Monday June 5, 2006

8:30 - 8:40 **Opening Ceremony**
Opening remark

Tsuda, M. (University of Hyogo, Japan)

8:40 - 10:10
Session 1 Activation of microbial rhodopsins

Chair: Padrós, E. (Universitat Autònoma de Barcelona, Spain)
Dencher, N. (Darmstadt University of Technology, Germany)

S1-1 Common Structural Motif in Archaeal Light-Driven Proton Pumps
Kouyama, T. (Nagoya University, Japan)

S1-2 Long-range Communication of Structural Changes Inside Bacteriorhodopsin
Lanyi, J. (University of California, USA)

S1-3 The role of protein bound waters in bacteriorhodopsins pump mechanism
Gerwert, K. (Ruhr-University, Germany)

S1-4 Time-resolved studies of conformation changes of photo-response retinal proteins in solution
Terazima, M. (Kyoto University, Japan)

10:30 - 12:10
Session 2 Activation of rhodopsin
(Sponsored by Strategic International Cooperative Program, JST)

Chair: Siebert, F. (Albert-Ludwigs-Universität, Germany)
Maeda, A. (University of Illinois, USA)

S2-1 X-ray Analyses of the Tetragonal Crystals of Bovine Rhodopsin
Okada, T. (AIST and CREST, JST, Japan)

S2-2 Structure of the GPCR rhodopsin and the metarhodopsin I photointermediate
Schertler, G. (MRC Laboratory of Molecular Biology, UK)

S2-3 Solid-state NMR studies of metarhodopsin II
Smith, S. (Stony Brook University, USA)

S2-4 Functionally relevant and coupled dynamics of bacteriorhodopsin in purple membranes
Watts, A. (University of Oxford, UK), Kamihira, M. (University of Shizuoka)

S2-5 Protonation Switches During Rhodopsin Activation
Vogel, R. (University Freiburg, Germany)

12:20 - 13:00

Luncheon Seminar (Awaji Yumebutai International Conference Center B1F, Event Hall)

(Sponsored by Rigaku Corporation)

L1-1 Getting good data out of bad crystals: A micro focus X-ray generator equipped with a latest optical system & a novel mounting system to save bad crystals
Sasaki, S. (Rigaku Corporation), Hamada, K. (PharmAxess Corporation, Japan)

14:00 - 15:40

Session 3 Photochemistry of retinal proteins

Chair: Lugtenburg, J. (Leiden University, Netherlands)
Iwasa T. (Muroran Institute of Technology, Japan)

S3-1 Sub-5-fs real-time spectroscopy of *transition states* in bacteriorhodopsin and rhodopsin during retinal isomerization
Kobayashi, T. (University of Electro-Communications and Osaka University, Japan), Yabushita, A. (National Chiao-Tung University , Taiwan), Tsuda, M. (University of Hyogo, Japan)

S3-2 Direct Structural Observation of the Primary Isomerization in Vision with Femtosecond Stimulated Raman.
Mathies, R., Kukura, P., McCamant, D., Wandschneider, D., Yoon, S. (Univ. of California, USA)

S3-3 Some Puzzles Regarding the Structure and Dynamics of Rhodopsin
Buss, V., Hufen, J., Sugihara, M., Weingart, O. (University of Duisburg-Essen, Germany)

S3-4 The Structure of the Photoisomerization Path of Rhodopsin
Olivucci, M. (Universita di Siena, Italy)

S3-5 First Steps of Retinal Photoisomerization in Proteorhodopsin
Lenz, M., Huber, R. (Institute for Physical and Theoretical Chemistry, Germany), Schmidt, B. Gilch, P. (University Munich, Germany), Kalmbach, R., Engelhard, M. (Max-Planck-Institute of Molecular Physiology, Germany), Wachtveitl, J. (Institute for Physical and Theoretical Chemistry, Germany)

16:00 - 17:40

Session 4　Color tuning of retinal proteins

Chair: Sheves, M. (Weizmann Institute, Israel)
Ishiguro, M. (Suntory Institute for Bioorganic Research)

S4-1 Molecular basis of spectral tuning in the SWS1 pigments in vertebrates
Yokoyama, S. (Emory University, USA)

S4-2 Evolutionary Diversification of Visual Opsin Subtypes in Fish and Primates
Kawamura, S. (University of Tokyo, Japan)

S4-3 Spectral tuning of shortwave-sensitive visual pigments in vertebrates
Hunt, D., Carvalho, L., Cowing, J., Parry, J., Wilkie, S., Bowmaker, J.
(UCL Institute of Ophthalmology, UK)

S4-4 Theoretical Studies on Spectral Tuning and Photo-chemical Dynamics of Retinal Proteins
Hayashi, S. (Kyoto University, Japan)

S4-5 Mechanism of color tuning in retinal protein: SAC-CI and QM/MM study
Fujimoto, K., Hayashi, S., Hasegawa, J., Kato, S., Nakatsuji, H. (Kyoto University, Japan)

19:00 - 20:40

Session 5　Photoactive yellow protein

Chair: Hellingwerf, K. (University of Amsterdam, Netherlands)
Kataoka, M. (Nara Institute of Science and Technology, Japan)

S5-1 Spectral tuning, photoisomerization and energy flow in photoactive yellow protein
Yamato, T. (Nagoya University and CREST, JST, Japan), Ishikura, T. (Nagoya University, Japan),
Kakitani, T. (Meijo University, Japan), Kawaguchi, K., Watanabe, H. (Nagoya University, Japan)

S5-2 Weak Hydrogen Bonds in Photoactive Yellow protein
Imamoto, Y. (Nara Institute of Science and Technology, Japan)

S5-3 New Insight in the Mechanism of Activation of Photoactive Yellow Protein Obtained
from Ultrafast Vibrational Spectroscopy
van Wilderen, L. (Vrije Universiteit, Netherlands),
van der Horst, M. (University of Amsterdam, Netherlands),
van Stokkum, I. (Vrije Universiteit, Netherlands),
Hellingwerf, K. (Vrije Universiteit and University of Amsterdam, Netherlands)
van Grondelle, R., Groot, M. (Vrije Universiteit, Netherlands)

S5-4 Photoactive Yellow Protein (PYP) and Phytochrome photoreceptorsin Bacteria
Kyndt, J. (Ghent University, Bergium)

S5-5 Spectroscopic study of interaction between molecular probes and Photoactive Yellow Protein
Hamada, N. (CREST, JST and Osaka University, Japan), Matsumoto, K. (Osaka University, Japan)
Nakamura, R. (CREST, JST and Osaka University, Japan),
Ichida, H., Tokunaga, F., Kanematsu, Y. (Osaka University, Japan)

Tuesday June 6, 2006

8:30 - 10:10

Session 6 Retinoid metabolism and visual cycle

(Sponsored by Molecular Life Science Based on Structural Biology, University of Hyogo, 21st COE, MEXT)

Chair: Crouch, R. (Medical University of South Carolina, USA)
Irie T. (Hakodate National College of Technology, Japan)

S6-1 From *Drosophila* to Man: Analysis of a novel gene family in vitamin A metabolism
von Lintig, J., Voolstra, O., Hessel, S., Isken, A., Oberhauser, V. (University of Freiburg, Germany),
Wyss, A. (DSM Nutritional Products Ltd., Switzerland), Vogt, K. (University of Freiburg, Germany)

S6-2 Formation and clearance of all-*trans* retinol in vertebrate rod photoreceptors
Koutalos, Y. (University of South Carolina, USA),
Wu, Q. (University of South Carolina, and Sun Yat-sen University China),
Cornwall, C. (Boston University, USA), Crouch, R. (University of South Carolina, USA),
Wiggert, B. (National Institutes of Health, USA)

S6-3 Steps of the visual cycle in gecko green photoreceptors
Kolesnikov, A. (Institute for Evolutionary Physiology and Biochemistry, Russia),
Ala-Laurila, P. (Boston University, USA),
Shukolyukov, S. (Institute for Evolutionary Physiology and Biochemistry, Russia),
Crouch, R. (Medical University of South Carolina, USA),
Estevez, M., Cornwall, M (Boston University, USA),
Govardovskii, V. (Institute for Evolutionary Physiology and Biochemistry, Russia)

S6-4 Roles of critical residues in RPE65 retinol isomerase activity
Redmond, M., Poliakov, E., Yu, S., Tsai, J., Lu Z., Gentleman, S.
(National Institutes of Health, USA)

S6-5 Origin of the Vertebrate Visual Cycle
Takimoto, N., Kusakabe, T., Horie, T., Tsuda, M., (University of Hyogo, Japan)

10:30 - 12:10

Session 7　Evolution and divergence of retinal proteins

(Sponsored by Molecular Life Science Based on Structural Biology, University of Hyogo, 21st COE, MEXT)

Chair: Yokoyama S. (Emory University, USA)
Tokunaga, F. (Osaka University, Japan)

S7-1 Comparative analyses of phototransduction proteins in vertebrates: Gβγ-PD system in the teleost photoreceptor cells
Hisatomi, O. (Osaka University, Japan)

S7-2 Diversity of opsins and photosensory organs in the simple chordate *Ciona intestinalis*
Kusakabe, T., Tsuda, M. (University of Hyogo, Japan)

S7-3 Origin of vertebrate retina I:
Three distinct photoreceptor cells characterized with opsin antibody in the ascidian larva
Horie, T., Kusakabe, T. (University of Hyogo, Japan),
Terakita, A., Shichida, Y. (Kyoto University, Japan),
Ohtsuki, H. (Oita University, Japan), Tsuda, M. (University of Hyogo, Japan)

S7-4 Expression and characterization of diverged bistable pigments in rhodopsin family.
Terakita, A. (Kyoto University, Japan and CREST, JST)

S7-5 Photosensitive Retinal Ganglion Cells: Phototransduction Mechanisms and New Roles Examined.
Foster, R., Peirson, S., Lupi, D., Sekaran, S., Hankins, M. (University of Oxford)

14:00 - 15:40

Session 8　Molecular physiology of retinal proteins

Chair: Ebrey, T. (University of Washington, USA)
Kawamura, S. (Osaka University, Japan)

S8-1 Stable expression of human melanopsin in a mammalian cell line.
Kumbalasiri, T., Rollag, M. (University of Virginia, USA),
Provencio, I. (University of Virginia and Uniformed Services University, USA)

S8-2 Role of VAL-opsin Genes in Developing Zebrafish.
Kojima, D., Fukada, Y. (University of Tokyo, Japan), Dowling, J. (Harvard University, USA)

S8-3 CRY4 is a Candidate for a Novel Blue-light Photoreceptor in the Chicken Pineal Gland and Retina.
Okano, T., Kubo, Y., Akiyama, M. (Waseda University, Japan and CREST, JST),
Fukada, Y. (University of Tokyo, Japan)

S8-4 Molecular mechanisms of rapid inactivation of light-activated cone visual pigments by phosphorylation
Tachibanaki, S., Shimauchi-Matsukawa, Y., Arinobu, D., Kawamura, S. (Osaka University, Japan)

S8-5 The transport and sensory function of microbial rhodopsins in photosynthetic microbes
Jung, K. (Sogang University)

16:00 - 17:40

Session 9 Novel microbial rhodopsins

Chair: Bogomolni, R. (University of California)
Ihara, K. (Nagoya University)

S9-1 The Multitalented Microbial Sensory Rhodopsins
Sasaki, J., Spudich, J. (University of Texas, USA)

S9-2 Xanthorhodopsin, a Proton Pump with Light-Harvesting Carotenoid Antenna
Balashov, S., Imasheva, E. (University of California, USA),
Boichenko, V. (Russian Academy of Sciences, Russia),
Wang, J. (University of California, USA), Anton, J. (University of Alicante, Spain),
Lanyi, J. (University of California, USA)

S9-3 Kinetics of Channelrhodopsin-1 and Acetabulariarhodopsin
Hegemann, P., Tsunoda, S. (Humboldt University, Gernany),
Gradmann, D., (Albrecht von Haller Institute, Germany)

S9-4 New Proton Pumping Rhodopsin from Green Alga Acetabularia
Tsunoda, S. (Humboldt University, Germany), Ewers, D. (Albrecht von Haller Institute, Germany)
Gazzarrini, S., Moroni, A. (University of Milano, Italy),
Gradmann, D. (Albrecht von Haller Institute, Germany),
Hegemann, P. (Humboldt University, Germany)

S9-5 Structure-Function Relationship in Archaeal Rhodopsins from Archaea, Eubacteria and Eucaryotes
Kandori, H. (Nagoya Institute of Technology, Japan)

19:00 - 20:40

Session 10 Structure & function relationship of 7-transmembrane proteins

Chair: Luecke, H. (University of California, USA)
Mitaku, Y. (Nagoya University, Japan)

S10-1 Crystal structures of bacteriorhodopsin and the question of proton vs OH ("H2O") transport
Glaeser, R. (University of California, USA)

S10-2 Proteorhodopsin: Insight from Solid-State NMR on Proteoliposomes and 2D Crystals
Pfleger, N., Shastri, S., Worner A., Lorch, M. (Goethe University, Germany),
Kuhlbrandt, W. (Max Planck Institute for Biophysics, Germany),
Glaubitz, C. (Goethe University, Germany)

S10-3 Molecular dynamics study on the activation mechanism of rhodopsin as a model of GPCR
Sakurai, M. (Tokyo Institute of Technology, Japan)

S10-4 Sequence and structure features of GPCRs, which are effective to determine the GPCR and G-protein binding selectivity
Suwa, M. (National Institute of Advanced Industrial Science and Technology (AIST), Japan)

S10-5 Dynamic properties of seven-transmembrane helical bundle structures
Tastan, O., Yu, E. (Carnegie Mellon University, USA),
Aref, A. (University of Pittsburgh, USA), Rader A. (Indiana University-Purdue University, USA),
Klein-Seetharaman, J. (Carnegie Mellon University and University of Pittsburgh, USA)

Wednesday June 7, 2006

8:30 - 10:10

Session 11 Ion transfer in microbial rhodopsins

Chair: Herzfeld, J. (Brandeis University, USA)
Tsujimoto, K. (Japan Advanced Institute of Science and Technology, Japan)

S11-1 Comparing the photochemical reaction cycle of the proton pumping retinal proteins (BR, PR, XR)
Varo, G., Zimanyi, L., Khoroshyy, P.
(Biological Research Center of the Hungarian Academy of Sciences, Hungary),
Balashov, S., Lanyi, J. (University of California, USA)

S11-2 Anion transport mechanism of *pharaonis* halorhodopsin
Demura, M. (Hokkaido University, Japan)

S11-3 Proton Transfers in New Microbial Rhodopsins
Shi, L., Waschuk, S., Bezerra A. (University of Guelph, Canada),
Yoon, S., Jung, K. (Sogang University, Korea), Brown, L. (University of Guelph, Canada)

S11-4 Mechanism of bacteriorhodopsin proton transfer: insights from computer simulations
Bondar, A., Fischer, S. (University of Heidelberg, Germany),
Elstner, M., Suhai, S. (German Cancer Research Center, Germany),
Smith, J. (University of Heidelberg, Germany)

S11-5 The crystal structure of the L1 intermediate of halorhodopsin at 1.9A resolution
Tittor, J., Gmelin, W., Zeth, K. (Max Planck Institute for Biochemistry, Germany)
Efremov, R., Heberle, J. (Research Center Juelich, Germany),
Oesterhelt, D. (Max Planck Institute for Biochemistry, Germany)

10:30 - 12:10

Session 12 Signal transduction in microbial rhodopsins

Chair: Engelhard, M. (Max Planck Institute, Germany)
Saito, H. (Himeji Institute of Technology, Japan)

S12-1 Development of the signal in sensory rhodopsin and its transfer to the related transducer as seen by X- ray crystallography
Gordeliy, V., Moukhametzianov, R., Efremov, R., Baeken, C., Labahn, J., Buldt, G.
(Research Center Juelich, Germany),
Klare, J., Goppner, A. Engelhard, M. (Max Planck Institute for Molecular Physiology, Germany),

S12-2 Local structures and dynamics of archaeal rhodopsins leading to signal transduction as revealed by site-directed solid state ^{13}C NMR
Naito, A. (Yokohama National University, Japan)

S12-3 The Mechanism of Signal Transfer in the SRII/HtrII Complex
Klare, J., Bordignon, E., Steinhoff, H. (University of Osnabruck, Germany),
Engelhard, M. (Max Planck Institute for Molecular Physiology, Germany)

S12-4 Importance of Specific Hydrogen Bonds of Archaeal Rhodopsins for the Binding with Transducer Protein: What Happens When the Transducer Protein Binds to an Engineered pharaonis Halorhodopsin?
Kamo, N., Sudo, Y., Hasegawa, C., Miyauchi, S., Kikukawa, T. (Hokkaido University, Japan)

S12-5 Temperature Dependent Interactions between M Intermediate of *pharaonis* Phoborhodopsin and its CognateTransducer Detected by FT-IR Spectroscopy
Furutani, Y., Kamada, K., Sudo, Y. (Nagoya Institute of Technology, Japan),
Kamo, N. (Hokkaido University, Japan), Kandori, H. (Nagoya Institute of Technology, Japan)

Thursday June 8, 2006

8:30 - 10:10

Session 13 Signal transduction in visual pigments

(Sponsored byStructural and Functional Analyses of G Protein-Coupled Receptors Using Rhodopsin as a Model Receptor from CREST, JST)

Chair: Hofmann, K.P. (Humboldt University)
Fukada, Y. (The University of Tokyo)

S13-1 Multi-step activation mechanism of G-protein by rhodopsin.
Yoshinori Shichida, Y. (Kyoto University and CREST, JST, Japan)

S13-2 Mechanism of interaction between light-activated rhodopsin and transducin
Ernst, O. (Charite-Universitatsmedizin Berlin, Germany)

S13-3 Ligand-dependent activation/deactivation of rod and cone pigments
Kono, M. (Medical University of South Carolina, USA)

S13-4 Retinal binding and release: Insights and mysteries.
Farrens, D., Fay, J. (Oregon Health & Science University, USA),
Janz, J. (Rockefeller University, USA),
Mansoor, S., Sommer, M. (Oregon Health & Science University, USA)

S13-5 2D-Visualization of Surface Dynamics and Conformational Changes in Active Rhodopsins
Alexiev, U., Kim, T., Winkler, K., Moller, M. (Freie Universitat, Germany)

10:30 - 12:10

Session 14 Structure, function and regulation of GPCR

(Sponsored by Membrane Mechanisms Project, ICORP, JST)

Chair: Pin, J. (Institut de Génomique Fonctionnelle)
Haga, T. (Gakushuin University)

S14-1 Regulation of GPCR function by arrestins.
Benovic J. (Thomas Jefferson University, USA)

S14-2 Regulation of β_2-Adrenergic Receptor by GRK and Clathrin
Kurose, H. (Kyushu University, Japan)

S14-3 Mapping of amino acid residues required for signaling activation of
rat melanin-concentrating hormone receptor 1
Saito, Y., Aizaki, Y. (Saitama Medical School, Japan),
Nakano-Tetsuka, M. (International Welfare and Medical University, Japan),
Maruyama, K. (Saitama Medical School, Japan)

P14-4 Structure-Function Analysis of Muscarinic Acetylcholine Receptors
Li, B., Li, J., Scarselli, M., Wess, J. (National Institutes of Health, USA)

S14-5 Key Amino Acid Residues on the Cytoplasmic Surface Responsible for G Protein
Activation of Metabotropic Glutamate Receptor
Yamashita, T., Terakita, A., Shichida, Y. (Kyoto University and CREST, JST, Japan)

14:00 - 15:40

Session 15　Organization of rhodopsin and GPCR

(Sponsored by Membrane Mechanisms Project, ICORP, JST)

Chair: Keszthelyi, L. (Institute of Biophysics)
Nakata, H. (Tokyo Metropolitan Institute for Neuroscience)

S15-1 On the functioning of GPCR dimers: what we learned from class C GPCRs
Pin, J. (Institute of Functional Genomics, France), Yamada, T. (Universite de Montpellier, France)

S15-2 Heterodimerization/oligomerization-directed alteration of signal transduction of protochordate GnRH receptors.
Satake, H., Sakai, T., Aoyama, M. (Suntory Institute for Bioorganic Research, Japan), Kitajima, Y., Horie, T. (University of Hyogo, Japan), Park, M. (University of Tokyo, Japan), Kusakabe, T., Tsuda, M. (University of Hyogo, Japan)

S15-3 Single-molecular behavior of rhodopsin in native disc membrane
Hayashi, F. (Kobe University, Japan)

S15-4 G protein coupling and lateral mobility of chemoattractant receptor revealed by single molecule imaging
Miyanaga, Y., Kuwayama, H., Yanagida, T. (Osaka University, Japan), Devreotes, P. (Johns Hopkins University, USA), Ueda, M. (Osaka University, Japan)

S15-5 GPCR oligomerization as observed by single-molecule tracking
Kusumi, A., Kasai, R. (ICORP-JST, Kyoto University, Japan)

15:40 - 16:30

Closing Ceremony

Past and future of retinal proteins
Ebrey, T. (University of Washington, USA)

Greeting form next organizer

Closing remark
Kamo, N. (Hokkaido University, Japan)