

Research outline

(Updated: April 1st, 2023)

Department/Center	Laboratory	Faculty	Research outline
Department of Informatics	Gene- Expression Analysis	OKUBO, Kousaku / Professor	“How can we make use of data and information at our finger-tip in making smarter decisions in our own contexts?” Without solving this question, all analytical and descriptive efforts that digitalize the reality end up in vain. Our tentative answer/goal for this is to develop method to enhance “fluidity” and “utility”of medical knowledge among humans and machines.
	Genetic Informatics	KAWAMOTO, Shoko /Associate Professor	We are working on research and development of databases and information retrieval system for the national bio-resource project (NBRP).
	Genome Evolution	KUROKAWA, Ken / Professor HIGASHI, Koichi / Assistant Professor	We are interested in understanding about microbial genome evolution and microbial community dynamics, and we are currently reaching out in the following two major research directions: I. Facilitate the development of an integrated database “MicrobeDB.jp”, II. Microbial community dynamics.
	Genome Diversity	MORI, Hiroshi / Associate Professor	Our main research goal is to understand the relationships between the habitat of organisms and genome diversity. To facilitate the studies using comparative genomics and metagenomics, we are also developing various bioinformatics methodologies.
	Biological Networks	ARITA, Masanori / Professor	Network analysis of metabolic pathways based on comprehensive identification and quantification of metabolites (metabolomics); Bioinformatics related to plant secondary metabolism and lipid metabolism
	Genome Informatics	NAKAMURA, Yasukazu / Professor TANIZAWA, Yasuhiro / Assistant Professor	Intelligent information technology for structural and functional annotations of large-scale nucleotide sequences.
Department of Genomics and Evolutionary Biology	DNA Data Analysis	IKEO, Kazuho / Associate Professor	Evolutionary study of genomic structure and gene expression pattern to elucidate the evolutionary mechanism of central nervous system and sensory organs. Evolutionary genomics analysis of various species. Metagenome analysis. Developing databases and computer software for biological research.

	Plant Genetics	SATO, Yutaka / Professor NOSAKA (TAKAHASHI), Misuzu / Assistant Professor	The goal of our research is to understand molecular mechanisms governing early processes of plant development using a series of rice embryogenesis defective mutants. Currently we are focusing on the mechanism of regulating the cell division pattern and plasticity in cellular differentiation in rice embryo.
	Evolutionary Genetics	AKASHI, Hiroshi / Professor	We infer mechanisms of genome evolution using population genetic and comparative genomic approaches. Current interests include global forces such as biosynthetic constraints that underlie weak selection.
	Ecological Genetics	KITANO, Jun / Professor YAMASAKI, Yo / Assistant Professor	We use threespine stickleback fishes to investigate the genetic and molecular mechanisms underlying adaptation and speciation.
	Comparative Genomics	TOYODA, Atsushi / Project Professor	We have been conducting advanced genomics research on the plasticity of genome structure and functions using most advanced genome technology such as New-Generation Sequencers.
	Molecular Life History	KURAKU, Shigehiro / Professor KAWAGUCHI, Akane / Assistant Professor	We focus on vertebrates and bridge molecular-level laboratory approaches and genome informatics, in order to document genome evolution and elucidate its mechanism.
Department of Gene Function and Phenomics	Symbiosis and Cell Evolution	MIYAGISHIMA, Shin-ya / Professor FUJIWARA, Takayuki / Assistant Professor	In order to understand endosymbiotic evolution of eukaryotes, we are studying coordinating mechanisms of eukaryotic cell and organelle/endosymbiont proliferation using algae, plants, and protists.
	Model Fish Genetics	SAKAI, Noriyoshi / Associate Professor	We establish reliable protocols for genetically modification of zebrafish using sperm, and analyze the molecular mechanisms of spermatogenesis and early development in zebrafish.
	Systems Neuroscience	KUBO, Fumi / Associate Professor	We study how visual information generates goal-directed behavior. We aim to understand the neural circuit mechanisms underlying this process using a combination of genetic, optic and behavioral approaches in zebrafish.

	Plant Cytogenetics	NONOMURA, Ken-ichi / Associate Professor TSUDA, Katsutoshi / Assistant Professor	We aim to elucidate the regulatory system of plant germ-cell development and chromosome kinetics, mainly using seed-sterile rice mutants.
	Mammalian Neural Circuits	IWASATO, Takuji / Professor NAKAGAWA, Naoki / Assistant Professor	We are studying molecular and cellular mechanisms of neuronal circuit development in the mammals, using mouse genetics and other related methods.
	Multiscale Sensory Structure	YONEHARA, Keisuke / Professor MATSUMOTO, Akihiro / Assistant Professor	We use mice and marmosets to understand the structure, function, development, disease, and environmental adaptation of visual neural circuits at multi-levels, including genes, neural circuit physiology, and behavior.
	Multicellular Organization	SAWA, Hitoshi / Professor NEGISHI, Takefumi / Assistant Professor	We are studying the mechanisms that produce a variety of cell types through asymmetric cell divisions using the nematode <i>C.elegans</i> .
	Brain Function	HIRATA, Tatsumi / Professor KAWASAKI, Takahiko / Assistant Professor ZHU, Yan / Assistant Professor	Development of the vertebrate nervous system with special focus on neuronal network formation.
	Molecular and Developmental Biology	KAWAKAMI, Koichi / Professor	Genetic studies on development, morphogenesis and behaviors by using a model vertebrate zebrafish.
	Microbial Physiology	NIKI, Hironori / Professor	We investigate higher order structure of chromosomes and their dynamics in yeast and bacteria through genetic and cell biological analysis.
	Mouse Genomics Resource	KOIDE, Tsuyoshi / Associate Professor	For understanding genetic basis of behavioral diversity, behavioral and genetic analyses are applied on a variety of mouse resources including wild-derived strains. We are developing genome editing methods in mice for analyzing function of genes.
Department of Chromosome Science	Genome Dynamics	MAESHIMA, Kazuhiro / Professor IDE, Satoru / Assistant Professor HIBINO, Kayo / Assistant Professor	Our research interest lies in determining how a long string of genomic DNA is three-dimensionally organized in living cells, and how the organized genome functions during cellular proliferation, differentiation, and development. We are using a novel combination of molecular cell biology and biophysics to elucidate 3D-organization and dynamics of human genome chromatin.

	Cell Architecture	KIMURA, Akatsuki / Professor TORISAWA, Takayuki / Assistant Professor	To understand the three-dimensional architecture of the cell and its dynamics, quantitative imaging and modeling approaches are employed. Specific targets of the research are size and shape of organelles, the mechanics of cytokinesis, and cytoplasmic streaming in the <i>C. elegans</i> embryo.
	Chromosome Biochemistry	MURAYAMA, Yasuto / Associate Professor	We investigate molecular mechanism underlying regulation of chromosome organization and dynamics by recapitulating their biochemical reactions using purified proteins. We now especially focus on SMC complexes.
	Physics and Cell Biology	SHIMAMOTO, Yuta / Associate Professor SAITO, Kei / Assistant Professor	Our laboratory uses a combination of biophysics, biochemistry, cell biology, and materials science to study how the mitotic spindle properly assembles and segregates chromosomes in cell division.
	Molecular Cell Engineering	KANEMAKI, Masato / Professor	To understand DNA transactions in human cells, we generate conditional cells using the auxin-inducible degron technology for genetic and cytological analyses. We also develop new technologies for construction of mutant human cells.
	Invertebrate Genetics	SAITO, Kuniaki / Professor MIYOSHI, Keita / Assistant Professor	We investigate molecular mechanisms of Drosophila gene expression and repression through biochemical and genetic techniques. Especially, we are focusing on the small RNA pathways and chromatin regulation during germ cell development.
Center for Frontier Research	Gene Quantity Biology	SASAKI, Mariko / Associate Professor	We study molecular mechanisms underlying genomic changes in eukaryotic cells. We mainly use budding yeast and human cell cultures and analyze genomic changes that result in changes to DNA quantity, using genetic and molecular biology tools. We specialize in isolating Mbp-sized DNA and separating it by Pulsed-Field Gel Electrophoresis.
	Theoretical Ecology and Evolution	YAMAMICHI, Masato / Associate Professor	We combine mathematical models, microcosm experiments, and meta-analyses to investigate complex feedbacks between rapid evolution and ecological processes.
Radioisotope Unit		ANDACHI, Yoshiki / Assistant Professor	We study microRNA-mediated post-transcriptional regulation in <i>C. elegans</i> using our original methods for the detection of microRNAs and target genes.