Graduate School of Integrated Sciences for Life

PROFESSORS 2021

HIROSHIMA UNIVERSITY

Striving to become a leading global center of educational and research excellence

Message from the Dean

In April 2019, as Japan embarked on the new era of Reiwa, Hiroshima University launched the Graduate School of Integrated Sciences for Life, with the aim of cultivating human resources capable of seeing the larger picture, thinking outside the box, and contributing to society through the ever-changing and evolving field of biology/life science. The world of life sciences has recently undergone revolutionary changes. For instance, advances in basic research have enabled the genes of organisms to be analyzed as sequences of nucleic acids, a universal feature of living things. RNA is central to cell biology, carrying out a variety of important functions, including the production of proteins such as enzymes, in addition to various regulatory functions. New aspects of DNA and RNA are revealed every year.

Advances in knowledge achieved through basic research can develop over time into applied research, which are founded on constant efforts to pursue new fundamental understanding across disciplines. It is therefore essential to promote interdisciplinary approaches that are not bound by conventional frameworks. The Graduate School of Integrated Sciences for Life offers an integrated course of study that combines seven degree programs-biotechnology, food and agrilife science, bioresource science, life and environmental sciences, basic biology, mathematical and life sciences, and biomedical science-so that today's students, who will be major players in the next generation, can acquire broader knowledge and skills in various science fields, rather than just a specific field of expertise. This is accomplished by having students organically learn biology and life sciences, which are usually fragmented in science, engineering, agricultural science, and medical science.

The Graduate School of Integrated Sciences for Life is also designed to promote coordination with the newly established Graduate School of Biomedical and Health Sciences in the area of medical sciences, and facilitates communication with the humanities and social sciences as well. Our hope and intention is to help young people learn to play leadership roles in new and multidisciplinary research fields, aiming to create a brighter and more sustainable future.

Dean, Graduate School of Integrated Sciences for Life
NISHIMURA Yoshifumi

CONTENTS

Program of Biotechnology

AKI Tsunehiro Professor

We are conducting research aimed at genome breeding of microorganisms that produce useful fats and oils and their application to the fields of health foods, health care materials, cosmetics, pharmaceuticals, chemicals, and bioenergy.

keywords: Biorefinery, Biomass, Carbon recycle, Enzyme, Lipid, Microorganism

1. Improvement of fatty acid productivity of thraustochytrid, *Aurantiochytrium* sp. by genome editing. J. Biosci. Bioeng., 131, 373-380 (2021)
2. Metabolite profile analysis of *Aurantiochytrium limacinum* SR21 grown on acetate-based medium for lipid fermentation. J. Oleo Sci., 68, 541-549 (2019)
3. Isolation of high carotenoid-producing *Aurantiochytrium* sp. mutants and improvement of astaxanthin productivity using metabolic information. J. Oleo Sci., 67, 571-578 (2018)

OKAMURA Yoshiko Professor

We have focused on the diversity and high functionality of marine bacteria, and developed innovative gene detection and gene synthesis technologies in order to utilize their useful genes. In addition, we have studied on metal mineralization, production of biopolymers and chemical building blocks using wastewater and biomass through bioconversion process.

keywords: marine bacteria, RHa-RCA, gene synthesis technology, metal mineralization, biopolymers, chemical building blocks

1. Direct detection of mRNA expression in microbial cells by fluorescence in situ hybridization using RNase H-assisted rolling circle amplification., Sci. Rep.,10: 9588 (2020)
2. Discovery of a novel gene conferring tellurite tolerance through tellurite reduction to Escherichia coli transformant in marine sediment metagenomic library., Mar. Biotechnol., 21:762-772 (2019)
3. Complete genome sequence of *Nitratireductor* sp. strain OM-1: A lipid-producing bacterium with potential use in wastewater treatment., Biotechnol. Rep., 24: e00366 (2019)

KATOU Junichi Professor

I am interested in superior biofunctions and their application to environmental biotechnology and bioproduction of value-added chemicals. I am paying special attention to molecular recognition mechanism of environmental bacteria and its application to establishment of sustainable agriculture.

keywords: environmental biotechnology, applied microbiology, microbe-plant interaction, bioproduction

1. Characterization of methyl-accepting chemotaxis proteins (MCPs) for amino acids in plant-growth-promoting rhizobacterium *Pseudomonas protegens* CHA0 and enhancement of amino acid chemotaxis by MCP genes overexpression. Biosci. Biotechnol. Biochem. 84:1948-1957 (2020).
2. Identification of boric acid as a novel chemoattractant and elucidation of its chemoreceptor in *Ralstonia pseudosolanacearum* Ps29. Sci. Rep. 7:8609 (2017).
3. Identification of the *mcpA* and *mcpM* Genes, Encoding Methyl-Accepting Proteins Involved in Amino Acid and l-Malate Chemotaxis, and Involvement of McpM-Mediated Chemotaxis in Plant Infection by *Ralstonia pseudosolanacearum* (Formerly *Ralstonia solanacearum* Phylotypes I and III). Appl. Environ. Microbiol. 81:7420-7430 (2015).

KAWAMOTO Seiji Professor

My lab focuses on healthcare biotechnology. Ongoing projects are: 1) Immune regulation of age-related disorders, 2) Development of diagnostics and immunotherapeutics for allergy, and 3) Prevention of proinflammatory disorders by food factors.

keywords: allergy, food factors, healthcare biotechnology, immunology

1. Influences of maternal factors over offspring allergies and the application for food allergy. *Front. Immunol*. 10, 1933 (2019)
2. Der f 35: an MD-2-like house dust mite allergen that cross-reacts with Der f 2 and Pso o 2. *Allergy* 72, 1728 (2017)
3. Der f 34, a novel major house dust mite allergen belonging to a highly conserved Rid/YjgF/YER057c/UK114 family of imine deaminases. *J. Biol. Chem.* 291, 21607 (2016)

KURODA Akio Professor

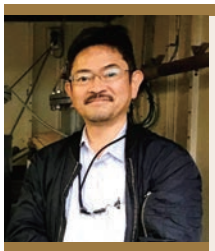
Creation of new proteins/peptides that bind to inorganic/organic surfaces by evolutionary molecular engineering. For example, we created an asbestos-binding protein and applied it to asbestos detection (biosensing) in environments. We also created a membrane-binding peptide in order to isolate extracellular membrane vesicle (exosome, microvesicles).

keywords: Protein engineering, Evolutionary molecular engineering, Inorganic/organic surfaces, Biosensing, Asbestos, Exosome, Microvesicles

1.Application of peptides with an affinity for phospholipid membranes during the automated purification of extracellular vesicles, Sci. Rep., 10, 18718 (2020)

2.Live-cell imaging of macrophage phagocytosis of asbestos fibers under fluorescence microscopy, Genes Env., 41, 14-25 (2019)

3.Rapid on-site detection of airborne asbestos fibers and potentially hazardous nanomaterials using fluorescence microscopy-based biosensing, Biotechnol J. 11, 757-767 (2016)



NAKASHIMADA Yutaka Professor

Aiming to realize a carbon recycling society, we make research plans based on life cycle assessment and developing several biorefinery processes using biomass, renewable energy and carbon dioxide.

keywords: carbon recycling society, biorefinery, renewable energy

1.Thermophilic ethanol fermentation from lignocellulose hydrolysate by genetically engineered *Moorella thermoacetica*/Bioresour. Technol./2017

2.Semi-continuous methane production from undiluted brown algae using a halophilic marine microbial community/Bioresour. Technol./2016

3.Improved methane fermentation of chicken manure via ammonia removal by biogas recycle/Bioresour. Technol./2010

MIZUNUMA Masaki Professor

Using model organisms (yeast and nematode), we are elucidating the mechanism of lifespan. In particular, we focus on the prevention of aging and healthy longevity by metabolites, and aim to apply them not only to medicine but also to the food field.

keywords: S. cerevisiae, C. elegans, aging, lifespan

1.Stimulating *S*-adenosyl-l-methionine synthesis extends lifespan via activation of AMPK. Proc. Natl. Acad. Sci. USA (2016)

2.mTORC2-SGK-1 acts in two environmentally responsive pathways with opposing effects on longevity. Aging Cell (2014)

3.Role of calcineurin and Mpk1 in regulating the onset of mitosis in budding yeast. Nature (1998)

AOI Yoshiteru Associate Professor

Most microorganisms in nature are not readily cultivable in the laboratory. This is the biggest impediment for understanding and application of environmental microorganisms. My research focuses on 1) innovations for microbial cultivation, 2) cultivation of uncultivated microorganisms, and 3) puzzling out the mechanism for "microbial uncultivability" of environmental microorganisms.

keywords: uncultivable microorganisms, isolation, microbial dormancy, growth controling network

1.Isolation of sublineage I Nitrospira by a novel cultivation strategy/Environ. Microbiol./2014

2.In Situ Cultivation Allows for Recovery of Bacterial Types Competitive in Their Natural Environment/Microb. Environ./2016

3.Isolation of Microorganisms Using Sub-Micrometer Constrictions/PLOS One/ 2014

ARAKAWA Kenji Associate Professor

Actinobacteria produces a wide variety of valuable secondary metabolites including antibiotics. Our group focuses on creation of novel bioactive compounds through genetic engineering of their biosynthetic and regulatory genes, using biochemistry, organic chemistry, and molecular biology.

keywords: Biosynthesis, Regulatory gene, Secondary metabolite, Antibiotic, Actinobacteria

1.Functional analysis of P450 monooxygenase SrrO in the biosynthesis of butenolide-type signaling molecules in *Streptomyces rochei*. Biomolecules, 10, 1237 (2020).

2.SrrB, a pseudo-receptor protein, acts as a negative regulator for lankacidin and lankamycin production in *Streptomyces rochei*. Front. Microbiol., 11, 1089 (2020).

3.The genome sequence of *Streptomyces rochei* 7434AN4, which carries a linear chromosome and three characteristic linear plasmids. Sci. Rep., 9, 10973 (2019).

IKEDA Takeshi Associate Professor

My current research focuses on bacterial biosilicification (silica biomineralization), the biological process through which soluble silicic acid, $Si(OH)_4$, is polymerized intracellularly and deposited as insoluble silica, SiO_2. I am also working for the development of new biomaterials by integrating biomolecules with silicon-based materials (including semiconductor devices).

keywords: biosilicification, biomaterial fabrication, silica

1.Arginine-mediated dissociation of single cells and cell sheets from a polystyrene culture dish. Biosci Biotechnol Biochem 83: 2272-2275. (2019)

2.Application of volcanic ash particles for protein affinity purification with a minimized silica-binding tag. J Biosci Bioeng 122: 633-638 (2016)

3.The C-terminal zwitterionic sequence of CotB1 is essential for biosilicification of the *Bacillus cereus* spore coat. J Bacteriol 198: 276-282 (2016)

KITAMURA Kenji Associate Professor

We investigate how amino acids and oligopeptides regulate physiological function of yeast cells; 1) regulation of amino acid/peptide transporter expression, 2) exploration of novel substrate of transporters, 3) unidentified physiological action of amino acids/dipeptides (e.g. growth inhibition) and its mechanism.

keywords: yeast, amino acid, oligopeptide, transporter, growth inhibtion

1.Critical role of the proton-dependent oligopeptide transporter (POT) in the cellular uptake of the peptidyl nucleoside antibiotic, blasticidin S. Biochim Biophys Acta Mol Cell Res 1864: 393 (2017)

2.Identification of ubiquitin-proteasome system components affecting the degradation of the transcription factor Pap1. Redox Biol 28: 101305 (2020)

3.Inhibition of the Arg/N-end rule pathway-mediated proteolysis by dipeptide-mimetic molecules. Amino Acids 48: 235 (2016)

TAJIMA Takahisa Associate Professor

My research interest is biological conversion using various kinds of enzymes. We have developed psychrophile-based simple biocatalysts (PSCats) to conduct efficient conversion processes. PSCats can produce the valuable target compounds with high yields only by their biosynthetic thermostable enzymes, which are heterologously expressed in psychrophilic cells whose metabolism is suppressed by heat treatment.

keywords: Biocatalysis, Heat treatment, Psychrophilic bacteria, Valuable chemicals

1.Accelerating itaconic acid production by increasing membrane permeability of whole-cell biocatalyst based on a psychrophilic bacterium *Shewanella livingstonensis* Ac10, J Biotechnol, 312:56-62 (2020)

2.Efficient production of 1,3-propanediol by psychrophile-based simple biocatalysts in *Shewanella livingstonensis* Ac10 and *Shewanella frigidimarina* DSM 12253, J Biotechnol, 323:293-301 (2020)

3.Efficient aspartic acid production by a psychrophile-based simple biocatalyst, J Ind Microbiol Biotechnol, 42:1319-1324 (2015)

NAKANO Miyako Associate Professor

Glycosylation, which is one of the posttranslational modifications of proteins, is involved in infection by pathogens such as bacteria and viruses, cancer and acquisition of drug-resistance. We investigate these biological mechanisms with detailed analysis of glycan structures by mass spectrometry.

keywords: glycan, mass spectromery, biomarker

1.Ceramide chain length-dependent protein sorting into selective endoplasmic reticulum exit sites. Science Adv. 6(50):eaba8237 (2020)

2.The SH3 domain in the fucosyltransferase FUT8 controls FUT8 activity and localization and is essential for core fucosylation. J Biol Chem. 295(23):7992-8004 (2020)

3.NIST Interlaboratory Study on Glycosylation Analysis of Monoclonal Antibodies: Comparison of Results from Diverse Analytical Methods. Mol Cell Proteomics. 19(1):11-30 (2020)

HIROTA Ryuichi Associate Professor

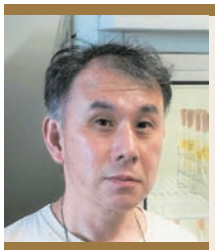
We are interested in the phosphorus metabolism of microorganisms and their contribution to global phosphorus cycling in terrestrial and aquatic environments. Based on the obtained knowledge in combination with synthetic biology, we are developing novel environmental biotechnologies for phosphorous resource management and bacterial cell growth control for biosafety measures.

keywords: phosphate, phosphorous cycling, bacteria, cyanobacteria, environmental biotechnology, synthetic biology, biosafety

1.Synthetic phosphorus metabolic pathway for biosafety and contamination management of cyanobacterial cultivation. ACS Synth. Biol. 7(9): 2189-2198 (2018)

2.A novel biocontainment strategy makes bacterial growth and survival dependent on phosphite. Sci. Rep. 7:44748 (2017)

3.Bacterial phosphate metabolism and its application to phosphorus recovery and industrial bioprocesses. J. Biosci. Bioeng. 109:423-432 (2010)



FUJIE Makoto Associate Professor

We are studying the interaction of microorganisms, such as bacteria and phages, with plants, with the aim of applying them to disease control. We are also developing genome editing technology for algae to produce useful substances, such as biodiesel or EPA.

keywords: algae, microorgnisms, biodiesel, genome-editing

1.Zepp, a LINE-like retrotransposon accumulated in the Chlorella telomeric region. EMBO J. 16:3715-3723. (1997)

2.The involvement of a cysteine proteinase in the nodule development in Chinese milk vetch infected with Mesorhizobium huakuii subsp. rengei. Plant Physiology.124: 1087-1095. (2000)

3.Monitoring growth and movement of Ralstonia solanacearum cells harboring plasmid pRSS12 derived from bacteriophage ϕRSS1. J. Biosci. Bioeng., 109. 153 – 158. (2010).

FUNABASHI Hisakage Associate Professor

Our research focuses on the utilization of biomolecules and living cells as functional materials to create biodevices. We are developing novel functional molecules such as biosensing molecules with proteins or nucleic acids. We are also exploring new methods to create, evaluate, and manipulate functional living cells.

keywords: Biodevices, Biosensensing molecules, Cellular devices

1.Insulin sensor cells for the analysis of insulin secretion responses in single living pancreatic β cells, Analyst, 144, 3765-3772, 2019

2.Continuous monitoring of specific mRNA expression responses with a FRET-based DNA nano-tweezer technique that does not require gene recombination, Analytical Chemistry, 88, 7894-7898, 2016

3.A split G-quadruplex-based DNA nano-tweezers structure as a signal-transducing molecule for the homogeneous detection of specific nucleic acids, Biosensors & Bioelectronics, 74, 222-226, 2015

ISHIDA Takenori Associate Professor or Lecturer

My research connects biotechnology and different fields using biomolecules that interact with the surface of inorganic (asbestos) or organic (lipid bilayer). Recently, we are developing peptides that bind to the lipid bilayer of exosomes, which has the potential to be used in regenerative medicine, and applied it to exosome purification.

keywords: Peptides, Binding peptides, Asbestos, Exosome

1.Application of peptides with an affinity for phospholipid membranes during the automated purification of extracellular vesicles. Sci Rep . 10:18718 (2020)

2.Live-cell imaging of macrophage phagocytosis of asbestos fibers under fluorescence microscopy. Genes Environ. 41:14 (2019)

3.Rapid on-site detection of airborne asbestos fibers and potentially hazardous nanomaterials using fluorescence microscopy-based biosensing. Biotechnol J . 11:757 (2016)

KATO Setsu Assistant Professor

How do microbial cells maintain cellular homeostasis for proliferation? Which kind of processes do they go through when they die? We aim to clarify the boundary of life and death and find the principles of life. These findings will help us to create useful host cells for bioprocess.

keywords: Microbial cells, single-cell observation

1.A constant size extension drives bacterial cell size homeostasis., Cell, 159: 1433-1446, 2014

2.Spatial self-organization resolves conflicts between individuality and collective migration., Nat Commun., 9:2177, 2018

3.Cyclic di-GMP differentially tunes a bacterial flagellar motor through a novel class of CheY-like regulators., eLife, 6: e28842, 2017

KAWASAKI Takeru Assistant Professor

Focusing on the interaction between phytopathogenic bacterial phages and algae viruses and their hosts, we are conducting research aimed at constructing a system for diagnosing, preventing, and controlling plant diseases and producing substances by algae. We are paying particular attention to giant phages and viruses.

keywords: Phage, Virus, Phytopathogen, giant phage

1.Systemic method to isolate large bacteriophages for use in biocontrol of a wide-range of pathogenic bacteria. J Biosci Bioeng. 127:73-78 (2019)

2.Xanthomonas citri jumbo phage XacN1 exhibits a wide host range and high complement of tRNA genes. Sci Rep.14;8:4486. (2018)

3.Cryo-electron microscopy 3D structure of the jumbo phage RSL1 infecting the phytopathogen Ralstonia solanacearum Structure 21:298-305 (2013)

HIDA Akiko Assistant Professor

Studies on mechanism of chemical recognition involved in directional motility of environmental bacteria and its roles in biological interactions such as infection and symbiosis, and its applications to biotechnology.

keywords: bacteria, motility, plant pathogen

1.Chemotactic disruption as a method to control bacterial wilt caused by *Ralstonia pseudosolanacearum*. Biosci Biotech Biochem (2020)
2.Identification of boric acid as a novel chemoattractant and elucidation of its chemoreceptor in *Ralstonia pseudosolanacearum* Ps29. Sci Rep (2017)
3.Identification of the *mcpA* and *mcpM* genes, encoding methyl-accepting proteins involved in amino acid and L-malate chemotaxis, and involvement of McpM-mediated chemotaxis in plant infection by *Ralstonia pseudosolanacearum* (formerly *Ralstonia solanacearum* phylotype I and III). App Environ Microbiol (2015)

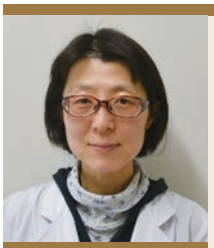
National Research Institute of Brewing

AKAO Takeshi Visiting Professor

We study about industrial yeast for sake and shochu making, based on applied genomics and genetics. For the purpose of characteristic evaluation, property predition, and maintenance of the strains, we advance phylogenetic study, molecular biology of fermentation, stress responses and flavor compound, as well as development of genetic mapping systems.

keywords: sake yeast, genomics, genetics, brewing characteristics

1.Development of sake yeast haploid set with diverse brewing properties using sake yeast strain Hiroshima no. 6 exhibiting sexual reproduction/J. Biosci. Bioeng./2020
2.A loss-of-function mutation in the PAS kinase Rim15p is related to defective quiescence entry and high fermentation rates in Saccharomyces cerevisiae sake yeast strains/Appl. Environ. Microbiol./2012
3.Whole-genome sequencing of sake yeast Saccharomyces cerevisiae Kyokai no. 7/DNA Res./2011



National Research Institute of Brewing

ISOGAI Atsuko Visiting Professor

The main research theme is aroma of alcoholic beverages. We try to clarify the components responsible for the aroma of Japanese sake and Shochu, elucidate their formation mechanism, and develop the techniques for controlling them.

keywords: Sake, Shochu, Aroma

1.Construction of sake yeast with low production of dimethyl trisulfide (DMTS) precursor by a self-cloning method, J. Biosci. Bioeng., 2018
2.Study for practical application of supported gold nanoparticles for removal of DMTS responsible for hineka in sake, J. Brew. Soc. Jpn. (2019)
3.Aroma Compounds responsible for the "spicy/4VG" character of sake submitted to Sake Contests, J. Brew. Soc. Jpn. (2016)

National Research Institute of Brewing

IWASHITA Kazuhiro Visiting Professor

The essence of brewing study is to challenge to the complicate human sensory and perception. All studies about raw materials, Koji-fungi, yeast, chemistry of sake, and human sensitivity are required. We explore this deep world using genomics and metabolomics, with the support of artificial intelligence.

keywords: Taste, Brewing science, Genomics, metabolomics, artificial intelligence

1.Investigation of relationship between sake-making parameters and sake metabolites using a newly developed sake metabolome analysis method/ J. Biosci. Bioeng./2019
2.Effect of koji starter on metabolites in Japanese alcoholic beverage sake made from the sake rice Koshitanrei/ Biosci. Biotechnol. Biochem./2020
3.Analysis of metabolites in Japanese alcoholic beverage sake made from the sake rice Koshitanrei/Biosci. Biotechnol. Biochem./2019

National Institute of Advanced Industrial Science and Technology

KITAMOTO Dai Visiting Professor

We are focusing on the development of functional chemicals using renewable resources. Especially, we are promoting the microbial production of bio-based surfactants and their application in daily necessities and cosmetics.

keywords: Bio-based chemicals, biosurfactant, biopolymer, fermentation process, yeast, cosmetics

1.Mannosylerythritol lipids: Production and Applications, J. Oleo Sci., 64, 133 (2015)

National Institute of Advanced Industrial Science and Technology

FUJII Tatsuya Visiting Associate Professor

To use filamentous fungi and yeasts effectively, we aim to reveal the mechanisms of their various phenotypes such as high-productivity of useful materials and high stress tolerance.

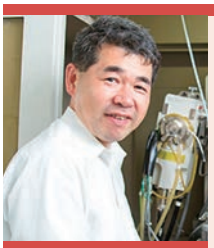
keywords: filamentous fungus, yeast, renewable resources

1.The Putative Transcription Factor Gene thaB Regulates Cellulase and Xylanase Production at the Enzymatic and Transcriptional Level in the Fungus *Talaromyces cellulolyticus*. Appl Biochem Biotechnol. (2020)

2.Identification and characterization of a GH30-7 endoxylanase C from the filamentous fungus *Talaromyces cellulolyticus*. Appl Environ Microbiol. (2019)

3.Short-chain ketone production by engineered polyketide synthases in *Streptomyces albus*. Nat Commun. (2018)

Program of Food and AgriLife Science



UENO Satoru Professor

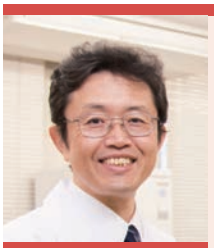
Clarification of crystallization and crystal structure for edible solid fats such as chocolate and margarine, and emulsion system such as mayonnaise. We are also studying the relationship between these crystallization and/or crystal structure and deliciousness of edible solid fats.

keywords: crystallization, triacylglycerol, ultrasound stimulation, fats, polymorphic crystallization, crystallization, W/O)", winter adaptation, triacylglycerol

1.Synchrotron radiation microbeam X-ray analysis of microstructures and the polymorphic transformation of spherulite crystals of trilaurin/ Cryst. Growth Design/2008

2.In-situ studies of ultrasound-stimulated fat crystallisation using synchrotron radiation/J. Phys. Chem. B/2003

3.Fat Bloom Caused by Partial De-Oiling on Chocolate Surfaces after High-Temperature Exposure/J. Am. Oil Chem. Soc./2021



OHTA Shinji Professor

My research is to elucidate the structure and function of biologically active compounds derived from marine organisms, plants, and insects. I am aiming to develop new anti-cancer agents, therapeutic agents for intractable neurodegenerative diseases, and drug lead compounds that can be candidates for diabetes improving agents.

keywords: marine sponge, plant, insect, biologically active compound

1.Asaroidoxazines from the roots of Asarum asaroides induce apoptosis in human neuroblastoma cells. J. Nat. Prod., 83, 3050 (2020)

2.Rare sulfated purine alkaloid glycosides from Bruchidius dorsalis pupal case. Phytochemistry Lett., 35, 10 (2020)

3.Norbisabolane and bisabolane sesquiterpenoids from the seeds of Angelica keiskei. Phytochemistry Lett., 33, 94 (2019)

KAWAI Kiyoshi Professor

To improve and control food processing, preservation, and texture, thermal and rheological property changes (crystallization, melting, glass to rubber transition, and complex formation) of foods and biomaterials are investigated. For example, frozen foods, freeze-dried foods, starch and starchy foods, powders, and lactic acid bacteria are employed as the samples.

keywords: Food processing, Preservation, Texture, Thermal property, Rheological property

1.Effect of sugar composition on the water sorption and softening properties of cookie. Food Chem, 145, 772-776: 2014.

2.Effect of stepwise baking without starch melting on the macroscopic structure, browning, texture, and in vitro starch digestibility of cookie. Food Sci Technol, 66: 384-389, 2016.

3.Effect of glass transition on the hardness of a thermally compressed soup solid. J Food Eng, 247: 38-44, 2019.

SAMBONGI Yoshihiro Professor

Clarifying the structure and function of proteins required for microbial energy metabolism, thereby learning the mechanism for organisms to live. Also focusing on the fermentation process as a form of energy metabolism, hoping to leverage basic findings in the food industry.

keywords: Energy metabolism protein, Fermentation

1.Expression of two glutamate decarboxylase genes in Lactobacillus brevis. Biosci Biotech Biochem 84:1069-1072. (2020)

2.Response of neutrophilic Shewanella violacea to acid stress: Growth rate, organic acid production, and gene expression. Extremophiles 23:319-326. (2019)

3.Stability of cytochromes c' from psychrophilic and piezophilic Shewanella species: Implications for complex multiple adaptation to low temperature and high hydrostatic pressure. Extremophiles 23:239-248. (2019)

SHIMADA Masayuki Professor

Concurrent post : Bioresource Science

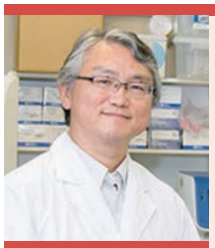
My special field is the reproductive biology to clear the testis and ovarian function from the viewpoints from molecular biology and molecular endocrinology. I' m doing the translational study from the basic research to be contributed for the infertility care and animal reproductive technology.

keywords: Reproductive aging, Senescent cell, Epigenetic regulation, Fibrosis, Metabolomic activity

1.ERK1/2 in ovarian granulosa cells are critical for female fertility. Science, 324; 938-941. (2009)

2.Activation of Toll-like receptor 7/8 encoded by the X chromosome alters sperm motility and provides a novel simple technology for sexing sperm. PLoS Biol 17:e3000398. (2019)

3.A simple sperm-sexing method that activates TLR7/8 on X sperm for the efficient production of sexed mouse or cattle embryos. Nat Protoc 15:2645-2667. (2020)



SHIMAMOTO Tadashi Professor

From the viewpoint of food safety, we are conducting research on the analysis of virulence-related genes of foodborne pathogenic bacteria such as Vibrio spp. and the mechanism of inter-bacterial transmission of antimicrobial resistance genes via mobile genetic elements, as well as the development of norovirus inactivation methods and anti-noroviral disinfectants.

keywords: foodborne pathogenic bacteria, virulence-related genes, antimicrobial resistance genes, mobile genetic elements, norovirus

1.First report of foodborne *Klebsiella pneumoniae* coharboring bla_{VIM-1}, bla_{NDM-1}, and *mcr-9*. Antimicrob. Agents Chemother. 64:e00882-20. (2020)

2.Antiviral effects of persimmon extract on human norovirus and its surrogate, bacteriophage MS2. J. Food Sci. 79:M941-M946. (2014)

3.A novel retron of *Vibrio parahaemolyticus* is closely related to retron-Vc95 of *Vibrio cholerae*. J. Microbiol. 51:323-328. (2013)

SUZUKI Takuya Professor

Defects in the intestinal barrier increase the penetration of luminal inflammatory molecules into the intestinal mucosa and are closely associated with both intestinal and extra-intestinal diseases. Our research group investigates the roles of food factors and nutrients in regulation of intestinal barrier and inflammation and explores their therapeutic potentials.

keywords: Dietary fibers, Polyphenols, Intestinal barrier, Microbiota, Tight junction

1.Bioactive factors secreted by Bifidobacterium breve B-3 enhance barrier function in human intestinal Caco-2 cells. Benef Microbes 10: 89 (2019)

2.Exopolysaccharides from Leuconostoc mesenteroides attenuate chronic kidney disease in mice by protecting the intestinal barrier. J Functional Foods 52: 276 (2019)

3.Dietary Fermentable Fibers Attenuate Chronic Kidney Disease in Mice by Protecting the Intestinal Barrier. J Nutr 148: 552(2018)

NAKAE Susumu Professor

Based on the search results for genes involved in acute and chronic inflammatory diseases such as allergy and autoimmunity, our purpose is to elucidate how those genes are involved in the development of such diseases using the mouse models.

keywords: immunology, allergy, autoimmunity, mouse disease model, cytokine

1.IL-25 exacerbates autoimmune aortitis in IL-1 receptor antagonist-deficient mice. Sci Rep. 9:17067 (2019)

2.IL-25 enhances TH17 cell-mediated contact dermatitis by promoting IL-1β production by dermal dendritic cells. J Allergy Clin Immunol. 142:1500-1509 (2018)

3.An Interleukin-33-Mast Cell-Interleukin-2 Axis Suppresses Papain-Induced Allergic Inflammation by Promoting Regulatory T Cell Numbers. Immunity. 43:175-186 (2015)

NAGANUMA Takeshi Professor

The Applied Environmental Life Science Lab investigates characteristics of lives in extreme environments such as deep sea, deep subsurface, volcanoes and Antarctica as well as in non-extreme environments, and seeks their applicability directions. Possibilities of extraterrestrial lives and human habitations in outer space are also studied.

keywords: Extreme environment, Extraterrestrial life

1.Enhanced bacterial growth and gene expression of D-amino acid dehydrogenase with D-glutamate as the sole carbon source. Front. Microbiol. 9, 2097 (2018)

2.*Oligoflexus tunisiensis* gen. nov., sp. nov., a Gram-negative, aerobic, filamentous bacterium of a novel proteobacterial lineage, and description of *Oligoflexaceae* fam. nov., *Oligoflexales* ord. nov. and *Oligoflexia* classis nov. Intl. J. Syst. Evol. Microbiol. 64, 3353-3359 (2015)

3.Phylotype diversity of deep-sea hydrothermal vent prokaryotes trapped by 0.2- and 0.1-μm-pore-size filters. Extremophiles 11, 637-646 (2007)

NISHIBORI Masahide Professor

Our goals are to cralify the history of origin and transmission of livestock (camels, pigs, chickens, etc.) in the world based on genomic DNA information, to clarify genetic diversity of those animals, and genetically elucidate animal ecology through metagenomics and environmental DNA analysis.

keywords: genomic DNA, genetic diversity, metagenomics, livestock

1.Unraveling the history of the genus *Gallus* through whole genome sequencing. Mol Phylogenet Evol, 2020.107044 (2021)

2.The complete mitochondrial genome of the Japanese rock ptarmigan (Lagopus muta japonica Clark, 1907). Mitochondrial DNA Part B, 5:1648-1649. (2020)

3.Phylogenetic Studies on Red Junglefowl (*Gallus gallus*) and Native Chicken (*Gallus gallus domesticus*) in Samar Island, Philippines using the Mitochondrial DNA D-Loop Region. J Poult Sci, 56:237-244. (2019)

HAGURA Yoshio Professor

Both basic and applied research in the Food Engineering is conducted. Particularly, we focus on the following main topics: Measurement of the food manufacturing process using electrical properties, Measurement and evaluation of mechanical properties of foods, including texture, and Mechanical processing of food using low-temperature mechanical properties (e.g., cryo-cutting, cryo-shattering).

keywords: food manufacturing process, electrical properties, mechanical properties, texture, mechanical processing of food, low-temperature

1.Nondestructive determination of the rheological properties of liquid food in sealed retort pouches. J. Food Process Preserv, 42: e13651. (2018)

2.Estimation of Hardness of Cooked Rice during Retort Sterilization by Electric Impedance Measurement. Journal of The Japanese Society for Food Science and Technology,66:469 (2019)

3.Influence of physical properties on the taste and flavor of strawberry jam. J Texture Stud, e12582. (2021)

HOSONO Kenji Professor

I study food value chain and develop methods of securing sustainable food and resource, from the viewpoint of Socio-economic Agricultural Science. I have studied the structure and mechanism of food value chain, and developed the strategies of food marketing and rural promotion.

keywords: food value chain, food marketing, agricultural structure and mechanism, rural promotion

1.Competitive Advantage Factors in Vertically Diversified Brand Chicken Business: A Partial Value Chain Analysis of a Japanese Poultry Wholesaler, Japan Agricultural Research Quarterly, 54: 327-333. (2020)

2.Constructing the Value Chain for Promotion of Lemon Production in Hiroshima Prefecture, Japan, Agricultural Marketing Journal of Japan, 27: 46-53. (2018)

3.Existence Conditions of Rural Community Business, Journal of Rural Economics, 91: 23-28. (2019)

HORIUCHI Hiroyuki Professor

Basic research area: Avian stem cell biology, Avian immunobiology, Avian embryogenesis. Applied research area: Production of genetic-modified and genome editing domestic poultry. Study on elucidation of sex determination in chickens, highly pathogenic avian influenza (HPAIV), and development of useful chicken and/or mouse monoclonal antibodies (mAbs).

keywords: genome editing, sex determination, HPAIV, mAbs

1.Prion protein signaling induces M2 macrophage polarization and protects from lethal influenza infection in mice. PLOS Pathog. 1008823 (2020)

2.An improved protocol for stable and efficient culturing of chicken primordial germ cells using small-molecule inhibitors. Cytotechnology 72:397-405 (2020)

3.Comparison of sex determination mechanism of germ cells between birds and fish: Cloning and expression analyses of chicken forkhead box L3-like gene. Dev. Dyn. 248:826-836 (2019)

YANAKA Noriyuki Professor

A number of people who have obesity, diabetes, and cancers has been increasing with westernization of meal, and it has become a big social problem. We are trying to elucidate nutrients and food factors preventing these illnesses at molecular and genetic levels by using new gene knockout mice.

keywords: food, nutrients, obesity, diabetes

1.The serum amyloid A3 promoter-driven luciferase reporter mice is a valuable tool to image early renal fibrosis development and shows the therapeutic effect of glucosyl-hesperidin treatment. Sci. Rep. 9:14101. (2019)

2.Serum amyloid A3 gene expression in adipocytes is an indicator of the interaction with macrophages. Sci. Rep. 6:38697. (2016)

3.New members of the mammalian glycerophosphodiester phosphodiesterase family: GDE4 and GDE7 produce lysophosphatidic acid by lysophospholipase D activity. J. Biol. Chem. 290:4260-4271. (2015)

OOMURA Hisashi Associate Professor

Chemical ecology is the interdisciplinary research field to understand the origin, function, and significance of natural products that mediate biological interactions in ecosystem. Using butterflies, I aim to discover bioactive compounds involved in their mating, oviposition, and defense against predation, and to apply these chemicals to crop protection.

keywords: Semiochemical, Pheromone, Allelochemical, Butterfly, Plant, Bioassay, Organic Chemistry, Behavior, Chemical sense, Evolution, Speciation, Chemotaxonomy

1.The male swallowtail butterfly, *Papilio polytes*, uses cuticular hydrocarbons for mate discrimination. Anim Behav 170:133-145.(2020)

2.A cyanogenic glucoside of Trifolium repens deters oviposition by the common grass yellow *Eurema mandarina*. Physiol Entomol 44:222-229.(2019)

3.The role of *N,N,N*-trimethylglycine in oviposition of *Eurema mandarina* on *Albizia julibrissin*. J Chem Ecol 45:371-377.(2019)

OKINAKA Yasushi Associate Professor

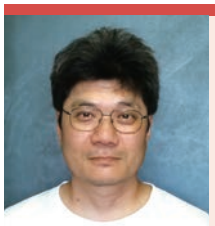
Fish diseases have caused significant economic losses to the global aquaculture industry. In order to develop a method to control fish diseases drastically, we are investigating host-pathogen interactions in molecular biological aspects.

keywords: fish diseases, host-pathogen interactions

1.Identification of RNA regions that determine temperature sensitivity in betanodaviruses. Arch. Virol. 155: 1597-1606.(2010)

2.Comparisons among the complete genomes of four betanodavirus genotypes. Dis. Aquat. Org. 80: 113-121.(2008)

3.Betanodavirus infection in the freshwater model fish medaka(*Oryzias latipes*). J. Gen. Virol. 87: 2333-2339.(2006)



KUNIYOSHI Hisato Associate Professor

I am interested in the metamorphosis from asexual stage (polyps) to sexual stage (jellyfish) in the life cycle of jellyfish, and I am studying the molecular mechanisms of metamorphosis in the moon jellyfish using techniques from organic chemistry and molecular biology.

keywords: jellyfish, metamorphosis, bioactive substances

1.Molecular characterization of aspartylglucosaminidase, a lysosomal hydrolase upregulated during strobilation in the moon jellyfish, Aurelia aurita./Biosci. Biotech. Biochem., 81, 938-950./2017

2.Indomethacin induction of metamorphosis from the asexual stage to sexual stage in the moon jellyfish, Aurelia aurita./Biosci. Biotech. Biochem., 76, 1397-1400./2012

3.Molecular cloning and expression profile of sex-specific genes, Figla and Dmrt1, in the protogynous hermaphroditic fish, Halichoeres poecilopterus./Zool. Sci., 29, 690-701./2012

KOIZUMI Haruhiko Associate Professor

Research on the improvement in the quality of protein crystals, which is important for elucidating biological functions and drug discovery, has been performed by applying an electric field and controlling the hydration structure. In future, this technique will also be applied to materials related to food, including pharmaceuticals.

keywords: Electric field, hydration structure, Crystal growth, Crystal quality

1.Improvement of Hen Egg White Lysozyme Crystal Quality by Control of Dehydration Process Cryst. Growth Des. 19: 5955.(2019)

2.Improvement of Crystal Quality for Tetragonal Hen Egg White Lysozyme Crystals under Application of an External Alternating Current Electric Field J. Appl. Cryst. 46: 25.(2013)

3.Control of Nucleation Rate for Tetragonal Hen-Egg White Lysozyme Crystals by Application of an Electric Field with Variable Frequencies Cryst. Growth Des. 9: 2420.(2009)

CHOMEI Yosuke Associate Professor

My research theme is about problems and issues from agricultural production to food consumption in agricultural and rural communities, mainly through fieldwork in Japan and overseas (China, Europe…etc.). My major specialty are agricultural management and agricultural economics. The main subjects of the survey are dairy farming and beef cattle farming.

keywords: Dairy management, Beef cattle management, Innovation, Fieldwork, Questionnaire survey

1.酪農経営の変化と食料・環境政策—中国内モンゴル自治区を対象として/養賢堂/2017

2.稲作法人経営における多角化戦略と経営革新/農林業問題研究/2018

3.牛肉の購買行動における消費者意識構造の把握—共分散構造分析を用いた解析—/農林業問題研究/2016

NAKAYAMA Tatsuya Associate Professor

We are conducting molecular epidemiological studies on food poisoning bacteria such as *Campylobacter* and *Bacillus cereus*, as well as studies on plasmid-mediated antibiotic-resistant bacteria in collaboration with overseas research institutes.

keywords: Food microbiology, Food hygine, Antibiotic resistant bacteria, Plasmid, Horizontal gene transfer

1.Water metagenomic analysis reveals low bacterial diversity and the presence of antimicrobial residues and resistance genes in a river containing wastewater from backyard aquacultures in the Mekong Delta, Vietnam. Environmental Pollution/ Environ Pollut /2017

2.Carriage of colistin-resistant, extended-spectrum beta-lactamase-producing Escherichia coli harboring the mcr-1 resistance gene after short-term international travel to Vietnam /Infect Drug Resist /2018

3.Quantification and long-term carriage study of human extended-spectrum/AmpC beta-lactamase-producing Escherichia coli after international travel to Vietnam /J Global Antimicro Resist /2019

FUNATO Kouichi Associate Professor

We are investigating the transport mechanisms that determine the subcellular localization of lipids and their roles in cellular functions at the molecular-genetic level. We are also developing applied researches for mass production of lipids using yeast as a host.

keywords: lipid, transport, cellular function, genetics, yeast, metabolic engineering

1.Tricalbins are required for nonvesicular ceramide transport at ER-Golgi contacts and modulate lipid droplet biogenesis. iScience, 23:101603 (2020)

2.Producing human ceramide-NS by metabolic engineering using yeast Saccharomyces cerevisiae. Sci. Rep., 5:16319 (2015)

3.Vesicular and nonvesicular transport of ceramide from ER to the Golgi apparatus in yeast. J. Cell Biol., 155:949 (2001)

KUMRUNGSEE Thanutchaporn Associate Professor

My research interests are in elucidation of food factors with potent preventive effects on lifestyle-related diseases and their mechanisms. Currently, I am interested in exploring roles of imidazole dipeptides in muscle regeneration and brain functions as well as focusing on regulation of GABA metabolism to prevent obesity.

keywords: skeletal muscle, muscle stem cells (satellite cells), muscle regeneration, functional foods, bioactive compounds, carnosine/Homocarnosine, obesity, GABA, vitamin B6

1.Dietary GABA and its combination with vigabatrin mimic calorie restriction and induce antiobesity-like effects in lean mice. Journal of Functional Foods 78:104367. (2021)

2.Dietary GABA induces endogenous synthesis of a novel imidazole peptide homocarnosine in mouse skeletal muscles. Amino Acids 52:743–753. (2020)

3.Novel metabolic disturbances in marginal vitamin B 6 -deficient rat heart. Journal of Nutritional Biochemistry 65:26–34. (2019)

HIRAYAMA Makoto Associate Professor or Lecturer

Research to elucidate the molecular basis of the unique glycan recognition of sugar-binding proteins "lectins" from algae and to develop them as pharmaceuticals (anticancer, antiviral, etc.), biochemical reagents (glycan/cell identification, tumor marker detection), and health food materials.

keywords: Lectin, alga, glycan, anticancer, antiviral, tumor marker, health food

1.A novel high-mannose specific lectin from the green alga *Halimeda renschii* exhibits a potent anti-influenza virus activity through high-affinity binding to the viral hemagglutinin. Mar Drugs 15: 255. (2017)

2.High-mannose specific lectin and its recombinants from a carrageenophyta *Kappaphycus alvarezii* represent a potent anti-HIV activity through high-affinity binding to the viral envelope glycoprotein gp120. Mar Biotechnol 18: 144-160. (2016)

3.High mannose-binding lectin with preference for the cluster of α1–2-mannose from the green alga *Boodlea coacta* Is a potent entry inhibitor of HIV-1 and Influenza viruses. J Biol Chem 286: 19446-19458. (2011)

FUJIKAWA Yukichi Associate Professor or Lecturer

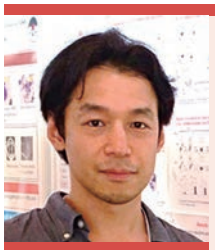
Plants have to compromise their yield potential for their tolerance towards environmental stress. To develop stress-tolerant/resistant plants with the level of their yield potential maintained or improved, we are conducting biochemical research on the expression and function of enzymes and proteins involved in plant stress.

keywords: biochemical research, environmental stress, enzymes, plant

1.Split luciferase complementation assay to detect regulated protein-protein interactions in rice protoplasts in a large-scale format./Rice/2014

2.Luminescence detection of SNARE–SNARE interaction in Arabidopsis protoplasts/Plant Mol. Biol./2010

3.Split luciferase complementation assay to study protein-protein interactions in Arabidopsis protoplasts/Plant J./2007



IKUTANI Masashi Assistant Professor

Our research team conducts research on immune cells, which are involved in allergic diseases including asthma and atopic dermatitis. To explore the causes of these immune-related diseases, we study dynamics of particular immune cells, such as ILC2 and eosinophil, as well as cytokines that regulate these cells.

keywords: Allergy, ILC2, Eosinophil, Cytokine

1.Elimination of eosinophils using anti-IL-5 receptor alpha antibodies effectively suppresses IL-33-mediated pulmonary arterial hypertrophy, Immunobiology, 223, 486-492 (2018)

2.Prolonged activation of IL-5-producing ILC2 causes pulmonary arterial hypertrophy, JCI Insight, 2, e90721 (2017)

3.Identification of Innate IL-5-Producing Cells and Their Role in Lung Eosinophil Regulation and Antitumor Immunity, J Immunol, 188, 703-713 (2012)

TANAKA Wakana Assistant Professor

I am interested in how plants elaborate their structures such as flowers and branches. My research objective is to elucidate the molecular and genetic mechanisms underlying the control of plant development.

keywords: Branch formation, Flower development, Meristem, Plant stem cells, Rice

1.Antagonistic action of *TILLERS ABSENT1* and *FLORAL ORGAN NUMBER2* regulates stem cell maintenance during axillary meristem development in rice/New Phytol., 225: 974-984/2020

2.Axillary meristem formation in rice requires the *WUSCHEL* ortholog *TILLERS ABSENT1*/Plant Cell, 27: 1173-1184/2015

3.The *YABBY* gene *TONGARI-BOUSHI1* is involved in lateral organ development and maintenance of meristem organization in the rice spikelet/Plant Cell, 24: 80-95/2012

TOMINAGA Jun Assistant Professor

If you are interested in the smart crop production, this is the right place! My lab focuses on photosynthesis for improved crop management and productivity, though I am very interested in the biology of photosynthesis. I also try to address questions involving the climate change, stress physiology, and sustainable agriculture.

keywords: Photosynthesis, Gas exchange, Phenomics, Physiological ecology of land plants/crops

1.Overexpression of BUNDLE SHEATH DEFECTIVE 2 improves the efficiency of photosynthesis and growth in Arabidopsis. Plant J 102: 129-137. (2020)

2.Direct measurement of intercellular CO2 concentration in a gas-exchange system resolves overestimation using the standard method. J Exp Bot 69: 1981-1991. (2018)

3.Cuticle affects calculations of internal CO2 in leaves closing their stomata. Plant Cell Physiol 56: 1900-1908. (2015)

FUJII Sotaro Assistant Professor

Nitric oxide (NO) has a positive side that functions as a signaling molecule in vivo, but it also has a negative side that is cytotoxic. In our laboratory, we are studying how microorganisms cope with and handle NO.

keywords: Microorganism, Nitrigen cycle, heme protein

1.Structural and functional insights into thermally stable cytochrome c' from a thermophile. Protein Sci 26:737-748. (2017)

MATSUZAKI Mei Assistant Professor

Our goal is to develop genetic modification technology using genome editing in birds, and to apply it to the pharmaceutical and food industries. In addition, we focus on the molecular mechanisms of avian reproductive systems and the development of reproductive technologies based on these mechanisms in poultry.

keywords: genome-editing, avian reproduction

1.Lactic acid is a sperm motility inactivation factor in the sperm storage tubules. Sci. Rep. 5: 17643 (2015)

2.Expression of transferrin and albumin in the sperm-storage tubules of Japanese quail and their possible involvement in long-term sperm storage. J. Poult. Sci. 57: 88-96 (2020)

3.Longer and faster sperm exhibit better fertilization success in Japanese quail. Poult. Sci. 100: 100980 (2021)

YAMAMOTO Yoshinari Assistant Professor

The purpose of our research is to explore the immunomodulatory effects of foods and microorganisms, and then to utilize their function to develp functional foods that prevent and reduce some diseases such as infectious, inflammatory and allergic diseases.

keywords: Food immunology, Microorganism, Functional food, Mice, Cell culture, Oral administration

1.Class A CpG Oligonucleotide Priming Rescues Mice from Septic Sock via Activation of Platelet-Activating Factor Acetylhydrolase. Front Immunol. (2017)

2.Oral Administration o Flavonifractor plautii Strongly Suppresses Th2 Immune Responses in Mice. Front Immunol. (2020)

3.Inhibitory/Suppressive Oligodeoxynucleotide Nanocapsules as Simple Oral Delivery Devices for Preventing Atopic Dermatitis in Mice. Mol Ther. (2015)

National Research Institute of Brewing

OKUDA Masaki Visiting Professor

Our research focus is the understanding of the properties of the ingredient rice grains and water for sake making to make high quality of sake and shochu. We are investigating the influences of the meteorological conditions during rice growing on sake making process, and the compounds affecting sake quality.

keywords: sake, shochu, rice, water, meteorological condition

1.Rice used for Japanese sake making, Biosci. Biotechnol. Biochem., 83,1428-1441 (2019)

2.Analysis of protein composition in cultivar rice used for sake brewing, and their effects on nitrogen compounds in sake, Cereal Chem.95,320-329 (2018)

3.Characteristics of the starch and protein composition of rice grains used for awamori,J.Brew.Soc.,114, 585-595 (2019) in Japanese

National Research Institute of Brewing

MASAKI Kazuo Visiting Associate Professor

I am studying microbiology (yeast and koji-mold) for the brewing. In particular, the main targets are elucidation of functions, breeding, and enzymatic research. I am also interested in exploring new enzymes, developing new uses, and mass-producing enzymes.

keywords: enzyme, yeast, koji-mold, brewing microbiology

1. *Aspergillus oryzae* acetamidase catalyzes degradation of ethyl carbamate, J Biosci Bioeng,130, 577 (2020)

2.Construction of a new recombinant protein expression system in the basidiomycetous yeast *Cryptococcus* sp strain S-2 and enhancement of the production of a cutinase-like enzyme, Appl Microbiol Biotechnol, 93, 1627 (2012)

3.Cutinase-like enzyme from the yeast *Cryptococcus* sp strain S-2 hydrolyzes polylactic acid and other biodegradable plastics, Appl Environ Microbiol, 71, 7548 (2005)

Program of Bioresource Science

ISOBE Naoki Professor

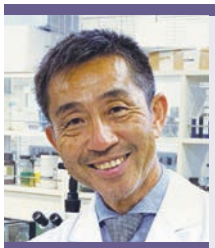
My study focuses on innate immune function in mammary gland to prevent and treat mastitis. I found that some antimicrobial components (defensin, S100, cathelicidin, lactoferrin) were produced and secreted into milk for the defense against microorganisms. Mastitis caused by the bacterial components translocated from uterus was identified.

keywords: mastitis, mammary gland, antimicrobial component

1.Translocation of intrauterine-infused bacterial lipopolysaccharides to the mammary gland in dexamethasone-treated goats. Reprod Domest Anim 55:1688-1697. (2020)

2.Effects of intrauterine infusion of bacterial lipopolysaccharides on the mammary gland inflammatory response in goats. Vet Immunol Immunopathol 219: 109972, (2020)

3.Production of antimicrobial peptide S100A8 in the goat mammary gland and effect of intra-mammary infusion of lipopolysaccharide on S100A8 concentration in milk. J Dairy Sci 102:4674-4681 (2019)



UMINO Tetsuya Professor

My current research focuses on sustainable use for commercially important fish using by stock enhancement and resource management. Black sea bream is representative fish of my research, I want to pursue studies to clarify all of the mysteries of this fish as my life work.

keywords: fish, black sea bream, stock enhancement, resource management, sustainable use

1.The role of the isolation of the marginal seas during the Pleistocene in the genetic structure of black sea bream *Acanthopagrus schlegelii* (Bleeker, 1854) in the coastal waters of Japan. PeerJ 9(24):e11001(2021)

2.Estimating the spawning season of black sea bream *Acanthopagrus schlegelii* in Hiroshima Bay, Japan, based on temporal variation in egg density. Fish Sci, 86:645-653(2020)

3.Infestation of the parasitic isopod *Mothocya parvostis* on Juveniles of the black sea bream *Acanthopagrus schlegelii* as an optional intermediate host in Hiroshima Bay. Zool Sci,1-10(2020)

OHTSUKA Susumu Professor

The systematics, evolutionary biology and ecology of zooplankters such as copepods and jellyfish have been most intensively investigated in the world. Recently, the life cycle of symbiotic copepods such as sea lice have been studied.

keywords: Copepods, Ecology, Evolution, Life cycle, Jellyfish, Symbiosis, Systematics

1.Evolutionary transformation of mouthparts from particle-feeding to piercing carnivory in viper copepods: review and 3D analysis of a key innovation using advanced imaging techniques. Front Zool 16:35 (2019)

2.Symbionts of marine medusae and ctenophores. Plankton Benthos Res, 4(1): 1-13. (2009)

3.Sexual dimorphism in calanoid copepods. Hydrobiologia 453/454: 441-466. (2001)

OBITSU Taketo Professor

In order to establish sustainable and healthy ruminant production system, I am studying on the by-product feed utilization, mitigation of enteric methane emission from ruminants, and regulation of amino acid metabolism in cattle and sheep by the natural functional compounds in forage.

keywords: Forage, digestion, metabolism, protein, amino acid, cow, sheep, milk, meat.

1.Phytol supplementation alters plasma concentrations of formate, amino acids, and lipid metabolites in sheep. Animal 15:100174. (2021)

2.Effects of ensiling treatment for tuber crop forages and grain source on carbohydrate digestion, nitrogen utilization, and urea metabolism in sheep. Anim Feed Sci Technol 243: 140-149. (2018)

3.Effects of nitrogen fertilizer and harvesting stage on photosynthetic pigments and phytol contents of Italian ryegrass silage. Anim Sci J 88: 1513 – 1522. (2017)

KAWAI Kouichirou Professor

To seek some strategies on sustainable human activities by physiological, ecological, behavioral and molecular clarification of survival by tough creatures.

keywords: strategy, survival, tough creature

1.An association between head-spot types and genetic types in char distributed in the Chugoku region, Japan. Environ Biol Fishes 103:339-347. (2020)

2.Genetic relationships of cichlid fishes from Lake Malawi based on mitochondrial DNA sequences. Limnology 21:151-163 (2020)

3.Population genetics and taxonomic signatures of wild *Tilapia* in Japan based on mitochondrial DNA control region analysis. Hydrobiologia 847: 1491-1504. (2020)

KOIKE Kazuhiko Professor

Microalgae, or single-cell algae, especially their diversity, environmental adaptation and photosynthetic mechanisms are investigated both from field studies and laboratory culture experiments. Goal of the study is to apply these knowledges for conserving characteristic ecosystems (e.g. coastal biological production, mangrove ecosystem, coral reef ecosystem, etc) whose basis are microalgae.

keywords: Microalgae, aquatic ecosystem, coast, mangrove, coral reef

1.Fecal pellets of giant clams as a route for transporting Symbiodiniaceae to corals/ PLoS ONE/2020

2.Zooxanthellal genetic varieties in giant clams are partially determined by species-intrinsic and growth-related characteristics/ PLoS ONE/ 2017

3.Aplication of a pulse-amplitude-modulation (PAM) fluorometer reveals its usefulness and robustness in the prediction of Karenia mikimotoi blooms: A case study in Sasebo Bay, Nagasaki, Japan/ Harmful Algae/ 2017

SAKAI Yoichi Professor

Behavioral ecology of reef fishes focusing on survival and reproductive strategies (e.g. foraging and mating tactics, social and mating system, and sex change patters) by use of the methodology of animal sociology including field observation and demographic survey in nature.

keywords: Underwater observation, field survey, function of behaviors, intra- and interspecific relationships, individual-level data, reproductive success

1.Reversed sex change in the haremic protogynous hawkfish *Cirrhitichthys falco* in natural conditions. Ethology 118: 1-9 (2012)

2.Effect of changing harem on timing of sex change in female cleaner fish *Labroides dimidiatus*. Anim Behav 62: 251-257 (2001)

3.Alternative spawning tactics of female angelfish according to two different contexts of sex change. Behav Ecol 8: 372-377 (1997)

SUGINO Toshihisa Professor

It is focusing on the nutrition and metabolism at transition periods for weaning and calving in dairy cattle. Especially, it has the study that the relationship between dietary nutrition and metabolic hormone action.

keywords: gastro-intestinal hormone, dairy cow, dairy calf, nutritional management

1.Effects of feeding hay and calf starter as a mixture or as separate components to Holstein calves on intake, growth, and blood metabolite and hormone concentrations. J. Dairy Sci. 103 : 4423-4434 (2020)

2.Effects of feeding a moderate-or high-energy close-up diet to cows on response of newborn calves to milk replacer feeding and intravenous injection of glucagon-like peptide 1.Domest. Anim. Endocrinol. 74: 106528 (2021)

3.Exposure to blue LED light before the onset of darkness under a long-day photoperiod alters melatonin secretion, feeding behaviour and growth in female dairy calves. Anim. Sci. J. 91: e13353 (2020)

TANIDA Hajime Professor

All of my research projects focus on interactions between human and other animals to quantify of the positive effects of human-animal relationships on either party. This research field is also known as anthrozoology. Target animals could be farm animals, companion animals, zoo animals, wild animals and animals kept in kindergartens.

keywords: Human-animal relationships, Anthrozoology, Animal welfare, Field study, Animal behavior

1.Health status of 'community cats' living in the tourist area of the old town in Onomichi City, Japan. J Appl Anim Welf Sci in press. (2021)

2.The effect of communal litter box provision on the defecation behavior of free-roaming cats in old-town Onomichi, Japan. Appl Anim Behav Sci 224: 104938. (2020)

3.Three-year route census study on welfare status of free-roaming cats in old-town Onomichi, Japan. J Appl Anim Welf Sci 21: 203-210. (2018)

TSUDZUKI Masaoki Professor

Concurrent post : Biomedical Science

I have revealed many quantitative trait loci (QTL) controlling economic traits of chickens and quail. Also, I have investigated the genetic features of and genetic relationship between native Japanese chicken breeds. In addition, I am keeping many breeds and mutant strains of chickens and quail in my laboratory.

keywords: chickens, quail, mutant, qualitative genetics, quantitative genetics

1. Geographic origin and genetic characteristics of Japanese indigeneous chickens inferred from mitochondrial D-loop region and microsatellite DNA markers. Animals 10: 2074. (2020)
2. Discovery of a new nucleotide substitution in the *MC1R* gene and haplotype distribution in native- and non-Japanese chicken breeds. Anim Genet 51: 235-248 (2020)
3. A longitudinal quantitative trait locus mapping of chicken growth traits. Mol Genet Genom 294: 243-252. (2019)

TOMINAGA Rumi Professor

The aim of our study is to elucidate the mechanism of epidermal cell differentiation in plants, by using epidermal cells form specialized organs, such as root hairs. By focusing on the function of transcription factors, we aim to understand plant morphogenesis and cell differentiation at the molecular level.

keywords: Arabidopsis, root hair, transcription factor

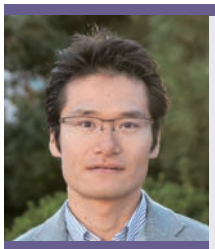
1. Extended C-termini of CPC-LIKE MYB proteins confer functional diversity in Arabidopsis epidermal cell differentiation. Development 144: 2375-2380 (2017)
2. The GLABRA2 homeodomain protein directly regulates CESA5 and XTH17 gene expression in Arabidopsis roots. Plant J.60: 564-574 (2009)
3. Functional Analysis of the Epidermal-Specific MYB Genes CAPRICE and WEREWOLF in Arabidopsis. Plant Cell 21: 2307-2322 (2007)

BUNGO Takashi Professor

The objectives are to understand how to regulate the rearing conditions to satisfy the demand of livestock. We must figure out the physiology and behavior of livestock under the environment to maximize their production. The study of physiology is for realizing their condition, and behavior is for interpreting their mind.

keywords: Thermoregulation, Feeding and metabolism, Brain, Stress, Behavioral traits, Temperament

1. Adenosine 5'-monophospheate induced hypothermia and its relevance to central thermoregulation in chicks. Brain Res. Bull. 172: 14-21. (2021)
2. Effects of thermal conditioning on changes in hepatic and musclar tissue associated with reduced heat production and body temperature in young chickens. Front. Vet. Sci. 7: 61039 (2021)
3. The use of behavioral tests of fearfulness in chicks to distinguish between the Japanese native chicken breeds, Tosa-Kukin and Yakido. Anim. Sci. J. 92: e13507. (2021)



ASAOKA Satoshi Associate Professor

I am an aquatic environmental scientist with a broad perspective-wastewater treatment, restoration of coastal seas etc. on the basis of my analytical chemistry background. My specialties and skills are as follows: (1) Coastal environment restoration using industrial recycled materials, (2) Development of analytical methods to evaluate aquatic environment.

keywords: Aquatic environment, Environmental analytical chemistry, Environmental remediation, SDGs, Wastewater treatment

1. Adsorption of phosphate onto lanthanum-doped coal fly ash—Blast furnace cement composite. J. Hazard. Mater., 406, 124780. (2021)
2. Organic matter degradation characteristics of coastal marine sediments collected from the Seto Inland Sea, Japan, Mar. Chem. 225, 103854. (2020)
3. Estimation of spatial distribution of coastal ocean primary production in Hiroshima Bay, Japan, with a geostationary ocean color satellite, Estuar. Coast. Shelf Sci. 244, 106897, (2020)

UEDA Akihiro Associate Professor

Our research focuses on molecular physiological analysis of environmental stress (high salinity, nutrient deficiency, etc.) tolerance in higher plants for sustainable crop production. We also study plant growth promoting bacteria to increase crop production through improving bacterial fitness in the rhizosphere and identifying bioactive compounds useful for crop growth.

keywords: Sustainable crop production, Rice, Salinity stress, Nutrient deficiency, Plant nutrition, Plant growth promoting bacteria

1. Contribution of two different Na^+ transport systems to acquired salinity tolerance in rice. Plant Sci 297: 110517. (2020)
2. Identification of the genes controlling biofilm formation in the plant commensal *Pseudomonas protegens* Pf-5. Arch Microbiol 202: 2453-2459. (2020)
3. Characterization of Na^+ exclusion mechanism in rice under saline-alkaline stress. Plant Sci 287: 110171. (2019)

KATO Aki Associate Professor

Seaweeds benefit human life by providing food and indirectly by maintaining biodiversity in coastal ecosystems. Focusing on the impacts of climate change on seaweed aquaculture and seaweed forests, I have examined molecular phylogeny and ecophysiology of key species of macroalgae and conducted empirical research relevant for aquaculture.

keywords: coralline algae, edible seaweeds, optimum growth conditions, rhodolith, taxonomy

1.Effects of water temperature, light and nitrate on the growth of sporelings of the non-geniculate coralline alga *Lithophyllum okamurae* (Corallinales, Rhodophyta). J. Appl. Phycol. 32: 1923 - 1931 (2020)

2.Distribution of *Lithophyllum kuroshioense sp. nov*., *Lithophyllum subtile* and *L. kaiseri* (Corallinales, Rhodophyta), but not *L. kotschyanum*, in the northwestern Pacific Ocean. Phycologia 58: 648 - 660 (2019)

3.Western Pacific. In Rhodolith/Maërl Beds: a global perspective. Springer, Switzerland. pp. 335-347. (2017)

KAWAKAMI Siniti Associate Professor

Research of the brain mechanisms of innate behavior such as feeding, drinking, and aggressive behavior in chickens.

keywords: feeding behavior, drinking behavior, aggressive behavior, hypothalamus, chicken

1.Screening of the behavioral tests for monitoring agonistic behavior of layer chicks. J.Poult.Sci. 54:296-302. (2017)

2.Blood testosterone concentration and testosterone-induced aggressive behavior in male layer chicks: Comparison between isolated- and grouped-raising. J.Poult.Sci. 56:290-297. (2019)

3.Effects of testicular and non-testicular testosterone on territorial and isolation-induced aggressive behavior of male layer chicks. J.Poult. Sci. 57:236-240. (2020)

KUROKAWA Yuuzou Associate Professor

Shortening dairy cows' productive lifespan is a serious problem, because it leads to decrease in milk production efficiency and low animal welfare. I am investigating the relation of blood antioxidants (vitamin C and glutathione) with disease incidence, including mastitis, and reproductive performance to improve dairy cows f lifecycle.

keywords: Antioxidants, dairy cows, lifecycle, milk production, productive lifespan

1.広島大学農場における乳牛の分娩間隔が乳生産に及ぼす影響/日畜会報/2019

2.A comparison of plasma glucose and oxidative status in lactating dairy cows in summer and autumn/Anim. Sci. J./2016

SAITOU Hidetoshi Associate Professor

My research interests are ecological researches on aquatic organisms, especially understanding of life history aimed at the dispersal mechanism of alien species and the conservation of threatened species.

keywords: Benthos, Fishing bait, Freshwater, Intertidal flat, polychaete, shrimp

1.Population genetics of the alien freshwater shrimp Palaemon sinensis (Sollaud, 1911) in Japan based on mitochondrial 16S rRNA sequence analysis Aquat. Invasions 16: (in press) (2021)

2.Population Dynamics of Lancelet *Branchiostoma japonicum* in the Seto Inland Sea, Japan. Zool Sci 37:331-337 (2020)

3.Seasonal occurrence of the alien freshwater shrimp *Palaemon sinensis* (Sollaud, 1911) in lower reaches of a river in western Japan. BioInvasions Rec. 8:369–378 (2019)

TOMIYAMA Takeshi Associate Professor

I am studying the fisheries biology in Japan, especially in the Seto Inland Sea, to contribute to the sustainable coastal fisheries. My research interests are mainly in the life history traits of commercially important species, predator-prey interactions, and the response of fishes to climate change.

keywords: Aquatic ecology, Fisheries, Life history, Thermal biology, Tidal flat

1.Seasonal bathymetric distributions of three coastal flatfishes: estimation from logbook data for trawl and gillnet fisheries. Fish Res 233: 105733. (2021)

2.Importance of experienced thermal history: effect of acclimation temperatures on the high-temperature tolerance and growth performance of juvenile marbled flounder. J Therm Biol 97: 102831. (2021)

3.Food availability before aestivation governs growth and the winter reproductive potential in the capital breeding fish, *Ammodytes japonicus*. PLoS ONE 14: e0213611. (2019)

NAGAOKA Toshinori Associate Professor

Aiming for sustainable plant production, I am conducting researches to analyze and utilize soil functions. Current researches are focused on analysis of the effects of application of organic matter such as compost on nutrient supply (especially phosphorus) to plants and on relating soil microorganisms.

keywords: Soil, Organic matter, Nutrient cycling, Phosphorus, Soil microorganisms

1.Phytate degradation by fungi and bacteria inhabiting sawdust and coffee residue composts. Microbes Environ.(2013)
2.Isolation and characterization of cellulose-decomposing bacteria inhabiting sawdust and coffee residue composts. Microbes Environ. (2012)
3.Compost amendment enhances population and composition of phosphate solubilizing bacteria and improves phosphorus availability in granitic regosols. Soil Sci. Plant Nutr. (2011)

HASHIMOTO Toshiya Associate Professor

My main purpose of the study is to maintain and manage the marine environment that is available for sustainable fishery production. For the purpose, I perform a study about the material circulation system in the coastal seas by computer data analysis, numerical ecosystem model and field observations.

keywords: sustainable fishery production, computer data analysis, numerical ecosystem model

1.Primary Production and Physical Structure of the Seto Inland Sea, Japan / Bull. Coastal Oceanogr. (1997)
2.Analysis of Primary Production in the Seto Inland Sea, Japan, Using a Simple Ecosystem Model/ J. Oceanogr. 54: 123-132.(1998)
3.Optical Properties of Sea Water in Hiroshima Bay, Japan / Oceanography in Japan (1997)

YOSHIDA Masayuki Associate Professor

Concurrent post : Biomedical Science

Biological psychology and behavioral neuroscience. Studying animal mind as a biological function. My research involves quantitative observation of behavior and manipulation of underlying neural activities to evaluate emotional states of animals.

keywords: behavior, biological psychology, brain, emotion

1.Measurement of emotional states of zebrafish through integrated analysis of motion and respiration using bioelectric signals. Scientific Reports 11:187 (2021)
2.Relationship between brain morphology and life history in four bottom-dwelling gobiids. Zoological Science, 37, 168-176 (2020)
3.Granule cells control recovery from classical conditioned fear responses in the zebrafish cerebellum. Scientific Reports, 7, 11865 (2017)

WAKABAYASHI Kaori Associate Professor

The main research interest is the early life history of marine invertebrates particularly from the viewpoints of taxonomy, developmental biology, and ecology. Applied aquaculture sciences in crustaceans and echinoderms are also the research topics that we focus on.

keywords: Lobster, Larvae, Jellyfish, Hatchery, Land-based aquaculture

1.The final phyllosoma, nisto, and first juvenile stages of the slipper lobster *Petrarctus brevicornis* (Holthuis, 1946) (Decapoda: Achelata: Scyllaridae). J Crustac Biol 40: 237–246. (2020)
2.Culture of slipper lobster larvae (Decapoda; Achelata; Scyllaridae) fed jellyfish as food. In Lobsters: Biology, Fisheries and Aquaculture. Springer Singapore, Singapore, pp. 519–540. (2019)
3.Amended larval recruitment model for the Japanese spiny lobster *Panulirus japonicus* from new larval records and population genetic data in Taiwan. J Oceanogr 75: 273–282. (2019)

LIAO Lawrence Manzano Associate Professor

My research deals with the taxonomy of macroalgae around Southeast Asia, including their use as bioindicators of environmental change. Students are trained in practical taxonomic and communication skills to prepare them for jobs in research, teaching and international science journalism.

keywords: algae, freshwater Rhodophyta, museum studies, phycology, phytogeography, seaweeds

1.The Ulvophyceae (Chlorophyta) of eastern Sorsogon, Philippines, including *Halimeda magnicuneata* sp. nov. (Bryopsidales). Botanica Marina 63: 439-453 (2020)
2.Satellite image analysis reveals changes in seagrass beds at Van Phong Bay, Vietnam during the last 30 years. Aquatic Living Resources 33: 1-10. (2020)
3.*Dictyota adnata* Zanardini (Phaeophyceae) – a new record from the Sundarbans mangrove forests, Bangladesh. Bangladesh J. Bot. 49: 407-412 (2020)

UMEHARA Takashi Assistant Professor

Our aim is to develop the reproductive technology in animal production. To achieve this aim, we are focusing on mammalian reproductive biology of both female and male, such as ovary, oocyte, testis and sperm, especially focusing on metabolism, endocrine and immune system.

keywords: animal reproduction, reproductive technology, endocrine, metabolism

1.A simple sperm-sexing method that activates TLR7/8 on X sperm for the efficient production of sexed mouse or cattle embryos. Nature protocols, (2020)

2.Activation of Toll-like receptor 7/8 encoded by the X chromosome alters sperm motility and provides a novel simple technology for sexing sperm. PLoS Biol., (2019)

3.The acceleration of reproductive aging in *Nrg1flox/flox; Cyp19-Cre* female mice. Aging cell, 16, 1288-1299. (2017)

KIKUTA Mayumi Assistant Professor

In our laboratory, we are working on the evaluation of cultivation environments and the development of cultivation management techniques in order to improve the stability and productivity of major crops such as rice and corn. Our research is mainly focused on poor environments in East Africa and Southeast Asia.

keywords: Rice, Stability and productivity , Cultivation management

1.A method for evaluating cold tolerance in rice during reproductive growth stages under natural low-temperature conditions in tropical highlands in Kenya. Plant Prod Sci 23: 466-476. (2020)

2.Effects of different water management practices on the dry matter production process and characteristics in NERICAs. Plant Prod Sci 22: 168-179. (2019)

3.Effects of slope-related soil properties on upland rice growth and yield under slash-and-burn agriculture in South Konawe Regency, Southeast Sulawesi Province, Indonesia. Trop Agr Develop 62: 60-67. (2018)

SEO Aira Assistant Professor

My research aims for the improvement of animal welfare, especially the welfare of free-roaming cats, from the view point of the symbiotic relationships between humans and animals.

keywords: Animal Welfare, Human-Animal Relationships, Free-roaming cats

1.Health status of 'community cats' living in the tourist area of the old town in Onomichi City, Japan. J Appl Anim Welf Sci in press. (2021)

2.The effect of communal litter box provision on the defecation behavior of free-roaming cats in old-town Onomichi, Japan. Appl Anim Behav Sci 224: 104938. (2020)

3.Three-year route census study on welfare status of free-roaming cats in old-town Onomichi, Japan. J Appl Anim Welf Sci 21: 203-210. (2018)

NAKAMURA Yoshiaki Assistant Professor

My research group aim to develop culture, cryopreservation and transplantation of germ cells including primordial germ cells and spermatogonial stem cells in birds and mammals, and to apply germ cell manipulation technologies from conservation of biological diversity to human infertility treatment.

keywords: germ cells, chicken, mouse, genetic coneservation, infertility treatment

1.Transient suppression of transplanted spermatogonial stem cell differentiation restores fertility in mice. Cell Stem Cell 28:1-14. (2021)

2.Efficient system for preservation and regeneration of genetic resources in chicken: concurrent storage of primordial germ cells and live animals from early embryos of a rare indigenous fowl (Gifujidori). Reprod Fertil Dev 22:1237-1246. (2010)

3.Germline replacement by transfer of primordial germ cells into partially sterilized embryos in the chicken. Biol Reprod 83:130-137. (2010)

NII Takahiro Assistant Professor

I work on the research about enhancement of mucosal barrier function and improvement of egg production for health and secure poultry production of chickens. In particular, I focus on the intestinal environment and the network between intestine and surrounding organs such as liver, brain and reproductive organs.

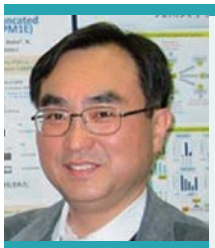
keywords: Avian, mucosal immunity, digestive tract cellular immunity, reproductive organ, egg laying function, probiotics

1.Slight Disruption in Intestinal Environment by Dextran Sodium Sulfate Reduces Egg Yolk Size Through Disfunction of Ovarian Follicle Growth. Front Physiol. 11:607369. (2021)

2.Intestinal inflammation induced by dextran sodium sulphate causes liver inflammation and lipid metabolism disfunction in laying hens. Poult Sci. 99:1663-1677. (2020)

3.Effects of avian infectious bronchitis virus antigen on eggshell formation and immunoreaction in hen oviduct. Theriogenology. 81: 1129-1138. (2014)

Program of Life and Environmental Sciences



ISHIDA Atsuhiko Professor

Concurrent post : Biomedical Science

I am interested in intracellular signal transduction, especially protein phosphorylation and dephosphorylation. I am studying multifunctional CaM kinases, which play important roles in Ca^{2+} signaling, and CaM kinase phosphatase (PPM1F) involved in their regulation. The latter has been found to be involved in various diseases such as cancer and depression.

keywords: phosphorylation, dephosphorylation, biochemistry, molecular biology, chemical biology, enzyme inhibitor

1.Autoactivation of C-terminally truncated Ca^{2+} /calmodulin-dependent protein kinase (CaMK) I δ via CaMK kinase-independent autophosphorylation Arch. Biochem. Biophys. 668 29 - 38 (2019)

2.Functions and dysfunctions of Ca^{2+} /calmodulin-dependent protein kinase phosphatase (CaMKP/PPM1F) and CaMKP-N/PPM1E Arch. Biochem. Biophys. 640 83 - 92 (2018)

3.The phosphatase-resistant isoform of CaMKI, Ca^{2+} /calmodulin-dependent protein kinase I δ (CaMKI δ), remains in its 'Primed' form without Ca^{2+} stimulation. Biochemistry 54 3617 - 3630 (2015)

UKENA Kazuyoshi Professor

Concurrent post : Biomedical Science

I have identified novel neuropeptides in the avian and rodent brain and elucidate their molecular mechanisms, especially instinctive behavior such as appetite and regulation of energy metabolism. I am aiming for discoveries in the field of neurometabolic and neuroendocrine regulations.

keywords: Neuropeptide, Energy metabolism, Neurometabolism, Neuroendocrinology

1.Avian and murine neurosecretory protein GL participates in the regulation of feeding and energy metabolism. Gen. Comp. Endocrinol. 260:164-170 (2018)

2.Neurosecretory protein GL stimulates food intake, de novo lipogenesis, and onset of obesity. eLife 6:e28527 (2017)

3.Neurosecretory protein GL, a hypothalamic small secretory protein, participates in energy homeostasis in male mice. Endocrinology 158:1120-1129 (2017)

KUGA Yukari Professor

My research themes are the symbioses between plants and soil fungi. Major topics are the mycorrhizal cellular functions using stable isotope tracers and nanoscale map SIMS and the decline mechanisms of the white root rot fungal pathogen associated with changes of soil microbial communities by the hot water treatment.

keywords: Symbioses, Mycorrhiza, Soil-borne plant disease, Orchid, Arbuscular, Soil microbial community, Ultrastructure, Secondary ion mass spectrometry

1.Stable isotope cellular imaging reveals that both live and degenerating fungal pelotons transfer C and N to orchid protocorms. New Phytol. 2014

2.Uptake and intraradical immobilization of cadmium by arbuscular mycorrhizal fungi as revealed by stable isotope tracer and synchrotron radiation μX-ray fluorescence analysis. Microbes Environ. 2018

3.From imaging to functional traits in interactions between roots and microbes. In: Methods in Rhizosphere Biology Research. Springer 2019

SATOH Akiko Professor

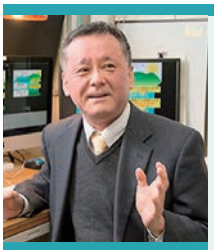
Organelles maintain their shapes and functions as the equilibrium of membrane flow into and out of them. We are trying to identify the dynamics of Golgi apparatus, and understand its function on the biogenesis of the secretory and membrane proteins.

keywords: Golgi stacks, cisternae, Trans Golgi Network (TGN)

1.Rab6 is required for multiple apical transport pathways but not for basolateral transport pathway in Drosophila photoreceptors/PLOS Genetics/2016

2.Recycling endosomes are attached to trans-side of Golgi units both in Drosophila and mammalian cells/J. Cell Sci./2020

3.Sec71 separates Golgi stacks in *Drosophila* S2 cells/J. Cell Sci./2020



TAKEDA Kazuhiko Professor

I am a professional environmental scientist based on analytical chemistry in the aquatic environments and atmosphere. The current works are focused on photochemistry and their dynamics of 1) microplastics, 2) iodine, 3) reactive oxygen species, and 4) pollutants in environments. We are approaching these themes with laboratory work and fieldwork.

keywords: Analytical Chemistry, Environmental Chemistry, Microplastics, Iodine, Reactive Oxygen Species

1.Factors controlling the degradation of hydrogen peroxide in river water, and the role of riverbed sand. Sci Total Environ 716: Article 136971. (2020)

2.Hydroxyl radical generation with a high power ultraviolet light emitting diode (UV-LED) and application for determination of hydroxyl radical reaction rate. J Photochem Photobiol A 340: 8-14. (2017)

3.The iodide and iodate distribution in the Seto Inland Sea, Japan. Aquat Geochem 23: 315-330. (2017)

NAKATSUBO Takayuki Professor

My research fields are ecosystem ecology and plant ecology. Recent research subject of my laboratory is the impact of alien species on the structure and function of ecosystems. In addition, I have been working on the impact of climate change on the Arctic terrestrial ecosystem for more than 20 years.

keywords: Alien species, Arctic, Climate change, Ecosystem ecology, Plant ecology

1.Effects of climate warming on the production of the pioneer moss *Racomitrium japonicum*: seasonal and year-to-year variations/J. Plant Res./2021

2.Annual respiration of Japanese mud snail *Batillaria attramentaria* in an intertidal flat: its impact on ecosystem carbon flows/Landsc. Ecol. Eng./2019

3.Distribution and stress tolerance of *Fimbristylis dichotoma* subsp. *podocarpa* (Cyperaceae) growing in highly acidic solfatara fields/Ecol. Res./2018

FURUKAWA Yasuo Professor

Concurrent post : Biomedical Science

We are interested in the structure and function of ion channels, which are membrane proteins permitting passive ion transport across the cell membrane. Ion channels are important determinants of neuronal excitability and plasticity. Currently, we are conducting research mainly on the peptide-gated Na^+ channel and the voltage-gated K^+ channels.

keywords: channel peptide excitability synapse

1.Modulation of the FMRFamide-gated Na^+ channel by external Ca^{2+}, Pflugers Arch, 469:1335-1347 (2017)

2.Serotonin modulates the excitatory synaptic transmission in the dentate granule cells, J Neurophysiol, 115:2997-3007 (2016)

3.Electrostatic charge at position 552 affects the activation and permeation of FMRFamide-gated Na^+ channels, J Physiol Sci, 64:141-150 (2014)

YAMAZAKI Takeshi Professor

Concurrent post : Biomedical Science

1) Physiological functions of steroid hormones synthesized in the brain (neurosteroids). Neuroprotective effect of sex steroid hormones. 2) Neuroprotective effect of polyunsaturated fatty acids on the neurotoxicity of methylmercury.

keywords: Neurosteroid, neuroprotection, estradiol

1.Potentiation of 17 β-estradiol synthesis in the brain and elongation of seizure latency through dietary supplementation with docosahexaenoic acid. Sci. Rep. 7:6268 (2017).

2.Protective actions of 17 β-estradiol and progesterone on oxidative neuronal injury induced by organometallic compounds Oxid. Med. Cell. Longev. 2015:343706 (2015).

3.De novo synthesized estradiol protects against methylmercury-induced neurotoxicity in cultured rat hippocampal slices. Pros One. 8:e55559 (2013).

YAMADA Toshihiro Professor

I mainly study in tropical forests in Indonesia, Malaysia, Myanmar and so on. Tropical forests are known for their mega-biodiversities. At the same time, they are known for a large loss of biodiversity. I am conducting research on measures to conserve tropical biodiversity.

keywords: biodiversity, conservation biology, tropical rain forests

1.The Forest Observation System, building a global reference dataset for remote sensing of forest biomass. Scientific data 6 (2019)

2.TRY plant trait database – enhanced coverage and open access. Global Change Biology (2020)

3.Dynamics of Tree Species Diversity in Unlogged and Selectively Logged Malaysian Forests. Scientific Reports 8:1024 (2018)

WASAKI Jun Professor

Concurrent post：Bioresource Science

Main research topic is plant nutrition (especially phosphorus) and the dynamics in the rhizosphere.Strategies of P mobilization by plants are actively investigating, such as cluster root formation, root exudates, and plant-microbial interactions. We are also trying to apply the strategy on improvement of P use efficiency.

keywords：Rhizosphere, Phosphorus, Root Exudates, Cluster Roots

1.AtALMT3 is involved in malate efflux induced by phosphorus deficiency in *Arabidopsis thaliana* root hairs. Plant Cell Physiol. 60: 107-115 (2019).

2.P and N deficiency change the relative abundance and function of rhizosphere microorganisms during cluster root development of white lupin (*Lupinus albus* L.). Soil Sci. Plant Nutr. 64: 686-696. (2018)

3.Formation of dauciform roots by Japanese native Cyperaceae and their contribution to phosphorus dynamics in soils. Plant Soil, 461:107-118 (2021).

VILLENEUVE Masumi Professor

My research area is colloid and interface science. From materials to biomembranes, what we call soft matter is the subject of my research. Currently, I study the thermodynamics and dynamics of self-assembled monolayers at interfaces and the swelling mechanism of gluten-free, additive-free rice bread.

keywords：Colloid, Interface, Thermodynamics, Rheology, Surfactants, Lipids, Starch

1.Roles of a-methyl trans-cyclopropane groups in behavior of mixed mycolic acid monolayers/BBA-Biomembrane 1861: 441 (2019)

2.Uptake of iron (III)-ethylenediamine-N,N,N',N'-tetraacetic acid complex by phosphatidylcholine lipid film. Part II. Effect of film curvature/ Chem. Phys. Lipids 210: 14 (2018)

3.Development of gluten-free rice bread: Pickering stabilization as a possible batter-swelling mechanism/LWt-Food Sci. Tech. 79: 632 (2017)

IWAMOTO Yoko Associate Professor

We are working on atmospheric aerosols. Aerosol particles can act as nuclei of cloud droplets, or can be a source of nutrients for plants on the sea/land surface. To understand the effects of aerosols on the global climate and biogeochemical cycles, we conduct atmospheric observations in various environments.

keywords：Aerosol, Climate, Cloud, Biogeochemical cycles

1.Contribution of oceanic aerosol particles to cloud condensation nuclei, Earozoru Kenkyu, 35(3), 192-198, 2020

2.Simultaneous measurement of CCN activity and chemical composition of fine-mode aerosols at Noto Peninsula, Japan, in autumn 2012/ Aerosol Air Qual. Res./2016

3.Spatial variation of biogenic and crustal elements in suspended particulate matter from surface waters of the North Pacific and its marginal seas/Progr. Oceanogr./2014

TSUCHIYA Akio Associate Professor

1) Modification of spectral irradiance in the PAR wavelength due to absorption/transmittance near the forest floor in tropical humid forests in the Amazonia Brasileira. 2) Chronological changes of development and conservation policies in the Amazonia Legal, and academic progress of the LBA (Large-Scale Biosphere-Atmosphere Experiments in Amazonia) project.

keywords：light quantity, light quality, agroforestry, climate change, deforestation

1.Stem sap flow at a secondary forest and its difference between dry and rainy seasons. Jpn. J. Biometeor. 56-2: 77-88 (2019)

2.Changes in CO2 concentration within shallow soils originating from solar radiation and rainwater in Central Amazonia. Jpn. J. Biometeor. 53-2: 93-93 (2016)

3.Micrometeorological environments and biodiversity in a closed forest and a tree-fall gap in central Amazonia. Cienc Florest 18-3/4: 415-425 (2008)

NEHIRA Tatsuo Associate Professor

Life science is explored by organic chemistry, specifically, organic synthesis and organic structure analysis. Synthesis of useful probes, chirality analysis by circular dichroism, and structure elucidation of natural products are conducted.

keywords：Organic synthesis, Structural organic chemistry, Natural product chemistry, Circular dichroism

1.Development of a Universal Ellipsoidal Mirror Device for Fluorescence Detected Circular Dichroism (FDCD) – Elimination of Polarization Artifacts, Appl Spectr 59: 121-125 (2005)

2.A sensitive method based on fluorescence-detected circular dichroism for protein local structure analysis, Anal Biochem 430: 179-184 (2012)

3.Natural Dolapyrrolidone: Isolation and Absolute Stereochemistry of a Substructure of Bioactive Peptides, Chirality 32: 1152-1159 (2020)

HIKOSAKA Akira Associate Professor

We are studying the early evolution of animals, the evolution of ontogeny, and the evolution of endosymbiosis with microalgae using an acoel flatworm, *Praesagittifera naikaiensis*, living in the Seto Inland Sea.

keywords: Acoela, Evolution, Endosymbiosis, Seto Inland Sea, *Praesagittifera naikaiensis*

1.Geographical Distribution and Genetic Diversity of *Praesagittifera naikaiensis* (Acoelomorpha) in the Seto Inland Sea, Japan. Zool Sci 37:314–9. (2020)

2.Multiple massive domestication and recent amplification of Kolobok superfamily transposons in the clawed frog *Xenopus*. Zoological Lett 4:17. (2018)

3.Genome evolution in the allotetraploid frog *Xenopus laevis*. Nature 538:336–343. (2016)

TODA Motomu Associate Professor or Lecturer

The objective of our research is to evaluate the meteorological, ecological and biogeochemical responses to ongoing changing climate in terrestrial forests using field observation and simulation approaches.

keywords: Terrestrial energy and carbon cycles, Climate change, Ecological modeling, Flux-tower observations, Multi-data synthesis

1.A Bayesian framework to evaluate parameter and predictive inference of a simple soil respiration model in a temperate forest in western Japan. *Ecological Modelling* (2020)

2.Estimation of plant area index and phenological transition dates from digital repeat photography and radiometric approaches in a hardwood forest in the Northeastern United States. *Agricultural and Forest Meteorology* (2017)

3.Single level turbulence measurements to determine roughness parameters of complex terrain. *Journal of Geophysical Research* (*Atmosphere*) (2003)

KATSUYAMA Chie Assistant Professor

My research themes are element cycles and dynamics caused by soil microorganisms. I am trying to elucidate the interactions between soil microorganisms, such as a mycorrhizal fungus, endobacteria, a fungal pathogen, and soil bacteria and fungi around fungal hyphae (hyphosphere), by using stable isotope tracers and microbial ecological methods.

keywords: Soil microorganisms, White root rot fungal pathogen, Mycorrhiza, Endobacteria, Hyphosphere, Element cycle, Stable isotope tracer, Gas Chromatography - Mass Spectrometry (GC/MS), Microbial ecology

1.Occurrence and potential activity of denitrifiers and methanogens in groundwater at 140 m depth in Pliocene diatomaceous mudstone of northern Japan. FEMS Microbiol Ecol 86: 532-543. (2013)

2.Complementary cooperation between two syntrophic bacteria in pesticide degradation. J Theor Biol 256: 644-654. (2009)

3.Denitrification activity and relevant bacteria revealed by nitrite reductase gene fragments in soil of temperate mixed forest. Microbes Environ 23: 337-345. (2008)

KOBAYASHI Yuuki Assistant Professor

Although G protein-coupled receptors (GPCRs) play important roles as receptors that mediate various life phenomena, a detailed understanding of their functions is limited. Main recent research topic is analysis of GPCRs localized in primary cilia. We are aiming for a breakthrough in the field of neuroscience.

keywords: GPCR, primary cilia, endocrinology, neuroscience

1.Properties of primary cilia in melanin-concentrating hormone receptor 1-bearing hippocampal neurons in vivo and in vitro. Neurochem Int 142 : 104902. (2021)

2.New perspectives on GPCRs: GPCR heterodimer formation (melanocortin receptor) and GPCR on primary cilia (melanin concentrating hormone receptor). Gen Comp Endocrinol 293 : 114474. (2020)

3.Characterization of functional primary cilia in human induced pluripotent stem cell-derived neurons. Neurochem Res 44 : 1736–1744. (2019)

NAKAGAWA Naoki Assistant Professor

Using mutants with altered plant mitochondrial function and plant growth regulators, we aim to clarify the relationship between mitochondria and various traits that have been overlooked.

keywords: plant hormone

1.The putative peptide gene FEP1 regulates iron deficiency response in Arabidopsis. Plant Cell Physiol. 59: 1739-52 (2018).

2.Sugar treatment inhibits IAA-induced expression of endo-1,3:1,4-β-glucanase EI transcripts in barley coleoptile segments Physiol. Planta. 139: 413-420 (2010).

3.A mutation in At-nMat1a, which encodes a nuclear gene having high similarity to group II intron maturase, causes impaired splicing of mitochondrial NAD4 transcript and altered carbon metabolism in Arabidopsis thaliana. Plant Cell Physiol. 47: 772 - 83 (2006).

HIRANO Tetsuo Assistant Professor

I have discovered that CCDC26-RNA, one of the enigmatic "non-coding RNAs", is involved in the oncogenic transformation of myeloid leukemia cells. Interestingly, I have recently found that this molecule is also involved in developmental stage-specific gene regulation of erythroid cells.

keywords: tumorigenesis, double minute chromosomes, gene amplification, leukemia, mt DNA, HL-60

1.Long noncoding RNA CCDC26 as a modulator of transcriptional switching between fetal and embryonic globins./BBA- MCR/2021

2.Long noncoding RNA, CCDC26, controls myeloid leukemia cell growth through regulation of KIT expression./Mol.Cancer/2015

3.Genes encoded within 8q24 on the amplicon of a large extrachromosomal element are selectively repressed during the terminal differentiation of HL-60 cells./Mutat.Res./2008

WATANABE Chiho Assistant Professor

I work on projects using *in vitro* cell models (artificial cells) such as polymer solutions, polymer droplets (emulsions), and liposomes (lipid membranes). My aim is to understand “life” from materials and explore connections between them. I am currently interested in neurodegenerative disease and lipid roles in liquid-liquid phase separation.

keywords: lipid membrane, artificial cell, polymer solutions, liposomes, emulsions

1.Membrane Surface Modulates Slow Diffusion in Small Crowded Droplets /Langmuir/2021

2.Quantitative Analysis of Membrane Surface and Small Confinement Effects on Molecular Diffusion/J. Phys. Chem. B/2020

3.On the possible structural role of single chain sphingolipids Sphingosine and Sphingosine 1-phosphate in the amyloid- β peptide interactions with membranes. Consequences for Alzheimer's disease development/Colloids Surf. A/2016

Program of Basic Biology

OGINO Hajime Professor

Concurrent post : Biomedical Science

My main research areas are developmental biology and evolutionary genomics. Using clawed frogs (*Xenopus*), lancelet, chicken, and mammalian culture cells, I am investigating molecular mechanisms of development, regeneration, and evolution of the brain and sensory organs with a focus on transcriptional and epigenetic gene regulation.

keywords: development, regeneration, evolution, genome, transcriptional regulation, epigenetics, brain, eye, *Xenopus*

1.Genome evolution in the allotetraploid frog Xenopus laevis. Nature, 538: 336-343 (2016)

2.Evolution of a tissue-specific silencer underlies divergence in the expression of pax2 and pax8 paralogues. Nature Communications 3: 848 (2012)

3.The genome of the western clawed frog Xenopus tropicalis. Science 328: 633-636 (2010).

KIKUCHI Yutaka Professor

Concurrent post : Biomedical Science

I am studying the following biological questions; "How do tissues and organs form and mature (Development)?" and "How do failure of tissues and organs occur (Carcinogenesis)?". My research goal is understanding the common mechanisms and systems underlying these biological phenomena by using Bioimage Informatics and Machine Learning.

keywords: Bioimage Informatics, Medical Image, Cancer, Machine Learning

1.Leucine/glutamine and v-ATPase/lysosomal acidification via mTORC1activation are required for position-dependent regeneration. Scientific Reports (2018).

2.Nuclear movement regulated by non-Smad Nodal signaling via JNK is associated with Smad signal transduction during zebrafish endoderm specification. Development (2017).

3.Nipbl and mediator cooperatively regulate gene expression to control limb development. PLOS Genetics (2014).

KUSABA Makoto Professor

My research centers around molecular genetic study of higher plants. I have two projects: (i) Molecular analysis of leaf senescence using the model plant *Arabidopsis thaliana*; (ii) Analysis of natural variation in the genus *Chrysanthemum* using a model strain as a reference, whole genome sequence of which we determined recently.

keywords: Molecular genetics, Arabidopsis, Chrysanthemum, Leaf senescence

1.Highly pleiotropic functions of CYP78As and AMP1 are regulated in non-cell autonomous/organ-specific manners. Plant Physiol. in press (2021)

2.Strigolactone regulates leaf senescence in concert with ethylene in Arabidopsis. Plant Physiol. 169:138-147 (2015)

3.Mendel's green cotyledon gene encodes a positive regulator of the chlorophyll-degrading pathway. Proc. Natl. Acad. Sci. USA 104: 14169-14174 (2007)

SUZUKI Katsunori Professor

Horizontal gene transfer from bacteria to eukaryotes is our main research theme. It is wondering to expect bacterial strains expressing stronger gene transfer activity, and to think over what environments activate the transfer machinery. Our achievements are applied as gene introduction tools.

keywords: Bacteria, Conjugation, Eukaryotes, DNA injection, Horizontal gene transfer, Plasmid, T4SS

1.The presence of the hairy-root-disease inducing (Ri) plasmid in wheat endophytic rhizobia explains a pathogen-reservoir function by healthy resistant plants. *Appl. Environ. Microbiol*. 86:e00671-20(2020)

2.Horizontal DNA transfer from bacteria to eukaryotes and a lesson from experimental transfers. *Res. Microbiol*. 166:753-756 (2015)

3.Ti and Ri plasmids. *Microbial Megaplasmids. E. Schwartz* (*ed*.) *in Microbiology Monograph series, Springer Verlag* pp.133-147 (2009)

TAKAHASHI Yousuke Professor

Gibberellins (GAs) are essential regulators of many aspects of plant development. We studies molecular mechanisms of transcriptional regulation by GAs, signal transduction of GAs, and crosstalk between GAs and other plant hormones.

keywords: plant hormone, gibberellin, transcriptional regulation, signal transduction

1.DELLAs function as coactivators of GAI ASSOCIATED FACTOR1 in regulation of GA homeostasis and signaling in Arabidopsis. Plant Cell 26, 2920-2938 (2014)

2.A tobacco calcium-dependent protein kinase, CDPK1, regulates the transcription factor REPRESSION OF SHOOT GROWTH in response to gibberellins. Plant Cell 20, 3273-3288 (2008)

3.14-3-3 proteins regulate intracellular localization of the bZIP transcriptional activator RSG. Plant Cell 13, 2483-2497 (2001)

YAMAGUCHI Tomio Professor

I study the taxonomy and diversity of bryophytes. My taxonomical specialty is the genus Leucobryum and also conducting research on the diversity of bryophytes in the southern part of Japan, including the Ryukyu Islands and the Ogasawara Islands.

keywords: Bryophytes, Taxonomy, Diversity

1.A revision of the genus Leucobryum (Musci) in Asia. J. Hattori Bot. Lab. 73: 1-123.(1993)

2.Filibryum (Hypnaceae), a new moss genus with a new species from East Asia. J. Bryol. 39: 152-160. (2017)

3.Bryocrumia vivicolor, new localites in Japan and Taiwan. Bry. Div. Evo. 42: 56-60. (2020)

UEKI Tatsuya Associate Professor

I have been working on molecular biological mechanisms of unique phenomena in marine animals, mainly on the isolation of proteins and genes related to the vanadium accumulation by ascidians, molecular and cell-level research for vanadium accumulation and reduction, and the identification of symbiotic bacteria related to vanadium accumulation.

keywords: vanadium, ascidians, symbiotic bacteria

1.Vanadium-binding proteins (vanabins) from a vanadium-rich ascidian *Ascidia sydneiensis samea*. Biochim. Biophys. Acta 1626, 43-50 (2003).

2.A novel vanadium transporter of the Nramp family expressed at the vacuole of vanadium-accumulating cells of the ascidian *Ascidia sydneiensis samea*. Biochim. Biophys. Acta 1810, 457-464 (2011).

3.Bioaccumulation of vanadium by vanadium-resistant bacteria isolated from the intestine of *Ascidia sydneiensis samea*. Mar. Biotech. 18, 359-371 (2016).

SHIMAMURA Masaki Associate Professor

We are conducting research on bryophytes from the perspectives of taxonomy, ecology, morphology, and cell biology. Focusing on the diversity of mitotic spindle formation, we are also conducting research on the evolution of cell division mechanisms in land plants.

keywords: Bryophytes, Marchantia, hornworts, cell division, cytoskeleton, evolution

1.Anthoceros genomes illuminate the origin of land plants and the unique biology of hornworts. Nature Plants 6: 259–272. (2020)

2.Marchantia polymorpha; Taxonomy, phylogeny and morphology of a model system. Plant Cell Physiol. 57:230–256.(2016)

3. γ-Tubulin in basal land plants: characterization, localization, and implication in the evolution of acentriolar microtubule organizing centers. Plant Cell 16: 45–59.(2004)

SUZUKI Atsushi Associate Professor

We are studying the molecular mechanisms for mesodermal and neural development in the body axis formation of vertebrates and for the regulation of stem cells and tissue regeneration. We are particularly interested in the roles of cell signaling mediated by growth factors and downstream transcription factors.

keywords: induction and patterning of mesoderm and neural tissue, tissue regeneration, inducing factors, growth factor signaling

1.Coordinated regulation of the dorsal-ventral and anterior-posterior patterning of *Xenopus* embryos by the BTB/POZ zinc finger protein Zbtb14. Dev Growth Differ 60:158-173. (2018)

2.Cdc2-like kinase 2 (Clk2) promotes early neural development in *Xenopus* embryos. Dev Growth Differ 61: 365-377. (2019)

3.The AP-1 transcription factor JunB functions in *Xenopus* tail regeneration by positively regulating cell proliferation. Biochem Biophys Res Commun 522:990-995. (2020)

TAGAWA Kunifumi Associate Professor

I have been conducting the research on development, regeneration, and evolution of the marine invertebrate deuterostome, an eneteropneust hemichordate, Ptychodera flava, and an acoel flatworm, Praesagittifera naikaiensis. I would like to approach the origin and evolution of chordates and bilaterians by comparative analyses using molecular biological and genome scientific techniques.

keywords: hemichordate, acoel flatworm, Evo-Devo, regeneration, comparative analyses

1.Regeneration in the enteropneust hemichordate, *Ptychodera flava*, and its evolutionary implications, Dev. Growth Differ.60:400-408(2018).

2.Hemichordate modles, Curr. Opin. Genet. Dev.39:71-78(2016).

3.Hemichordate genomes and deuterostome origins, Nature 527(7579)459-465(2015).

TSUBOTA Hiromi Associate Professor

My research focuses on plant systematics based on molecular phylogeny, flora and vegetation of coastal areas of the Seto Inland Sea, Japan, and phenomena occurring in isolated environments, in particular, on Miyajima Island registered as a World Heritage Site, its conservation and impact of phytophagous animals and invasive plants.

keywords: Bryophytes, algae, lichen, cryptogams, sea grasses, phytosociology, molecular phylogeny, phytogeography, phenology, allelopathy

1.Systematics of the family Pottiaceae (Bryophyta) with special reference to the familial and subfamilial circumscriptions. Hikobia 17: 117-129. (2016)

2.On the systematic position of the genus *Timmiella* (Dicranidae, Bryopsida) and its allied genera, with the description of a new family Timmiellaceae. Phytotaxa 181: 151–162. (2014)

3.Systematic position of the enigmatic liverwort *Mizutania* (Mizutaniaceae, Marchantiophyta) inferred from molecular phylogenetic analyses. Taxon 59: 448-458. (2010)

HAMAO Kozue Associate Professor

Concurrent post : Biomedical Science

I am focusing on the intracellular function of the cytoskeleton. I elucidated the roles of DAPK3 in the regulation of a contractile ring during cytokinesis. I am also studying the abnormal regulation of microtubules by dynamin-2 mutations to understand the mechanism of neuropathy.

keywords: cytoskeleton, cytokinesis, DAPK3, dynamin, microtubules, neuropathy

1.Impairment of cytokinesis by cancer-associated DAPK3 mutations. Biochem Biophys Res Commun. 533:1095-1101 (2020)

2.ZIP kinase phosphorylated and activated by Rho kinase/ROCK contributes to cytokinesis in mammalian cultured cells. Exp Cell Res. 386:111707. (2020)

3.Phosphorylation of myosin II regulatory light chain by ZIP kinase is responsible for cleavage furrow ingression during cell division in mammalian cultured cells. Biochem Biophys Res Commun. 459:686-691. (2015)

FURUNO Nobuaki Associate Professor

Oocytes and embryos have a unique cell cycle. Oocytes are arrested at G2 phase for a long time. Moreover, oocyte skips the S phase and arrests again at M phase. After fertilization, embryo has only one G2 phase in first cleavage. I study a unique mechanism of these cell cycles.

keywords: Cell cycle, oocyte, embryo, Xenopus, meiosis

1.Suppression of DNA replication via Mos function during meiotic division in Xenopus oocytes. EMBO J. 13, 2399-2410,1994

2.Human Cyclin A Is Required for Mitosis until Mid Prophase. J. Cell Biol., 147, 295-306,1999

3. Involvment of Myt1 kinase in the G2 phase of the first cell cycle in Xenopus laevis. Biochemocal and Biophysical Research Communications 515, 139-145,2019

MIURA Ikuo Associate Professor

Sexual reproduction, which recombines nuclear genomes between individuals to produce biodiversity, plays a critically important role for adaptation and evolution of eukaryotes. My research theme is to unveil evolutionary mechanisms of the sex determination and sex chromosomes, which are key parts for the sexual reproduction.

keywords: Sex determination, sex chromosome, evolution

1.Hybridogenesis in the Water Frogs from Western Russian Territory: Intrapopulation Variation in Genome Elimination. Genes (2021).

2.Reconstruction of female heterogamety from admixture of XX-XY and ZZ-ZW sex chromosome systems within a frog species. Mol Ecol (2018).

3.An evolutionary witness: the frog Rana rugosa, underwent change of heterogametic sex from XY male to ZW female. Sex Dev (2007).

MORIGUCHI Kazuki Associate Professor or Lecturer

Our group is working on an analysis of horizontal gene transfer mediated by type-4 secretion system in bacteria. Through the analysis, we aim to apply it as a gene introduction tool by promoting the transfer, and as a prevention method of the spread of antibiotic resistance genes by blocking it.

keywords: horizontal gene transfer (HGT), type-4 secretion system (T4SS), gene introduction tool, antibiotics resistance gene

1. Targeting Antibiotic Resistance Genes Is a Better Approach to Block Acquisition of Antibiotic Resistance Than Blocking Conjugal Transfer by Recipient Cells: A Genome-Wide Screening in Escherichia coli/Front. Microbiol./2020
2. Trans-Kingdom Horizontal DNA Transfer from Bacteria to Yeast Is Highly Plastic Due to Natural Polymorphisms in Auxiliary Nonessential Recipient Genes/PLoS ONE/2013
3. The complete nucleotide sequence of a plant root-inducing (Ri) plasmid indicates its chimeric structure and evolutionary relationship between tumor-inducing (Ti) and symbiotic (Sym) plasmids in rhizobiaceae/J. Mol. Biol./2001

ARIMOTO Asuka Assistant Professor

My current area of interest is comparative genomics among various marine organisms. I focus on differences and/or similarities of the molecular mechanisms associated with morphogenesis in the research. Omics approaches including genome decoding help our comprehensive understanding of the evolution of the mechanisms.

keywords: Comparative genomics, Genome assembly, Development, Evolution

1. A siphonous macroalgal genome suggests convergent functions of homeobox genes in algae and land plants / DNA Res 26:183-192 / 2019
2. A draft genome assembly of the acoel flatworm *Praesagittifera naikaiensis* / GigaScience 8:1-8/ 2019
3. A draft genome of the brown alga, *Cladosiphon okamuranus*, S-strain: a platform for future studies of 'mozuku' biology / DNA Res 23:561-570 / 2016

IGAWA Takeshi Assistant Professor

Concurrent post : Biomedical Science

My interests are gene function and genome differentiation of amphibian species which have diversified ecology. I am studying genome evolution and adaptation on both model (clawed frogs in the genus Xenopus) and non-model amphibians by ecology and genomics.

keywords: amphibian, molecular evolution, genome evolution, whole genome sequencing, population genetics

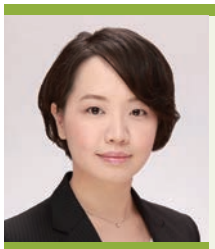
1. Fine-scale demographic processes resulting from multiple overseas colonization events of the Japanese stream tree frog, *Buergeria japonica*. J Biogeogr 44: 1586-1597 (2017)
2. Inbreeding ratio and genetic relationships among strains of the Western clawed frog, *Xenopus tropicalis*. PLoS One 10: e0133963 (2015)
3. Population structure and landscape genetics of two endangered frog species of genus *Odorrana*: different scenarios on two islands. Heredity 106: 131-137 (2013)

KOZUKA Toshiaki Assistant Professor

Photoautotrophic plants are particularly sensitive to their light environment. To optimize growth according to surrounding light conditions, plants evolved several classes of photoreceptors. I use molecular genetics in the model plant Arabidopsis thaliana to reveal the signaling events occurring downstream of photoreceptors.

keywords: Photoreceptor, Arabidopsis, Leaf senescence

1. Regulation of sugar and storage oil metabolism by phytochrome during de-etiolation. Plant physiology 182: 1114-1129 (2020)
2. Development and application of a high-resolution imaging mass spectrometer for the study of plant tissues. Plant and cell physiology 56: 1329-1338 (2015)
3. Tissue-autonomous promotion of palisade cell development by phototropin 2 in Arabidopsis. Plant cell 23: 3684-3695 (2011)



TAKAHASHI Haruko Assistant Professor

Concurrent post : Biomedical Science

By reconstructing and modeling "three-dimensional (3D) cancer tissues" *in vitro*, I aim to understand the molecular mechanisms of cancer malignancy and develop drug discovery or diagnostic tools through integrated analysis combining images and omics data.

keywords: *in vitro*, 3D, cancer, modeling

1. Amphiphilic polymer therapeutics: An alternative platform in the fight against antibiotic resistant bacteria, Biomater. Sci., 9: 2758–2767 (2021)
2. Anticancer polymers designed for killing dormant prostate cancer cells, Sci. Rep., 9: 1096 (2019)
3. Visualizing dynamics of angiogenic sprouting from a three-dimensional microvasculature model using stage-top optical coherence tomography, Sci. Rep., 7: 42426 (2017)

TAZAWA Ichiro Assistant Professor

I study the relationship between amphibian metamorphosis and fish-to-amphibian evolution. Evolution of hind limb development is my best interest.

keywords: amphibian, metamorphosis, land invasion, fish-to-amphibian

1.Homeotic transformation of tails into limbs in anurans. Dev Growth Differ 60:365-376. (2018)

2.Vitamin A induced homeotic hindlimb formation on dorsal and ventral sides of regenerating tissue of amputated tails of Japanese brown frog tadpoles. Dev Growth Differ 59:688-700. (2017)

3.A novel Xenopus laevis larval keratin gene, xlk2: its gene structure and expression during regeneration and metamorphosis of limb and tail. Biochim Biophys Acta 1759:216-24. (2006)

NAKAJIMA Keisuke Assistant Professor

I am studying the mechanisms of amphibian metamorphosis. Metamorphosis is induced by thyroid hormone. There are two receptors for thyroid hormone, and I have an interesting in the differences of roles and functions of them. I want to uncover the molecular mechanisms of metamorphosis, especially about tail regression.

keywords: metamorphosis, thyroid hormone, thyroid hormone receptor, tail regression, amphibian, Xenopus, tropicalis, gene knockout, CRISPR/Cas9, TALEN

1.Comprehensive RNA-Seq analysis of notochord-enriched genes induced during *Xenopus tropicalis* tail resorption/Gen. Com. Endocrinol.287: 113349 (2020)

2.Thyroid Hormone Receptor α– and β–Knockout *Xenopus tropicalis* Tadpoles Reveal Subtype-Specific Roles During Development/Endocrinol.159: 733-743. (2018)

3.Dual Mechanisms Governing Muscle Cell Death in Tadpole Tail During Amphibian Metamorphosis. Dev. Dyn. 227: 246-255 (2003)

NOBUSAWA Takashi Assistant Professor

I have been studying the regulatory mechanisms that control plant development (especially organ formation and senescence) using a model plant, Arabidopsis. In addition, I'm also going to study the plant physiology by the point of view from the lipid metabolism.

keywords: plant development, lipid metabolism

1.Highly pleiotropic functions of CYP78As and AMP1 are regulated in non-cell autonomous/organ-specific manner. *Plant Physiol*. in press (2021)

2.Differently localized lysophosphatidic acid acyltransferases crucial for triacylglycerol biosynthesis in the oleaginous alga *Nannochloropsis*. *Plant J*. 90:547–559. (2017)

3.Synthesis of Very-Long-Chain Fatty Acids in the Epidermis Controls Plant Organ Growth by Restricting Cell Proliferation. *PLoS Biol*. 11:e1001531. (2013)

HANADA Hideki Assistant Professor

This research objective is to develop two methods: One is to develop long-term-culturable amphibian organ heart with high-sensitivity similar to biological level, and the other is new testing technique-development for investigating reaction of various chemicals to the cultured organ heart.

keywords: Heart-organ-culture, amphibian, testing technique-development

1.Cyclosporin A inhibits thyroid hormone-induced shortening of the tadpole tail through membrane permeability transition, COMPARATIVE BIOCHEMISTRY AND PHYSIOLOGY B-BIOCHEMISTRY & MOLECULAR BIOLOGY, 135, pp. 473-483. (2003)

2.Do reactive oxygen species underlie the mechanism of apoptosis in the tadpole tail?, Free Radical Biology and Medicine, 23, pp. 294-301. (1997)

3.Phenolic antioxidant 2,6-di-tert-butyl-p-cresol (vitamin E synthetic analogue) does not inhibit 1,1 '-dimetyl-4,4 '-bipyridium dichloride (paraquat)-induced structural chromosomal damage in cultured leukocytes of the dark-spotted-frog Pelophylax (Rana) nigromaculatus, HEREDITAS, 149, pp. 173-177. (2012)

FUKAZAWA Jutarou Assistant Professor

Study of signal transduction and biosynthesis of plant hormones Using molecular biology, genetics, and biochemical techniques, we study how crosstalk between multiple plant hormones regulates germination, elongation growth, and flowering through the regulation of gene expression and response to the environment.

keywords: plant hormone, gibberellin, signal transduction, transcription factor, flowering, germination, Arabidopsis

1.DELLA degradation by gibberellin promotes flowering via GAF1-TPR-dependent repression of floral repressors in Arabidopsis. *Plant Cell*, in press (2021)

2.DELLA-GAF1 complex is a main component in gibberellin feedback regulation of GA 20-oxidase 2. *Plant Physiol*., 175: 1395-1406 (2017)

3.DELLAs function as coactivators of GAI ASSOCIATED FACTOR1 in regulation of GA homeostasis and signaling in Arabidopsis. *Plant Cell*, 26: 2920-2938, (2014)

MORISHITA Fumihiro Assistant Professor

Bioactive peptides are key molecules for regulation of homeostasis and behaviors in animals. I am a peptide hunter in gastropod mollusks. My research provides fundamental information on the structure and function of bioactive peptides, which are basis for understanding the neuronal and hormonal systems in the animal.

keywords: Aplysia, marine snail, HPLC, Mass spectrometry, Neuron, Precursor protein, Molecular biology

1.Physiological Functions of Gastropod Peptides and Neurotransmitters. In: Physiology of Molluscs. (Eds. Saleuddin S, Mukai ST), Apple Academic Press, Oakville, pp 379-476 (2017)

2.Molecular cloning of precursors for TEP-1 and TEP-2: The GGNG peptide-related peptides of a prosobranch gastropod, *Thais clavigera*. Peptides, 68:72-82 (2015)

3.Molecular cloning of two distinct precursor genes of NdWFamide, a D-tryptophan-containing neuropeptide of the sea hare, *Aplysia kurodai*. Peptides, 38:291-301 (2012)

Program of Mathematical and Life Sciences

IIMA Makoto Professor

We study bio-fluid mechanics and related problems such as flight and swimming of animals, collective behaviors of microorganisms, and transportation inside body, by using mathematical analysis. Our aim is to extract essential behavior of biological activity, movements and functions in terms of mathematics for future applications.

keywords: fluid mechanics, biofluid, swimming, flight, collective behavior, mathematical structure

1.Active lift inversion process of heaving wing in uniform flow by temporal change of wing kinematics, Phys Rev E, 99: 043110(2019)

2.Jacobian-free algorithm to calculate the phase sensitivity function in the phase reduction theory and its applications to Karman's vortex street, Phys Rev E, 99: 062203(2019)

3.Localized bioconvection patterns and their initial state dependency in Euglena gracilis in an annular container. J Phys Soc Jpn, 83: 043001 (2014)

IZUMI Syunsuke Professor

The ionization method called MALDI can acquire "mass information" and "position information" at the same time, but by combining this with the MALDI method that does not use a matrix, we would like to start the development of "micro natural product chemistry".

keywords: MALDI, mass information, position information

1.Mass spectrometric characterization of histone H3 Isolated from in-Vitro reconstituted and acetylated nucleosome core particle/Mass Spectrometry/2020

2.3-Hydroxy-4-nitrobenzoic Acid as a MALDI Matrix for In-Source Decay/ Analytical Chemistry / 2016

3.Alkylated Trihydroxyacetophenone as a MALDI Matrix for Hydrophobic Peptides/ Analytical Chemistry/ 2013

SAKAMOTO Atsushi Professor

My research interests lie in plant science, primarily elucidating molecular mechanisms of how plants respond to and survive in changing environments. Applied research is also conducted to exploit the capabilities of plants, including microalgae, for better performance under stress and towards the practical production of useful substances such as biofuels.

keywords: Plant molecular physiology, Plant hormone, Plant metabolite, Stress response, Stress tolerance, Biotechnology

1.Dynamics of the leaf endoplasmic reticulum modulate ß-glucosidase-mediated stress-activated ABA production from its glucosyl ester, J Exp Bot, 71: 2058-2071(2020)

2.Allantoin, a stress-related purine metabolite, can activate jasmonate signaling in a MYC2-regulated and abscisic acid-dependent manner, J Exp Bot, 67: 2519-2532(2016)

3.The purine metabolite allantoin enhances abiotic stress tolerance through synergistic activation of abscisic acid metabolism, Plant Cell Environ, 37: 1022-1036(2014)

SAKAMOTO Kunimochi Professor

Research activities of mine have been focused on the studies of the space-time pattern dynamics created by reaction-diffusion equations, together with the analyses of Turing destabilization/bifurcation, and the construction/stability analysis of transition layer solutions.

keywords: reaction-diffusion equations, dynamical systems, Turing destabilization, pattern formation

1.Turing type instability in a diffusion model with mass transport on the boundary /DCDS. 40, 3813-3836/2020

2.A diffusion model for cell polarization with interaction on the membrane/J.J.I.Appl.Math. 35, 261-276/2018

3.Turing type mechanism for linear diffusion systems under non-diagonal Robin boundary coditions/SIAM J. Math. Anal. 45, 3611-3628/2013

TATE Shinichi Professor

Concurrent post : Biomedical Science

My research focus is on the structure and function relations of intrinsically disordered proteins (IDPs) that constitute about 50% of human proteins with combinatorial use of theoretical and experimental approaches including NMR, molecular dynamics simulation, biochemistry, and cell biology. Students with a physics diploma are very welcome.

keywords: Biophysic, Structural Biology, Protein, IDP

1.Ultrasensitive Change in Nucleosome Binding by Multiple Phosphorylations to the Intrinsically Disordered Region of the Histone Chaperone FACT/J.Mol.Biol./2020

2.Non-RVD mutations that enhance the dynamics of the TAL repeat array along the superhelical axis improve TALEN genome editing efficacy/ Sci. Rep./2016

3.Allosteric breakage of the hydrogen bond within the dual-histidine motif in the active site of human Pin1 PPIase/Biochemistry/2015

NAKATA Satoshi Professor

Rhythm and pattern observed in living organisms and nature are called “self-organization”. Artificial experimental systems are developed to physicochemically elucidate the mechanism of self-organziation. Characteristic features of motion, such as collective motion and synchronized sailing, and oscillatory motion of self-propelled objects and chemical oscillation are examined actually.

keywords: self-organization, oscillation, pattern formation, synchronization

1.Evolution of self-propelled objects – From the viewpoint of nonlinear science, Chem. A Euro. J., 2018.

2.Self-propelled motion of a coumarin disk characteristically changed in couple with hydrolysis on an aqueous phase, J. Phys. Chem. B, 2019.

3.Chemical wave propagation in the Belousov-Zhabotinsky reaction controlled by electrical potential, J. Phys. Chem. A, 2019.

HONDA Naoki Professor

To understand the mechanisms behind dynamic and complex biological phenomena, we are combining mathematical modeling and machine learning for decoding the governing rules or equations that govern biological system.

keywords: Data-driven biology, Mathematical modeling, Machine learning

1. Model-based prediction of spatial gene expression via generative linear mapping. Nature Communication (2021)

2. Noise-resistant developmental reproducibility in vertebrate somite formation. PLoS Comput Biol (2019)

3. Identification of animal behavioral strategies by inverse reinforcement learning. PLoS Comput Biol (2018)

YAMAMOTO Takashi Professor

Concurrent post : Biomedical Science

We are developing genome editing technologies that can be used in various organisms and trying their use in various fields.

keywords: genome editing, developmental biology

1.Biased genome editing using the local accumulation of DSB repair molecules system, NATURE COMMUNICATIONS, 9:3270 (2018)

2.Single-Molecule Nanoscopy Elucidates RNA Polymerase II Transcription at Single Genes in Live Cells, CELL, 78:491-506.e28 (2019)

3.Zinc-finger nuclease-mediated targeted insertion of reporter genes for quantitative imaging of gene expression in sea urchin embryos, PNAS, 109:10915-20 (2012)

AWAZU Akinori Associate Professor

We progress theory-experimant hybrid studies for structural dynamics of biomolecular populations, genome dynamics and gene regulation, development and morphogenesis of multi-cellular organisms.

keywords: Mathematical model, Biological and medical data analysis, Experiment for molecular and developmental biology

1.Affinity of rhodopsin to raft enables the aligned oligomer formation from dimers: Coarse-grained molecular dynamics simulation of disk membranes. / PLoS ONE / 2020

2.Insulator Activities of Nucleosome-Excluding DNA Sequences Without Bound Chromatin Looping Proteins. / J. Phys. Chem. / 2019

3.Broad distribution spectrum from Gaussian to power law appears in stochastic variations in RNA-seq data. / Sci. Rep. / 2018

OHNISHI Isamu Associate Professor

I would like to prove some analytical theorems of nonlinear partial differential equations with dissipative structure by utilize of evolution equations theory, by which I elucidate mathematical structure of time global solutions of nonlinear partial differential equations under consideration.

keywords: nonlinear partial differential equations with dissipative structure, evolution equations theory

1.A mathematical study of the one dimenional Keller and Rubinou model for Liesegang bands / J. Stat. Phys. Vol. 135, 107-132 (2009)

2.Bifurcation analysis to the Lugiato–Lefever equation in one space dimension, Physica D: Nonlinear Phenomena Volume 239, 2066-2083 (2010)

3.Erratum: Stability of stationary solution for the Lugiato-Lefever equation / Tohoku Math. J. 72, 487-492 (2020)

KATAYANAGI Katsuo Associate Professor

Structure and function analysis of protein by X-ray crystallography. Target proteins are DNA-repair enzyme; toxin proteins from staphylococcus aureus; lectin from algae; proteins relating to cancer and Parkinson's disease; proteins from plant; glucokinase, and so on. Molecular evolution of protein is also analyzed from X-ray structure of artificial proteins.

keywords: protein, crystallography, structural biology, chemistry, physics, data science, synchrotron radiation, pharmacy

1.Three-dimensional structure of ribonuclease H from E. coli./Nature 347, 306–309/1990

2.X-ray structure of T4 endonuclease V: An exision repair enzyme specific for a pyrimidine dimer./Science 256, 523-526/1992

3.Structure-function relationship of assimilatory nitrite reductases from the leaf and root of tobacco based on high resolution structures./Prot. Sci. 21, 383-395/2012

SAKAMOTO Naoaki Associate Professor

Concurrent post : Biomedical Science

Using the sea urchin development as a model, I aim to elucidate the molecular mechanisms for transcriptional regulation of morphogenetic genes, nuclear dynamics of gene, chromatin and chromosome during development, and insulator activity with molecular biology techniques and genome editing.

keywords: sea urchin development, transcription, nuclear dynamics

1.Establishment of knockout adult sea urchins by using a CRISPR-Cas9 system. Dev Growth Differ 61:378-388. (2019)

2.Dynamic changes in the interchromosomal interaction of early histone gene loci during development of sea urchin. J Cell Sci 130:4097-4107. (2017)

3.Cilia play a role in breaking left–right symmetry of the sea urchin embryo. Genes Cells 21:568-578. (2016)

SAKUMA Tetsushi Associate Professor

Concurrent post : Biomedical Science

My research focuses on the development of new tools and methods of genome editing and epigenome editing. I also investigate the application of genome editing and related technologies in various fields of research such as medicine, dentistry, pharmacy, and agricultural science.

keywords: Genome editing, Epigenome editing, CRISPR-Cas9, TALEN

1.Biased genome editing using the local accumulation of DSB repair molecules system. Nat Commun 9: 3270. (2018)

2.MMEJ-assisted gene knock-in using TALENs and CRISPR-Cas9 with the PITCh systems. Nat Protoc 11: 118:133. (2016)

3.Microhomology-mediated end-joining-dependent integration of donor DNA in cells and animals using TALENs and CRISPR/Cas9. Nat Commun 5: 5560. (2014)

SHIMADA Hiroshi Associate Professor

We are studying the mechanisms of increase of photosynthesis activity, which may contribute to the reduction of CO_2 as greenhouse gas, and countermeasures against the global food crisis.
We have revealed several mechanisms of inhibition of photosynthetic protein oxidation and have succeeded in breeding plants with increased photosynthetic activity.

keywords: photosynthesis, Rubisco, redox, oxidative stress

1.Overexpression of BUNDLE SHEATH DEFECTIVE 2 improves the efficiency of photosynthesis and growth in *Arabidopsis*. (2020) *Plant J*. 102: 129-137.

2.Arabidopsis BSD2 reveals a novel redox regulation of Rubisco physiology *in vivo*. (2020) *Plant Signal*. *Behav*. 15

3.Overexpression of the protein disulfide isomerase AtCYO1 in chloroplasts slows dark- induced senescence in Arabidopsis. (2018) *BMC Plant Biology* 18: 1-9.

FUJIWARA Yoshihisa Associate Professor

Research fields consist of (1) effect of steady high magnetic fields up to 200,000 gauss and (2) effect of magnetically regulated gravitational fields, especially microgravity and hypergravity, on photochemical reactions and biological phenomena of *Aspergillus oryzae*.

keywords: Magneto-Science, Magnetic field, Magnetically regulated gravitational field, Microgravity, Hypergravity, Photochemical reation, *Aspergillus oryzae*

1.Effect of High Magnetic Fields on the Reverse Electron Transfer Process in an α-Cyclodextrin Inclusion Complex of Phenothiazine-Viologen Chain-Linked Compound / *Chem. Phys. Lett.*, 259, 361-367 / 1996.

2.Effect of Horizontal Strong Static Magnetic Field on Swimming Behavior of *Paramecium caudatum* / *Mol. Phys.*, 104, 1659-1666 / 2006.

3.Effect of Hypergravity Created by Strong Magnetic Force on Orientation of Porphyrin Nanorods / *J. Magn. Magn. Mater.*, 310, 2859-2861 / 2007.

ASHIDA Yoshiyuki Assistant Professor

OOMAE Eiji Assistant Professor

Since the internal and external hydrostatic pressures of deep-sea microorganisms are the same, their enzymes must work under high hydrostatic pressure and have some kind of pressure-adaptation mechanisms. Elucidation of such pressure-adaptation mechanisms of deep-sea enzymes make contributions to basic bioscience and industrial applications.

keywords: deep sea enzyme, high pressure, hydration, molecular adaptation, partial molar volume.

1.Functional, structural, and thermodynamic characteristics of enzymes from deep-sea microorganisms. Microbial Catalysts Volume 1: 325-343 (2019).

2.Stability, flexibility, and function of dihydrofolate reductases from *Escherichia coli* and deep-sea bacteria. Current Research in Microbiology: 1-36 (2018).

3.Similar structural stabilities of 3-isopropylmalate dehydrogenases from the obligatory piezophilic bacterium *Shewanella benthica* strain DB21MT-2 and its atmospheric congener *S. oneidensis* strain MR-1. Biocim. Biophys. Acta 1866: 680-691 (2018).

TAKAHASHI Misa Assistant Professor

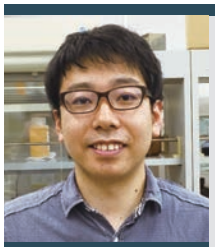
Nitrogen dioxide is a trace component of atmosphere, and is used to be known as a pollutant. I have found that nitrogen dioxide is a positive regulator for plants to nearly double organ size and shoot biomass. I have been studying the molecular mechanism how nitrogen dioxide acts on plants.

keywords: Nitrogen dioxide, Nitrogen oxide, Plant, Arabidopsis, Environment

1.Dual selective nitration in Arabidopsis: Almost exclusive nitration of PsbO and PsbP, and highly susceptible nitration of four non-PSII proteins, including peroxiredoxin II E/Electrophoresis/2015

2.Nitrogen dioxide regulates organ growth by controlling cell proliferation and enlargement in Arabidopsis/New Phytol/2014

3.Atmospheric nitrogen dioxide gas is a plant-vitalization signal to increase plant size and the contents of cell constituents/New Phytol/2005



TSUDA Masataka Assistant Professor

Concurrent post : Biomedical Science

DNA is continuously subject to damage by endogenous and environmental agents. If not repaired, DNA damage interferes with DNA replication and transcription, resulting in cell death and mutations. My current research interests focus on elucidating the elaborate DNA repair mechanism to mitigate the deleterious effects of superbulky DNA lesions.

keywords: DNA damage, DNA repair mechanism

1.Tyrosyl-DNA phosphodiesterase 2 (TDP2) repairs topoisomerase 1 DNA-protein crosslinks and 3'-blocking lesions in the absence of tyrosyl-DNA phosphodiesterase 1 (TDP1)./DNA Repair./2020

2.Repair of trapped topoisomerase II covalent cleavage complexes: Novel proteasome-independent mechanisms./Nucleosides, Nucleotides & Nucleic Acids./2020

3.BRCA1 ensures genome integrity by eliminating estrogen-induced pathological topoisomerase II-DNA complexes. /PNAS./2018

MITSUNAGA-NAKATSUBO Keiko Assistant Professor

To understand the morphological diversity and conservation of multicellular animals, I have been studying the regulatory mechanisms for morphogenesis during development using sea urchin, medaka and mouse. I am currently investigating on the molecular environment, function and evolution of novel extracellular matrix, which is indispensable for constructing multicellular systems.

keywords: morphogenesis, development, extracellular matrix, cell differentiation

1.Cell-surface arylsulfatase A and B on sinusoidal endothelial cells, hepatocytes, and Kupffer cells in mammalian livers. Med Mol Morphol 42:63-69. (2009)

2.Sea urchin arylsulfatase, an extracellular matrix component, is involved in gastrulation during embryogenesis. Dev Genes Evol 219:281-288. (2009)

3.Distributions of H^+,K^+-ATPase and Cl^-,$HCO_3^{(-)}$-ATPase in micromere-derived cells of sea urchin embryos. Differentiation 35:190-196. (1987)

FUJII Masashi Assistant Professor

We aim to understand the biological phenomena by using the mathematical modeling and the data analysis. Recently, we are focusing on the relationship among structure, movement and function of molecules, subcellular organelles and cells.

keywords: Mathematical Modeling, Statistics, Biophysics, Systems Biology, Bioinformatics

1.Logical design of oral glucose ingestion pattern minimizing blood glucose in humans/npj Syst. Biol. Appl. 5:31/2019

2.Robustness against additional noise in cellular information transmission/Phys. Rev. E 100:042403/2019

3.Small-Volume Effect Enables Robust, Sensitive, and Efficient Information Transfer in the Spine/Biophys. J. 112:813/2017

FUJIWARA Masao Assistant Professor

Analyzing the dynamic behavior of a group composed of molecules and ions under magnetic microgravity fields, viz., (1) magnetic orientation of crystals and carbon nanotubes, (2) magnetic movement and separation of transition-metal ions, (3) growth of protein crystals in microgravity space.

keywords: Magnetic microgravity field

1.Magnetic Orientation of Benzophenone Crystals in Fields up to 80.0 kOe. J. Phys. Chem. B 103, 2627-2630 (1999).

2.Magnetic Orientation and Magnetic Properties of a Single Carbon Nanotube. J. Phys. Chem. A 105, 4383-4386 (2001).

3.Formation of Protein Crystals (Orthorhombic Lysozyme) in Quasi-Microgravity Environment Obtained by Superconducting Magnet. J. Cryst. Growth 270, 184-191 (2004).

YASUDA Kyota Assistant Professor

Concurrent post : Biomedical Science

My research interest is in the mechanisms of cell-polarization, and how it contributes the bilological events, including human disease.

keywords: Cell polarity, Biomolecular condensates, Local translation, Bio-imaging

1. “The RNA-binding protein Fus directs translation of localized mRNAs in APC-RNP granules.” eLife, 2019

2. “FUS inclusions disrupt RNA localization by sequestering kinesin-1 and inhibiting microtubule detyrosination.” J. C. Biol., 2017.

3. “Translation regulation of protrusion-localized RNAs involves silencing and clustering after trasnport..” J. C. Biol., 2013.

TIWARI Sandhya Premnath Assistant Professor

Through the analysis of large-scale slow dynamics, atomic level dynamics using molecular dynamics in PyrR proteins, their control via allostery and RNA-binding function can be better understood and therefore targeted in antibiotic-resistant bacteria. Furthermore, through the large- scale analysis of structural data across different experimental sources, and large- scale slow dynamics via coarse-grained normal mode analysis, I will build a platform that will provide fresh insight into how biological shapes inform biological mechanisms.

keywords: Molecular dynamics, coarse-grained modeling, structual bioinformatics

1.Evolution of Oligomeric State through Allosteric Pathways That Mimic Ligand Binding. Science 346: 6216: 1254346. (2014)

2.Similarity in Shape Dictates Signature Intrinsic Dynamics Despite No Functional Conservation in TIM Barrel Enzymes. PLoS Comput. Biol. 12: 3: e1004834. (2016)

3.Searching for 3D Structural Models from a Library of Biological Shapes Using a Few 2D Experimental Images. BMC Bioinform. 19: 1: 320. (2018)

Program of Biomedical Science

IMAMURA Takuya Professor

Concurrent post : Basic Biology

Our Lab aims to understand the epigenetic mechanisms that underlie human brain development. We employ genome-wide analyses, combined with wide variety of functional analyses. We are now focusing on the involvement of long non-coding RNAs in the gene-specific epigenetic regulation that can shape species-dependent cellular networking in the cerebral cortex.

keywords: non-coding RNA, epigenome, DNA methylation/demethylation, gene activation, brain, neural stem cell, human, primate, mouse, rodent, species-specific, biodiversity, adaptation, evolution, bioinformatics

1.Evolutionary acquisition of promoter-associated non-coding RNA (pancRNA) repertoires diversifies species-dependent gene activation mechanisms in mammals. BMC Genomics, 18:285 (2017)

2.Bidirectional promoters link cAMP signaling with irreversible differentiation through promoter-associated non-coding RNA (pancRNA) expression in PC12 cells. Nucleic Acids Research, 44: 5105 (2016)

3.Gene activation-associated long noncoding RNAs function in mouse preimplantation development. Development, 142: 910 (2015)

CHIHARA Takahiro Professor

Concurrent post : Basic Biology

We are studying the following topics by using Drosophila genetic methods. How does the sense of smell control individual behavior, immunity, and longevity? How does sleep regulate synaptic function? What is the mechanism of tissue size control by nutrition? How is the topology of membrane protein regulated?

keywords: Drosophila, olfaction, longevity, aging, innate immunity, behavior, sleep, synapse, tissue size, membrane protein topology

1.Multiple functions of the ER-resident VAP and its extracellular role in neural development and disease/J Biochem/165/391-400/2019

2.Dendritic Eph organizes dendrodendritic segregation in discrete olfactory map formation in Drosophila/Genes Dev/31/1054-1065/2017

3.The Strip-Hippo pathway regulates synaptic terminal formation by modulating actin organization at the Drosophila neuromuscular synapses/Cell Rep/16/2289-2297/2016

HAYASHI Toshinori Professor

Concurrent post : Basic Biology

The amphibian newt has the remarkable ability to regenerate various body parts. Our laboratory aims to elucidate the mechanisms of organ regeneration using newts as experimental model. We are also working on the development and maintenance of a bioresource of the Iberian ribbed newts.

keywords: Newt, Regeneration, Bioresource

1.A comprehensive reference transcriptome resource for the Iberian ribbed newt Pleurodeles waltl, an emerging model for developmental and regeneration biology/ DNA Res. 217-229 (2019)

2.Cas9 ribonucleoprotein complex allows direct and rapid analysis of coding and noncoding regions of target genes in Pleurodeles waltl development and regeneration/ Dev. Biol. 127-136 (2018)

3.Molecular genetic system for regenerative studies using newts/ Dev. Growth Differ. 229-236 (2013)

BONO Hidemasa Professor (Special Appointment)

Concurrent post : Mathematical and Life Sciences

We are developing bioinformatic technologies required for genome editing, which is becoming a widely used tool for gene function analysis. We are also analyzing gene function using bioinformatics methods developed and public databases in life science, which is called bio digital transformation (BioDX).

keywords: bioinformatics, genome editing, transcriptome, functional annotation, public database, open source software, hypoxia, functional genomics

1.Meta-Analysis of Hypoxic Transcriptomes from Public Databases. Biomedicines, 8:10 (2020)

2.RefEx, a reference gene expression dataset as a web tool for the functional analysis of genes. Sci Data. 4:170105 (2017)

3.Identification of key uric acid synthesis pathway in a unique mutant silkworm Bombyx mori model of Parkinson's disease.PLoS One.8:e69130 (2013)

ISHIHARA Yasuhiro Associate Professor

Concurrent post : Life and Environmental Sciences

Our research topics are on the effects of environmental chemicals such as pesticides and PM2.5 on the central nervous system (CNS). We focus on an action of the brain immune cell, microglia. We are also interested in the interaction of chemical exposure and CNS disorders like stroke and epilepsy.

keywords: Neurotoxicology, Environmental chemicals, Microglia

1.Interleukin 33 expression induced by aryl hydrocarbon receptor in macrophages. Toxicol Sci. 170:404-414 (2019).
2.Neuroprotective activation of astrocytes by methylmercury exposure in the inferior colliculus. Sci Rep. 9:13899 (2019).
3.Retinoid X receptor-mediated neuroprotection via CYP19 upregulation and subsequent increases in estradiol synthesis. J Steroid Biochem Mol Biol. 193:105421 (2019).

UENO Masaru Associate Professor

Concurrent post : Biotechnology

Study about telomere maintenance, chromosome stability, and DNA repair and their application to anti-aging and anti-cancer research. We also take fluorescence live cell imaging and analyze them quantitatively to study the role for dynamics of proteins and chromatin in nuclear function.

keywords: telomere, chromosome stability, DNA repair, anti-aging, anti-cancer, fluorescence live cell imaging, dynamics of proteins, nuclear function

1.Spindle pole body movement is affected by glucose and ammonium chloride in fission yeast. Biochem Biophys Res Commun. (2019).
2.A diffusion model for the coordination of DNA replication in Schizosaccharomyces pombe. Sci Rep. (2016).
3.Chromosome passenger complex is required for the survival of cells with ring chromosomes in fission yeast PLoS One. (2018).

OKUMURA Misako Associate Professor

Concurrent post : Basic Biology

Although nematodes do not have eyes, worms can detect light and show light avoidance behavior. We try to reveal the molecular and neural mechanisms of how light is detected by the nematode, and how the light environment affects development and behaviors.

keywords: nematode, light, behavior, development, genetics, evolution, phenotypic plasticity, polyphenism

1. "Serotonin Drives Predatory Feeding Behavior via Synchronous Feeding Rhythms in the Nematode Pristionchus pacificus" G3: Genes, Genomes, Genetics 7:3745-3755 (2017)
2. "Screening for CRISPR/Cas9-induced mutations using a co-injection marker in the nematode Pristionchus pacificus" Development Genes and Evolution, 230, 257–264 (2020)
3. "Linking cell surface receptors to microtubules: Tubulin folding cofactor D mediates Dscam functions during neuronal morphogenesis" J Neurosci 35:1979-1990 (2015)

OCHIAI Hiroshi Associate Professor

Concurrent post : Mathematical and Life Sciences

Gene expression is mainly regulated at the transcriptional stage, but the transcriptional regulation mechanism is complex and varies greatly from gene to gene. We are currently conducting research using mouse embryonic stem cells to elucidate the regulatory mechanisms of transcription, particularly the phenomenon known as transcriptional bursting.

keywords: Gene expression, transcription, embryonic stem cells, transcriptional bursting

1.Genome-wide kinetic properties of transcriptional bursting in mouse embryonic stem cells. Sci Adv 6 eaaz6699. (2020)
2.Simultaneous live imaging of the transcription and nuclear position of specific genes, Nucleic Acids Res 43 e127. (2015)
3.Stochastic promoter activation affects Nanog expression variability in mouse embryonic stem cells, Sci Rep 4, 7125. (2014)

KUME Kazunori Associate Professor

Concurrent post : Biotechnology

Study on the control mechanism of intracellular structure that ensures eukaryotic cellular function. Our research is currently focused on nuclear size, establishment and maintenance of cell polarity, and organization of the cytoskeletons such as actin and microtubule. We use fission yeast as a model organism for eukaryotic cells.

keywords: intracellular structure, nuclear size, cell polarity, cytoskeleton, cell growth, organelle size, fission yeast, cell biology

1.Nuclear membrane protein Lem2 regulates nuclear size through membrane flow. Nat. Commun. (2019)
2.A systematic genomic screen implicates nucleocytoplasmic transport and membrane growth in nuclear size control. Plos Genet. (2017)
3.Calcineurin ensures a link between the DNA replication checkpoint and microtubule-dependent polarized growth. Nat. Cell Biol. (2011)

SUGI Takuma Associate Professor

Concurrent post : Mathematical and Life Sciences

Living things exhibit clever information processing to cope with environmental changes at individual and population level. I seek physical rules governing individual and population level behaviors and neural circuit aging. For this purpose, I have taken interdisciplinary approaches between neuroscience, ethology, engineering and nonlinear physics.

keywords: Biophysics, collective behavior, aging, optics

1.Regulation of behavioral plasticity by systemic temperature signaling in Caenorhabditis elegans, Nature Neurosci, 2011

2.C. elegans collectively forms dynamical networks, Nature Commun, 2019

3.High-throughput optical quantification of mechanosensory habituation reveals neurons encoding memory in Caenorhabditis elegans, PNAS, 2014

SHIMODE Sayumi Assistant Professor

Endogenous retroviruses (ERVs) are present in the genomes of all vertebrates. While most ERVs are inactivated by genetic and epigenetic mechanisms, some are transcribed and encode the proteins. ERVs' inheritance can be harmful or beneficial to the host. We are studying the functions and acquisition mechanisms of ERVs in mammals.

keywords: endogenous retroviruses, genome, virus, evolution

1.Multiple invasions of an infectious retrovirus in cat genomes/Scientific Reports/2015

2.Characterization of feline ASCT1 and ASCT2 as RD-114 virus receptor/Journal of General Virology/2013

3.Susceptibility of domestic animals to a pseudotype virus bearing RD-114 virus envelope protein/Gene/2015

SUZUKI Makoto Assistant Professor

Concurrent post : Basic Biology

I am studying embryonic development at the cellular and molecular levels. Using amphibians, I analyze the mechanisms of formation of epithelial organs such as the neural tube and human congenital abnormalities caused by its disruption, utilizing cell biology and advanced live imaging techniques.

keywords: embryonic development, amphibian, Xenopus, epithelial morphogenesis, congenital disabilities, live imaging

1.Distinct intracellular Ca^{2+} dynamics regulate apical constriction and differentially contribute to neural tube closure. Development 144:1307-1316. (2017)

2.Mechanical roles of apical constriction, cell elongation, and cell migration during neural tube formation in Xenopus. Biomech Model Mechanobiol 15:1733-1746. (2016)

3.MID1 and MID2 are required for Xenopus neural tube closure through the regulation of microtubule organization 137:2329-2339. (2010)

HOSOBA Kosuke Assistant Professor

Concurrent post : Mathematical and Life Sciences

Point mutations in human genome induce genetic disorders. To understand mechanism of human disorders, disease model animals are useful tools. My purpose is establishment of human disease model mice by CRISPR/Cas9 based genome editing technology and analysis of model mice to reveal pathology of human disorder.

keywords: Genome editing, Human mutation, Genetic disorder

1.Insufficiency of ciliary cholesterol in hereditary Zellweger syndrome/EMBO J 39:e103499/2020

2.PLK1-mediated phosphorylation of WDR62/MCPH2 ensures proper mitotic spindle orientation/Hum Mol Genet 26:4429-4440/2017

3.Phosphorylation of myosin II regulatory light chain by ZIP kinase is responsible for cleavage furrow ingression during cell division in mammalian cultured cells/Biochem Biophys Res Commun 459:686-91/2015

YUKAWA Masashi Assistant Professor

Concurrent post : Biotechnology

Our main research interests are the molecular mechanisms of mitotic progression, particularly we focus on the spindle assembly which is required for proper chromosome segregation. For this purpose, we usually use yeast as a model organism. We also aim to apply our findings towards the development of novel anti-cancer drugs.

keywords: mitosis, chromosome segregation, spindle assembly, microtubule, actin, kinesin, myosin, yeast, anti-cancer drug

1.Escape from mitotic catastrophe by actin-dependent nuclear displacement in fission yeast. iScience, 24:102031.(2021)

2.How Essential Kinesin-5 Becomes Non-Essential in Fission Yeast: Force Balance and Microtubule Dynamics Matter. Cells, 9:1154. (2020)

3.Kinesin-6 Klp9 plays motor-dependent and -independent roles in collaboration with Kinesin-5 Cut7 and the microtubule crosslinker Ase1 in fission yeast. Sci Rep, 9:7336. (2019)

WATANABE Tomonobu Visiting Professor

Concurrent post : Mathematical and Life Sciences

The aim of us is to describe the common mechanisms regulating high-order function in complex biological system in stem cell differentiation as an experimental model. To the end, we are developing a new quantitative analysis system that incorporates multi-layer data including spectroscopy, microscopy, transcriptome, and basic current biochemistry.

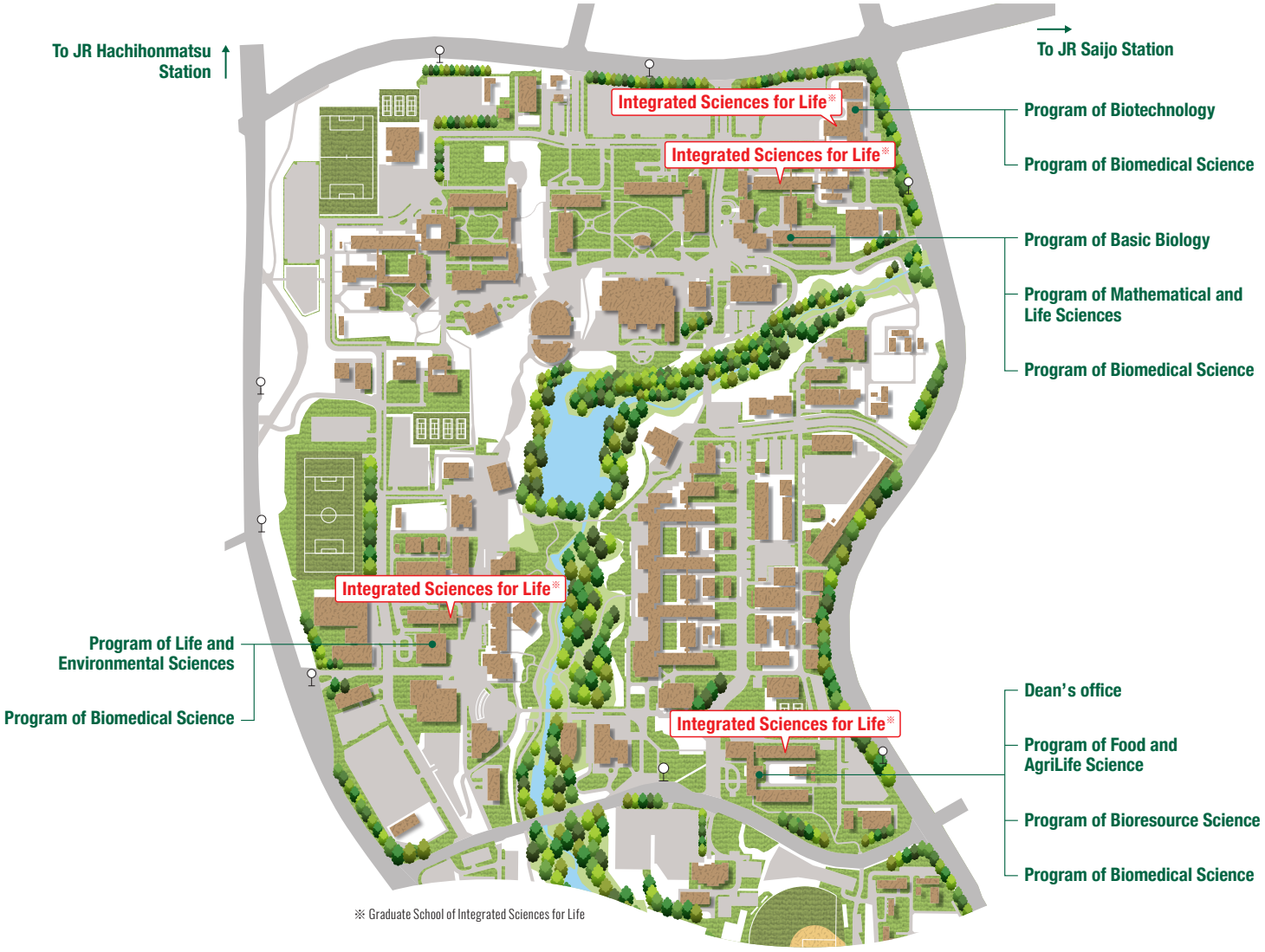
keywords: radiation-dose effect, stem cell research, quantitative biology, optical microscopy, spectroscopy, machine learning.

1.Following embryonic stem cells, their differentiated progeny, and cell-state changes during iPS reprogramming by Raman spectroscopy. Anal Chem 92, 14915–14923 (2020)

2.Linking substrate and nucleus via actin cytoskeleton in pluripotency maintenance of mouse embryonic stem cells. Stem Cell Res. 41, 101614 (2019)

3.Second harmonic generation polarization microscopy as a tool for protein structure analysis. Biophys Physicobiol. 16, 147-157 (2019)

Higashi-Hiroshima Campus Map



※ Graduate School of Integrated Sciences for Life

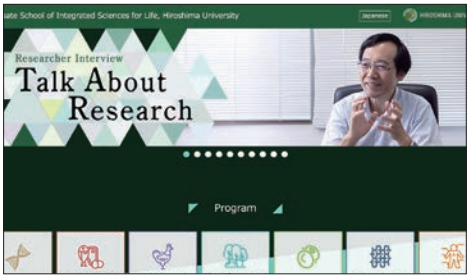
Web

Homepage

https://www.hiroshima-u.ac.jp/en/ilife

Talk About Research

https://gsbstop.hiroshima-u.ac.jp/kataru/index_en.html



Contact

Graduate School of Integrated Sciences for Life

Main Contact

1-4-4 Kagamiyama, Higashi-Hiroshima City, Hiroshima, 739-8528, Japan
TEL : +81-82-424-7904 / FAX : +81-82-424-2459 Support Office for the fields of Biosphere Science
https://www.hiroshima-u.ac.jp/ilife E-mail : sei-bucho-sien@office.hiroshima-u.ac.jp

●Program of Biotechnology
1-3-1 Kagamiyama, Higashi-Hiroshima City, Hiroshima, 739-8530, Japan
TEL : +81-82-424-7004 / FAX : +81-82-424-7000
Support Branch Office for the fields of Science

●Program of Food and AgriLife Science and Program of Bioresource Science
1-4-4 Kagamiyama, Higashi-Hiroshima City, Hiroshima, 739-8528, Japan
TEL : +81-82-424-7904 / FAX : +81-82-424-2459
Support Office for the fields of Biosphere Science

●Program of Life and Environmental Sciences
1-7-1 Kagamiyama, Higashi-Hiroshima City, Hiroshima, 739-8521, Japan
TEL : +81-82-424-6306 / FAX : +81-82-424-0751
Support Office for the fields of Integrated Arts and Sciences

●Program of Basic Biology, Program of Mathematical and Life Sciences and Program of Biomedical Science
1-3-1 Kagamiyama, Higashi-Hiroshima City, Hiroshima, 739-8526, Japan
TEL : +81-82-424-7305 / FAX : +81-82-424-0709
Support Office for the fields of Science