2SDP-04 合成化学的に構築した人工分子機械によって駆動される水中での非共有結合性分子集合体の巨視的運動**Macroscopic Motion of Soft Non-covalent Molecular Assembly in Water Actuated by Chemically Synthesized Molecular Machine****Yoshiyuki Kageyama**^{1,2} (¹*Fac. Sci., Hokkaido Univ.*, ²*PRESTO, JST*)

Artificial creation of macroscopic motion triggered with structural change of small molecule is a challenging theme. In many approaches to create macroscopic motions, our salient points are in (1) using non-covalent assembly constructed in water, (2) actuation by small amount of synthesized molecular machine, (3) repeatability, and (4) spatially organized dynamics. To propagate the structural change of small molecules to macroscopic dynamics, intermolecular interaction is essential. However, simple interaction makes only simple behavior. To create highly hierarchical motion, organizations of cooperative interactions are necessary. In the symposium, mechanistic aspects of macroscopic motions of self-assemblies, in which water plays important roles, will be discussed.

2SDP-05 アクチンモノマーの会合と多価カチオンが媒介する同符号コロイド粒子間実効引力**Association of Actin Monomers and Effective Attraction between Like-Charged Colloidal Particles Mediated by Multivalent Cations****Ryo Akiyama** (*Dept. of Chem., Kyushu Univ.*)

Disassembly and assembly of actin filament change a cell shape and drive the motion of amoeba-like cell. Then, the association of actin monomer regulates this function. To discuss this association mechanism we studied the attractive interaction between macroanions mediated by multivalent cations using an integral equation theory with a simple model. The calculated results indicate that the effective attraction increases as the charge of macroanion becomes larger. This result supports a hypothesis of the regulation mechanics: The association is driven by the charge of monomer and the charge is regulated by the hydrolysis of ATP. We will discuss the detail of the scenario.

**2SDP-06 タンパク質の構造ゆらぎと変化に対する相互作用成分解析
Interaction-Component Analysis on Protein Structure in Explicit Solvent****Nobuyuki Matubayasi** (*Division of Chemical Engineering, Graduate School of Engineering Science, Osaka University*)

Using all-atom molecular dynamics simulation combined with a statistical-mechanical theory of solvation, the hydration effect is addressed on the structural fluctuation of cytochrome c in pure-water solvent. During the course of equilibrium fluctuation, the variation of the protein intramolecular energy is shown to be induced and compensated by the solvent water through the exchange of the electrostatic interaction energy. The urea effect on protein structure is also analyzed in terms of the transfer free energy from pure-water solvent to the urea-water mixed solvent. It is found that the transfer free energy correlates strongly with the change in the van der Waals interaction upon transfer and not with the change in the electrostatic interaction.

2SEP-01 カラフルな植物光受容体、赤、青、UV-B を見る**Colorful plant photoreceptors see red, blue and UV-B light****Satoru Tokutomi**, Shizue Yoshihara (*Osaka Prefect. Univ., Grad. School Sci., Dep. Biol. Sci.*)

Immovable plants have to see the light condition precisely to adapt the environment. For this purpose, plants have acquired a variety of photoreceptors in a spectral range from far-red to UV-B. Phytochrome, a red- and far-red reversible receptor, regulates photomorphogenetic responses including flowering. Cryptochrom, a blue light receptor, acts for the regulation of similar physiological responses to those of phytochrome. Phototropin, a member of LOV blue light receptor families, serve to maximize photosynthetic activities by regulating phototropic responses, chloroplast movements, stomata opening, etc. Furthermore, UVR8 senses UV-B light. Molecular bases for the light-signal reception of these photoreceptors will be reviewed.

**2SEP-02 触覚パターンのオプトジェネティクス制御
Optogenetic patterning of touch sense****Hiromu Yawo**^{1,2,3}, Yukiobu Yokoyama^{1,2}, Akira Sumiyoshi⁴, Kenta Abe^{1,2}, Kyo Koizumi^{1,2}, Ryo Egawa^{1,2}, Yueren Liu^{1,2}, Tomokazu Ohshiro^{2,3}, Yoshiya Matsuzaka^{2,3}, Ryuta Kawashima⁴, Hajime Mushiake^{2,3}, Toru Ishizuka^{1,2} (¹*Tohoku Univ. Grad. Sch. Life Sci.*, ²*JST-CREST*, ³*Tohoku Univ. Grad. Sch. Med.*, ⁴*Tohoku Univ. IDAC*)

The rodent whisker-barrel system has been an ideal model for studying somatosensory representations in the cortex. However, it remains a challenge to experimentally stimulate whiskers with a given pattern under spatiotemporal precision. Here we identified the selective expression of channelrhodopsin-2 (ChR2) in the large mechanoreceptive neurons in the trigeminal ganglion (TG) as well as their peripheral nerve endings innervating the whisker follicles of a transgenic rat. The spatiotemporal pattern of whisker irradiation thus produced a barrel-cortical response with a specific spatiotemporal. Our methods of generating an optogenetic tactile pattern (OTP) should open a new avenue for investigating complex senses such as shape, size and movement.

**2SEP-03 脊椎動物クリプトクロムの多様性、機能および分子応用
Diversity, function and molecular application of vertebrate cryptochromes****Toshiyuki Okano** (*Waseda Univ. Sch. Adv. Sci. & Eng.*)

Cryptochromes (CRY) are blue-light photoreceptors highly related to photolyases. Cry genes have been diverged into several groups shared by a wide range of living organisms including plants, animals and fungi. In vertebrates, CRY1 and CRY2 are established circadian clock proteins, playing a pivotal role for the oscillatory transcription loops as negative regulators. Non-mammalian vertebrates have additional Cry genes, Cry3 and Cry4, and interestingly, these CRYs could be photoreceptors and/or magnetoreceptors. For future optogenetical application as well as functional characterization, we have been studying these CRYs by a wide variety of molecular approaches such as immunohistochemistry, biochemical analyses of recombinant proteins, and spectroscopic analyses.