【Biological Sciences】

Title of Project	Regulation of cell behavior by the interplays between cadherin adhesion molecules and cytoskeleton
Principal Investigator Name	Masatoshi Takeichi, RIKEN Laboratory for Cell Adhesion and Tissue Patterning, Group Director
Abstract of Research Project **Number of Researchers : 1** **Term of Project: 2008-2012**	Dissociated animal cells can actively move. Also during development, cells undergo active movement as well as deformation of cell layers, indicating that cell motility is essential for body construction. On the other hand, cells are attached to each other to maintain the body. Therefore, cell adhesion needs to be regulated for cells to move. Conversely, the cell adhesion itself is known to regulate cell movement. In this study, we explore the mechanisms of how cell adhesion molecules co-operate with cytoskeletal proteins to regulate cell behavior. The outcomes of this study are expected to contribute to not only our deeper understandings of developmental mechanisms but also designing remedies for cancer metastasis.

Title of Project	Molecular Mechanisms of Protein Sorting in Membrane Traffic and Roles in Higher Plants
Principal Investigator Name	Akihiko Nakano,The University of Tokyo, Graduate School of Science,Professor
Abstract of Research Project **Number of Researchers : 8** **Term of Project: 2008-2012**	Membrane traffic is a process of protein transport between organelles mediated by small membrane vesicles. Complex sets of machinery sort and convey proteins through multiple rounds of vesicle budding and fusion. Many questions remain to be answered, which will be approached in this project by the combination of genetics, biochemistry (complete cell-free reconstitution) and state-of-the-art imaging. Live cell imaging using our custom-made high-speed confocal microscope will be particularly powerful to solve problems that have been otherwise unable to attack. Elucidation of molecular mechanisms of membrane traffic will then be extended to understanding of their roles in higher plants from the viewpoints of development, physiology, and responses to environments.

Title of Project	Molecular basis of the function and generation of Foxp3-expressing regulatory T cells
Principal Investigator Name	Shimon Sakaguchi, Kyoto University, Institute for Frontier Medical Sciences, Professor
Abstract of Research Project **Number of Researchers : 8** **Term of Project: 2008-2012**	Naturally arising regulatory T cells (Tregs), which specifically express the transcription factor Foxp3, are engaged in the maintenance of immunological self-tolerance (i.e., immunological unresponsiveness to self-constituents) and immune homeostasis. Dysfunction of Tregs can be a cause of autoimmune disease, allergy, and immunopathology. In this project, we plan to decipher at the molecular level how Foxp3 controls the generation and function of Tregs, in particular how Foxp3 confers suppressive activity to Tregs. Our ultimate goal is to devise new ways of controlling suppressive function of Tregs to treat and prevent immunological diseases.

【Biological Sciences】

Title of Project	Molecular mechanisms of chromosome assembly mediated by condensins
Principal Investigator Name	Tatsuya Hirano, RIKEN Chromosome Dynamics Laboratory , Chief Scientist
Abstract of Research Project **Number of Researchers :8** **Term of Project: 2008–2012**	The long-term goal of this study is to understand the molecular mechanisms of chromosome assembly and segregation with a major focus on the role of condensins in these processes. We will examine the spatial and temporal regulation of two condensin complexes in vertebrate cells, and explore a potential functional link between chromosome duplication and condensation. We will also study the molecular architecture and activities of condensins to understand how this class of sophisticated molecular machines might work at a mechanistic level. The proposed study will directly be relevant to our understanding of human health because chromosome aberrations are often associated with tumor development or birth defects.

Title of Project	Comprehensive analysis of innate immunity
Principal Investigator Name	Shizuo Akira, Osaka University, Immunology Frontier Research Center, Professor
Abstract of Research Project **Number of Researchers : 4** **Term of Project: 2008–2012**	Innate immunity initially recognizes invading pathogens, eradicates them, and further activates acquired immunity. Innate immunity research field is rapidly advancing by studies including identification of roles of Toll-like receptors (TLRs). However, the entire picture of the molecular mechanisms has not been understood. The goal of this study is to clarify the molecular mechanism of the innate immune system from the initial pathogen recognition to the activation of acquired immunity. For the comprehensive understanding of innate immune system, we will integrate various approaches such as gene recombination techniques, molecular imaging and systems biology.