1SAP-02 ミドリムシにおける光運動制御マシンリーの解明

Euglena tumble and change their swimming direction in response to an abrupt increase or decrease in light intensity, called step-up or step-down photophobic responses, respectively. Iseki et al. successfully isolated the photosensin receptor, named PAC, responsible for step-up photophobic responses from a photosensin organelle, the paraflagellar body (PFB), in Euglena gracilis and found that it is a flavoprotein that has adenyl cyclase activity regulated by blue light. We recently revealed how PFB is constructed from PAC using cutting edge cryo-EM techniques, such as CEMOVIS. From the view of structural biology, we draw ever closer to understanding the mechanism behind how Euglena senses light, leading to a change of swimming direction.

1SAP-03 チューブリン様蛋白質 TubZ によるプラスミド分配の分子機構
Plasmid segregation driven by the tubulin-like GTPase TubZ
Ikuko Hayashi (Yokohama City University)

Segregation of low-copy-number plasmids relies on partitioning systems that contain plasmid-encoded cytoskeletal proteins. Tubulin/FtsZ-like GTPase TubZ was identified as a partitioning factor of the pXO1-like plasmids in virulent Bacillus. TubZ exhibits high GTPase activity and assembles into polymers both in vivo and in vitro, and its activation is suggested to be regulated by the DNA-binding protein TubR and the centromeric DNA site. However, the molecular mechanism of plasmid segregation by TubZ assembly is not well understood. Based on our recent progress in structural and biochemical studies, I would like to discuss the molecular recognition mechanism of TubR as an adaptor between the TubZ filament and DNA.

1SAP-04 黄色ブドウ球菌のコロニースプレッディングにおける毒素の役割
Role of toxin in Staphylococcus aureus colony spreading
Chikara Kaito, Kazuhiisa Sekimizu (Grad. Sch. Pharm., Univ. Tokyo)

S. aureus, a human pathogen, spreads on soft agar plates. We call the phenomenon “colony spreading”. High virulence S. aureus strains produce higher amount of toxins and exhibit higher colony-spreading abilities than low virulence strains. Deletion of a toxin encoding-gene diminishes the colony spreading. We recently revealed how PFB is constructed from PAC using cutting edge cryo-EM techniques, such as CEMOVIS. From the view of structural biology, we draw ever closer to understanding the mechanism behind how Euglena senses light, leading to a change of swimming direction.

1SAP-05 らせん細菌 Leptospira の遊泳力学とエネルギー論
Swimming dynamics and energetics of the spirochete Leptospira
Shuichi Nakamura (Grad. Sch. Eng., Tohoku Univ.)

Leptospira are spirochetes and pathogenic species cause a zoonotic disease. Leptospira have a right-handed and short-pitch helical cell body, which is called protoplasmic cylinder. When a cell swims in liquid, the anterior and the posterior cell ends are transformed into a left-handed and long-pitch helix (spiral), and a half circle (hook), respectively. The spiral end rotates counterclockwise and the protoplasmic cylinder rotates clockwise to generate thrust. The hook end also rotates for force balance during swimming. We have been analyzing the motion of Leptospira to elucidate its propulsion mechanism. In the symposium, I will present the swimming dynamics and energetics of Leptospira motility, which have been revealed by our recent research.

1SAP-06 チューブリン様蛋白質 TubZ によるプラスミド分配の分子機構
Plasmid segregation driven by the tubulin-like GTPase TubZ
Ikuko Hayashi (Yokohama City University)

Segregation of low-copy-number plasmids relies on partitioning systems that contain plasmid-encoded cytoskeletal proteins. Tubulin/FtsZ-like GTPase TubZ was identified as a partitioning factor of the pXO1-like plasmids in virulent Bacillus. TubZ exhibits high GTPase activity and assembles into polymers both in vivo and in vitro, and its activation is suggested to be regulated by the DNA-binding protein TubR and the centromeric DNA site. However, the molecular mechanism of plasmid segregation by TubZ assembly is not well understood. Based on our recent progress in structural and biochemical studies, I would like to discuss the molecular recognition mechanism of TubR as an adaptor between the TubZ filament and DNA.

1SAP-07 黄色ブドウ球菌のコロニースプレッディングにおける毒素の役割
Role of toxin in Staphylococcus aureus colony spreading
Chikara Kaito, Kazuhiisa Sekimizu (Grad. Sch. Pharm., Univ. Tokyo)

S. aureus, a human pathogen, spreads on soft agar plates. We call the phenomenon “colony spreading”. High virulence S. aureus strains produce higher amount of toxins and exhibit higher colony-spreading abilities than low virulence strains. Deletion of a toxin encoding-gene diminishes the colony spreading. We recently revealed how PFB is constructed from PAC using cutting edge cryo-EM techniques, such as CEMOVIS. From the view of structural biology, we draw ever closer to understanding the mechanism behind how Euglena senses light, leading to a change of swimming direction.

1SBP-01 凝固したハイドロゲルを用いたタンパク質結晶の成長と特徴
Growth and characterization of protein crystals using high-strength hydrogels
Shigeru Sugiyama 1,2 (1Grad. Sch. Sci., Osaka Univ., 2JST, ERATO, Lipid Active Structure Project)

X-ray crystallography offers an unprecedented opportunity to facilitate drug discovery. The most reliable approach is to determine the structure of the complex by soaking the ligand in apo-crystals, but many lead compounds are not readily water-soluble. Such lead compounds must be dissolved in concentrated organic solvents such as DMSO. Therefore, to date, it has been impossible to produce crystals of complexes by soaking in apo-crystals, because crystals dissolve immediately upon soaking in concentrated organic solvents. We propose an approach to avoid the damage by growing protein crystals in a hydrogel. The crystals did not dissolve for more than thirty minutes in concentrated organic solvents. Their diffraction data were suitable for structure analysis.