation of biological tissue
 - Development of related equipment and business creation

Point: Application of freshness- and function-preservation technologies for biological tissues



- No. 5.** Highly sensitive bacteria-monitoring system that is based on molecular ecology and is superior to the established method
- Development of bacterial detection system that is superior to established methods in simplicity, rapidity and sensitivity
 - The bacterial testing time will be shortened to 8 hours (conventional methods require 1-6 days)
 - Sub-lethally injured bacteria (that have the potential for growth in the intestine after ingestion with food) can be detected by this system but not by the established method based on culture

Point: Establishment of rapid bacterial testing method in processing and distribution of food



- No. 6.** Identification of species and geographic origin and traceability on the basis of biological information
- Development of geographic origin identification technology to prevent falsification
 - Development of species identification technology using DNA analysis
 - Identification of geographic origin of seaweed by multi-elemental analysis
 - Traceability (tracking information from producers to consumers)

Point: Establishment of safety, reliability, and regional brand of foods



Main Results

- Composition of special substances, genome analysis, and formation of sustainable Marine Garden System**
Sustainable production technologies of Gagome resources: Development of new kelp beds, Land-based recirculating culture system (coexistence with aquatic organisms)
Discovery of Uganomoku (*Cystoceira hakodatensis*) as a useful macroalgae with high productivity of fucoxanthin
- Effective utilization of functional components as medical, pharmaceutical, fine chemical, and food materials**
(1) Factors affecting the physiological properties of viscous polysaccharide solution extracted from Gagome, *Kjellmaniella crassifolia*, have been investigated from the viewpoint of food processing. (2) The enhancement of immune system by Gagome viscous-polysaccharide was confirmed in animal experiments. (3) Monodispersed pigment particles were successfully prepared from squid ink, and the industrial process was established using a bench-scale facility.
- Food design system based on functionality and texture**
The optimal drying technique for seafood, focusing on the relationship among multifunctional water species, taste, hardness and bacterial growth, was demonstrated. The technology developed was applied to other foods such as meats.
- Research on and application of function preservation technology for biological tissue**
Supplying oxygen was effective for retaining the freshness of squid during storage with ice. We applied this finding to scallops and other marine creatures. The research on neural control technology for the preservation of biological functions is now in progress.
- Highly sensitive bacterial monitoring system that is based on molecular ecology and is superior to the established bacterial method**
The FISHFC method is superior to the established method in the accuracy and the rapidity of the analysis of sub-lethally injured food poisoning bacteria. The probes for the detection of *Campylobacter spp.* and *Pseudomonas aeruginosa* were developed.
- Identification of species and geographic origin and traceability on the basis of biological information**
Determination of complete sequence of mitochondrial DNA from *Kjellmaniella crassifolia* (Gagome), and the simplification and speeding up of the element analysis method of trace metals were investigated. The QR code camouflage prevention technology was developed for marine product traceability.

