Research outline

(Updated: October 1st, 2020)

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 **MORI, Hiroshi** / 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.
	Biological Networks	**ARITA, Masanori** / Professor **KAWASHIMA, Takeshi** / Assistant 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.
	Population Genetics	**SAITOU, Naruya** / Professor **JINAM, Timothy** / Assistant Professor	We study evolution of genes and genomes, in particular human evolution. We also develop methods for study of genome evolution.

	Plant Genetics	**SATO, Yutaka** / Professor **NOSAKA (TAKAHASHI), Misuzu** / Assistant Professor **SUZUKI, Toshiya** / 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 **MATSUMOTO, Tomotaka** / Assistant 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.
	Human Genetics	**INOUE, Ituro** /Professor	Medical genomic study using high-throughput sequencing data is a promising procedure to create an innovate healthcare system and open a new aspect of population genetics.
	Ecological Genetics	**KITANO, Jun** / Professor **ISHIKAWA, Asano** / 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.
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 **KAWASAKI, Toshihiro** / Assistant Professor	We establish reliable protocols for genetically modification of zebrafish using sperm, and analyze the molecular mechanisms of spermatogenesis and early development in zebrafish.
	Cell Dynamics and Signaling	**ODA, Yoshihisa** / Professor **SASAKI, Takema** / Assistant Professor	We study the dynamic behavior of cortical cytoskeletons and small GTPases during cell differentiation and cell division to understand the mechanism underlying cell wall patterning in plant cells.

	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.
	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 *C.elegans*.
	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.
	Mammalian Development	**SAGA, Yumiko** / Professor **KATO, Yuzuru** / Assistant Professor **AJIMA, Rieko** / Assistant Professor	We study the early developmental events and the regulatory mechanisms during mouse embryogenesis through generation and analyses of gene-knockout and transgenic mice. We are especially interested in the organs derived from mesoderm (heart, lung, somite), and the germ cell system.
	Microbial Physiology	**NIKI, Hironori** / Professor **AOKI, Keita** /Assistant 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 **TAKANAMI, Keiko** /Assistant 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 *C. elegans* embryo.
	Physics and Cell Biology	**SHIMAMOTO, Yuta** / Associate 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 **NATSUME, Toyoaki** / Assistant 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 **KONDO, Shu** / Assistant 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	**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.
	Chromosome Biochemistry	**MURAYAMA, Yasuto** / Associate Professor	We investigate molecular mechanism underling regulation of chromosome organization and dynamics by recapitulating their biochemical reactions using purified proteins. We now especially focus on SMC complexes.
Advanced Genomics Center		**NOGUCHI, Hideki** / Project Professor	Development of new algorithms for *de novo* sequence assemblies, and analytical tools for comparative genomics employing massive data produced from next generation sequencers.

Radioisotope Unit		**ANDACHI, Yoshiki** / Assistant Professor	We study microRNA-mediated post-transcriptional regulation in *C. elegans* using our original methods for the detection of microRNAs and target genes.