

Development and application of cell-free protein synthesis system



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Status Professor

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The Japanese Biochemical Society

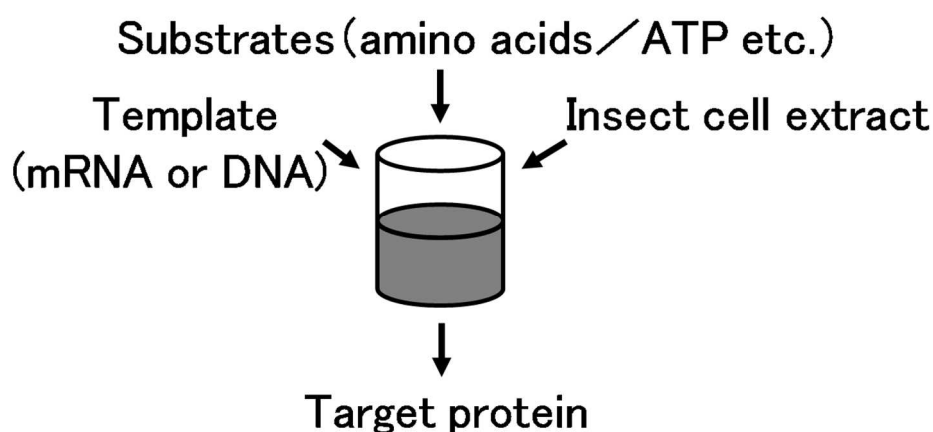
Keywords Cell-free protein synthesis system, insect, silkworm, polyphenol oxidase

Technical Support Skills

- Recombinant DNA experiment
- Screening, purification and analysis of enzymes

Research Contents

Development and application of insect cell-free protein synthesis system



Insect cell-free protein synthesis system

Available Facilities and Equipment

Spectrophotometer, DU800 (Beckman Coulter)	Microplate Reader, infinite M200 (TECAN)
Spectrophotometer, DU800 (Beckman Coulter)	Microplate Reader, sunrise rainbow thermo (TECAN)
Chromatography system, AKTA avant (GE Healthcare)	Microchip Electrophoresis System, MultiNA (SHIMADZU)
Chromatography system, AKTA prime plus (GE Healthcare)	
Cell disruptor, MULTI-BEADS SHOCKER (YASUI KIKAI)	



Name	Junsei Taira	E-mail	taira@okinawa-ct.ac.jp
Status	Professor		
Affiliations	•The Pharmaceutical Society of Japan •American Chemical Society		
Keywords	•Oxidative stress, Antioxidant, Cosmetics, Functional food		
Technical Support Skills	•Evaluation of functional materials in bioresources •Isolation of functional compounds		

Research Contents

My research target is to find the active compounds as potential useful functional food, pharmaceutical cosmetics and drugs in bioresources (plants¹⁻⁴) and marine natural products⁵⁻⁶) and also make the aroma profiles in beverages⁷). The research flow indicated in the under figure and general evaluation is as follows. Polyphenol content, antioxidant activity (ORAC method, ESR study), anti-inflammatory effect, antitumor activity, apoptotic activity and inhibition of melanogenesis.

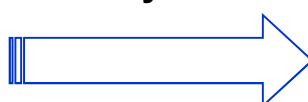
Recent research publications are as follows.

- 1) Oxidants and Antioxidants in Medical Science. 2, 21-28, 2013
- 2) Journal of Food Composition and Analysis. 29, 117-125, 2013
- 3) Journal of Agricultural and Food Chemistry. 62, 167-172, 2014
- 4) Food Chemistry. 166, 531-536, 2015
- 5) Marine Drugs. 10, 2741-2748, 2012
- 6) Tetrahedron Letters. 55, 1421-1423, 2014
- 7) Food Science and Technology Research. 18, 177-181, 2012

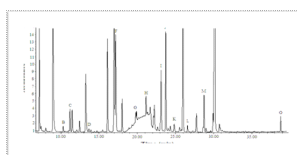
Natural products



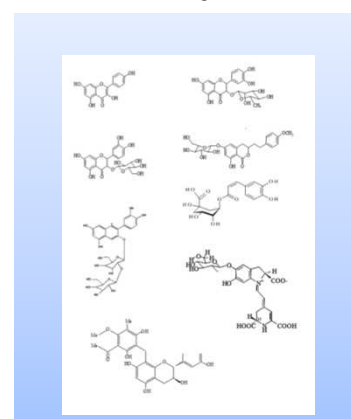
Assay



Analysis



Find



Available Facilities and Equipment

Large scale headspace GC/MS	Agilent Technologies
LC/MS	Agilent Technologies
LC for analysis and preparative isolation	Agilent Technologies
DNA analyzer	Agilent Technologies

Research of the Okinawan traditional distilled liquor “AWAMORI”



Name Yasutomo Yamaki **E-mail** tamaki@okinawa-ct.ac.jp

Status Associate Professor

Affiliations

Japan Society for Bioscience, Biotechnology, and Agrochemistry
The society for Biotechnology, Japan
The society of Tropical Resources Technology

Keywords

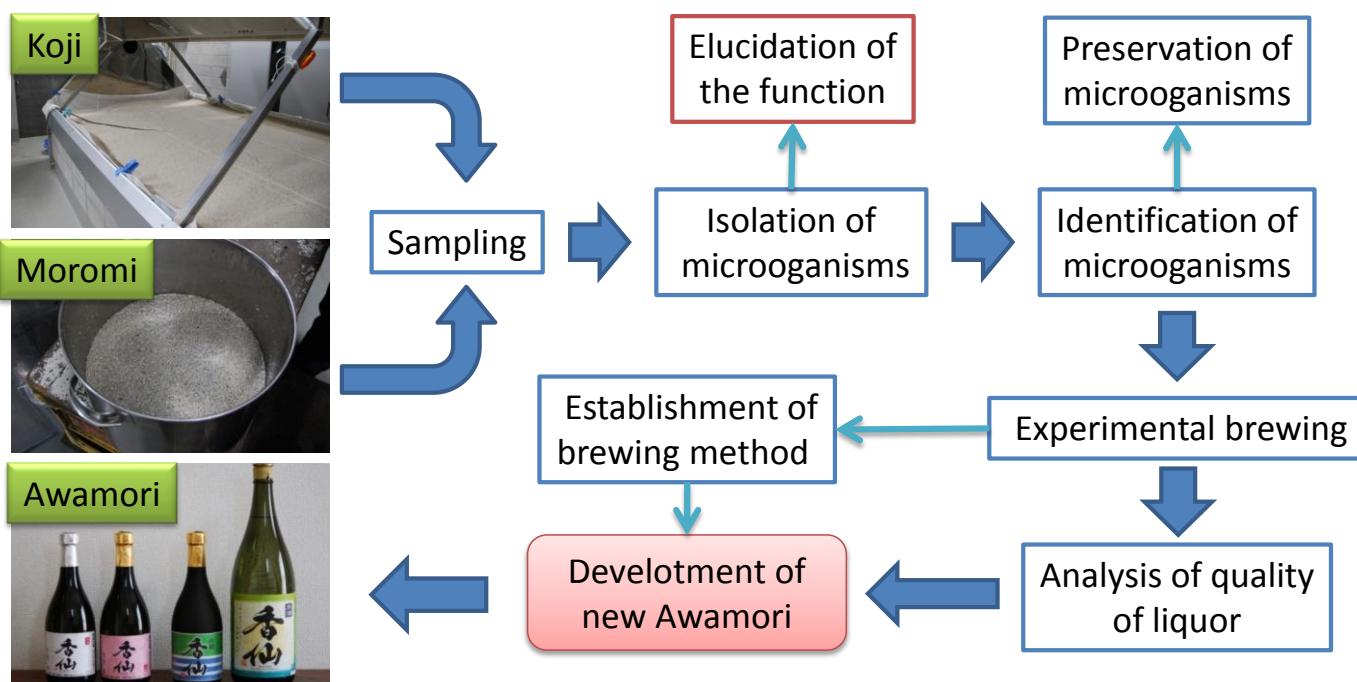
Awamori, fermentation, microorganisms, Black koji-mold,

Technical Support Skills

- The whole about the AWAMORI. / • Aromatic component analysis.
- Alcoholic beverages development of products. / • Fermented food development.

Research Contents

Research of the microbe which has an influence on the quality of Awamori.



Available Facilities and Equipment

名称・型番(メーカー)	
Gas Chromatograph Mass Spectrometer (GC-MS : Shimadzu)	Headspace automatic sampler system (Perkin Elmer)
High Performance Liquid Chromatography (HPLC : Shimadzu)	Biophotorecorder (ADVANTEC)
Differential scanning calorimeter (DSC : Shimadzu)	Thermal Analysis (TA : Shimadzu)
Jar fermenter (Takasugi)	Clean bench (AIRTEC)
Autoclave (Tomy)	Thermo-hygrostat (EYELA)

Bioresources and Photochemistry



Name	HAMADA Taisuke	E-mail	hamada@okinawa-ct.ac.jp
Status	Professor		
Affiliations	The Chemical Society of Japan, Japan Society of Coordination Chemistry, The Electrochemical Society of Japan, Japanese Society of Engineering Education		
Keywords	Photochemistry, Physical chemistry, Coordination chemistry		
Technical Support Skills	<ul style="list-style-type: none"> • Measurement of photochemical property • Supercritical fluid extraction • Photo energy conversion 		

Research Contents

[Dye sensitized solar cell]

Solar energy have attracted much attentions because it is clean, and it is called green energy. Solar cell is device to convert photo-energy to electric energy. We have been studied a solar cell, which is called the dye sensitized solar cell (DSSC).

We have made DSSCs and studied the effect of the dye on the efficiency under irradiation of sunlight (AM 1.5G) from the solar simulator (Fig. 1). In this study, we have evaluated the photochemical and photoelectrical properties of the dye. Therefore, we are able to measure and to evaluate the photochemical property of various compounds in order to clarify a photochemical ability.

[Super critical fluid extraction]

We have been trying to obtain the useful compound such as poly-methoxy flavonoid (PMF) by means of super critical CO₂ extraction method. The merit of this method is that the temperature for the extraction is relatively low and CO₂ dose not remain in an extract.



Fig. 1 Solar simulator.



Fig. 2 Supercritical fluid extraction apparatus.

Available Facilities and Equipment

Solar simulator (WACOM)	
Supercritical CO ₂ extraction apparatus (AKICO)	

Search for biodiversity and function of marine organisms and application to conservation



Name	Naoko Isomura	E-mail	iso@okinawa-ct.ac.jp
Status	Assistant Professor		
Affiliations	The Zoological Society of Japan, The Ecological Society of Japan, Japanese Coral Reef Society		
Keywords	Corals, Reproduction, Reproductive ecology, Genetic differentiation, Speciation		
Technical Support Skills	<ul style="list-style-type: none"> • Genotyping using sequences and microsatellite marker • Collecting gametes, cross experiments and rearing juveniles of marine organisms • Collecting marine organisms by SCUBA • Microbial community analysis by NGS (not main theme) 		

Research Contents

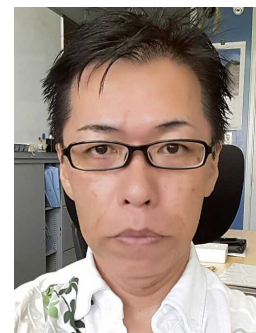
In my study, my purposes are to search biodiversity of marine organisms, especially scleractinian corals, and to apply for conservation.

My purpose is to estimate the genetic diversity and its function of marine organisms in Okinawa. First, I will try to clear morphological and/or diversity of species and population. And then, after I search and clarify the endocrine system of organisms by physiological and molecular analyses, I will evaluate the relationship between these system and ecological characteristics of organisms. Moreover, I will investigate conservation method for target organisms using my results.

Available Facilities and Equipment

Capillary Sequencer: CEQ8800 (Beckman Coulter)	Next Generation Sequencer MiSeq (illumine)

Cloning of the gene for plant stress responsiveness

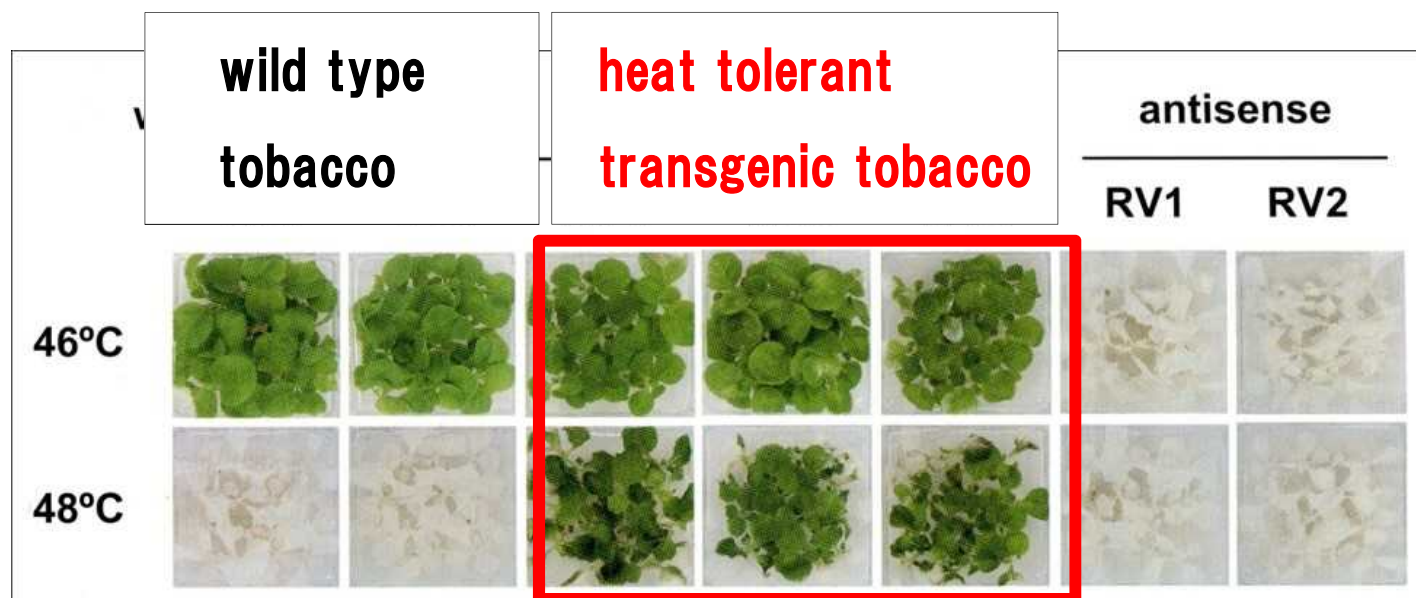


Name	SANMIYA Kazutsuka	E-mail	sanmiya@okinawa-ct.ac.jp
Status	Associate professor		
Affiliations	The Japanese Society of Plant Physiologists The Molecular Biology Society of Japan		
Keywords	plant stress responsive gene, isoprenoid, heat shock protein, saponin		
Technical Support Skills	<ul style="list-style-type: none"> • Gene cloning • Gene expression analysis • Transgenic plant 		

Research Contents

FPPS gene, heat shock protein gene, UGT gene, Rice yield

- Cloning of the gene for FPPS
For the first time, the gene for chloroplast FPPS was cloned.
FPPS is the key enzyme for isoprenoid biosynthesis.
Isoprenoids play roles in plant stress response such as protection against sunlight.
- Heat tolerant transgenic tobacco
The gene for heat shock protein was used for the transformation (Fig).
- Cloning of the gene for UGT
For the first time, the gene for saponin biosynthesis was cloned.
Saponin protects the Brassicaceae crops, cabbage, radish, broccoli against pests.
- Rice yield increased to 124% by glass silica



Available Facilities and Equipment

Electrophoresis apparatus Mupid (ADVANCE)	
Gene expression analyser AE6933 (ATTO)	
Thermal cycler TP450 (TaKaRa)	

Application of shock wave processing technology to biological materials

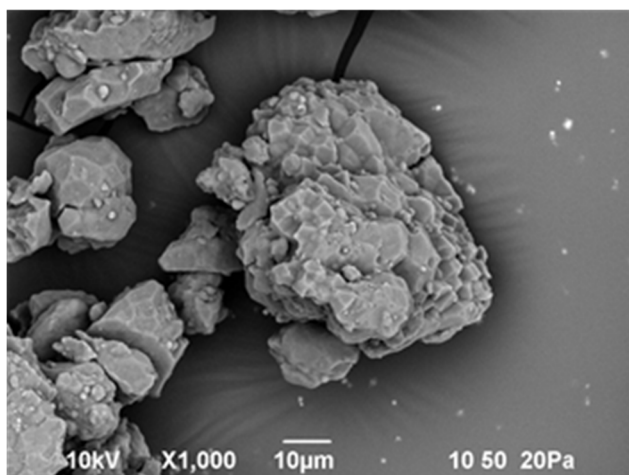


Name	Takemoto, Ayumi	E-mail	tkmt@okinawa-ct.ac.jp
Status	Associate Professor		
Affiliations	The Japan Society of High Pressure Science and Technology The Japan Society of Cookery Science The Materials Research Society of Japan The Gemmological Society of Japan The Museological Society of Japan		
Keywords	Shockwave processing, Non-thermal sterilization, Hands-on Display		
Technical Support Skills	<ul style="list-style-type: none"> Shock wave processing to biosystem Non-thermal milling, Efficient extraction 		

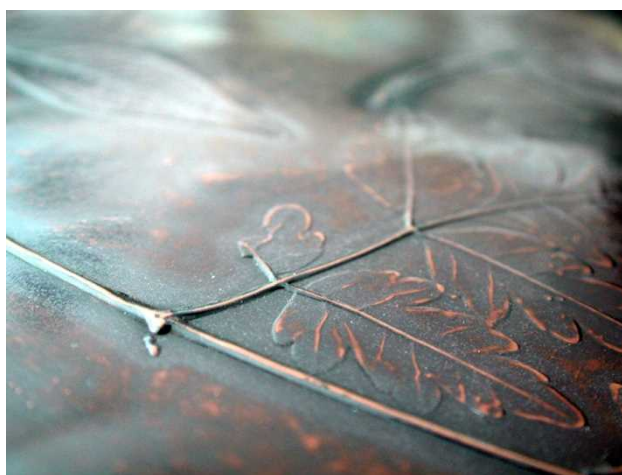
Research Contents

The instantaneous high pressure, that is, the shock wave divides into the penetration wave and the reflected wave on the surface of the density difference. The shock wave divides into the penetration wave and the reflected wave at the surface of the density difference. The reflected wave caused on a high density side brings the pull stress from negative pressure. Because this high-speed destruction phenomenon, it is expected the non-thermal sterilization, food processing, extraction, and so on.

Shock wave molding technology called "the Explography" is a metal molding technology that uses high pressure generated by a supersonic speed shock wave for plastic processing. By using the Explography, it is possible to three-dimensionally form onto a material plate such as a plant which is difficult to use in static press processing. This molded article can be applied to a hands-on exhibition in a museum, a teaching material in a blind school.



Rice flour milled by instantaneous high-pressure



The metal plant specimen by shock wave molding

Available Facilities and Equipment

Rheometer, RE2-33005C (YAMADEN co.,ltd)	
Scanning Electron Microscope, JCM-6000 (JEOL Ltd.)	



Application of Okinawan microorganisms



Name	Toshiaki TANABE	E-mail	tanabe@okinawa-ct.ac.jp
Status	Associate Professor		
Affiliations	JSBBA, SBJ, JSMSB, JSCC, MSJ, and BSO		
Keywords	Chitin, Chitosan, White-rot fungi,		
Technical Support Skills	<ul style="list-style-type: none"> • Component analysis of biomass • Screening of bacteria or enzymes for bioremediation or bioconversion 		

Research Contents

Construction of Okinawan Soil library

The soil samples were collected from approximately 2,600 places including each remote island in Okinawa, and were constructed to the Okinawan soil library. Various kinds of microbes are isolating from this library. They have various bioactive substances and enzymes.

Construction of the soil microbe library

□The soil microbe library was constructed with each microbe group isolated from each soil sample. This library includes about 500 strains of bacteria utilizing alkane, 500 strains of siderophore-like material-producing bacteria, 1,700 strains of Actinomyces, 500 strains of Basidiomycetes.

Application of biologically active substances

□□Bioactive substance library□has been constructed from the extracts of the soil microbe. For example, siderophore is an iron chelating agent which microbe produce. It is thought that siderophore is able to apply for anticancer.

Application to bioremediation

The isolated bacteria utilizing alkane are able to use for cleaning of the soil polluted with oil. In addition, the white-rot fungi degrading high selectively lignin are able to remediate the soil polluted by dioxin or PCB.

Available Facilities and Equipment

Bioshaker G B-200(Taitec)	
Electrophoretic apparatus(GE Healthcare Japan)	

Biodiversity of Oribatid mites in Ryukyu Islands

Name Wataru HAGINO E-mail hagino@okinawa-ct.ac.jp

Status Assistant Professor

Affiliations The Acarological Society of Japan, The Japanese Society of Soil Zoology, Japanese Society of Systematic Zoology

Keywords Soil fauna, Oribatid mites, Biological indicator, Ecology, Taxonomy

Technical Support Skills

- Taxonomical study of Oribatid mites (Order Acari; suborder Oribatida).
- Development of the biological indicator used by soil organisms.
- Experience-based program on biodiversity of our familiar environment.



Research Contents

Oribatid mites (Fig. 1) are small arthropods that are also called beetle mites, armored mites, or moss mites. They comprise more than 10,000 species. Most oribatid mites inhabit the soil-litter system; often, they are the dominant arthropods in temperate-forest soil.

The ultimate goal of my research is to clarify the entire Japanese oribatid fauna. Toward this goal, I performed a series of taxonomic studies targeting the Oribatid fauna of subtropical regions in Japan (=Ryukyu Islands), by using morphological and molecular biological methods.



(Fig. 1) Various Oribatid mites in Japan.

Available Facilities and Equipment
