

PROGRAM. 14th International Conference on Retinal Proteins

(Updated July 21, 2010)

August 2-6, 2010, UCSC Porter College, Santa Cruz CA

Chairs: John Spudich (Univ of Texas, Houston, USA) & Roberto Bogomolni (UC Santa Cruz, USA)

Talks are 30 min (includes 10 min discussion) and Minitalks are 15 min (includes 5 min discussion). Discussion Leaders may give up to 10 min introductory talks for the session.

Breakfasts Tuesday through Saturday are at 7:00 – 7:45 AM.

Tuesday Morning (8:15 – 11:15 AM)

8:15 AM Welcome and Announcements from the Chairs

Session I. **Microbial Sensory Rhodopsins I: Channelrhodopsins**

Discussion Leader: **John Spudich** (Univ of Texas, Houston, USA)

Speakers:

Oleg Sineshchekov (Univ of Texas, Houston, USA)
Channelrhodopsins *in vivo* and *in vitro*

Peter Hegemann (Humboldt-Univ, Berlin, Germany)
The channelrhodopsin light switch

Christian Bamann (Max-Planck-Institute, Frankfurt, Germany)
Ion permeation in the photocycle of channelrhodopsin-2

- 30' Break 10:10 AM -

Joachim Heberle (Hahn-Meitner-Institute, Berlin, Germany)
Vibrational spectroscopy on channelrhodopsin II

Minitalk:

Franz J. Bartl (Charite', Berlin, Germany)
Monitoring light induced structural changes of channelrhodopsin-2 by UV/Vis and FTIR difference spectroscopy

12:45 PM Lunch

Tuesday Afternoon (2:00 – 5:00 PM)

Session II. **Functional Insights from Atomic Structures of Mammalian Rhodopsin and Related GPCRs**

Discussion Leader: **Rosalie Crouch** (MUSC, Charleston, USA)

Speakers:

Ulrike Alexiev (Freie Universität, Berlin, Germany)
From high-resolution rhodopsin membrane structures to function

Jörg Standfuss (PSI, Villigen, Switzerland) Crystal structure of constitutively active rhodopsin: How an agonist can activate its GPCR

Gebhard Schertler (PSI, Villigen, Switzerland)
Exploring the ligand binding site of the adrenergic receptor

- 30' Break 3:40 PM -

Michael F. Brown (Univ of Arizona, Tucson, USA)
Beyond the atomic structure: Multiscale rhodopsin dynamics and membrane interactions

Minitalks:

Yasushi Imamoto (Kyoto University, Japan)
Low activation efficiency of transducin by cone visual pigment is attributed to the short lifetime of meta II intermediate

Sivakumar Sekharan (Emory University, Atlanta, Georgia, USA)
Chemistry of vision in a Gq-coupled GPCR – Insights from structural and spectral tuning studies of wildtype and mutant squid rhodopsin

6:15 PM *Dinner*

Tuesday Evening (7:30 – 10:30 PM)

Session III. Rhodopsin and the Visual Cycle

Discussion Leader: **Ted Wensel** (Baylor College of Med, Houston, USA)

Speakers:

Sharesh Kaushal (UMass Med School, Worcester, USA)
Controlling the fate and folding of rhodopsin: Bench to Bedside

Thomas Sakmar (Rockefeller Univ, New York, USA)
MD simulation of an opsin-transducin complex in a membrane bilayer

Zsolt Ablonczy (Medical Univ of South Carolina, USA)
Molecular imaging of retinoids in the RPE

- 30' Break 9:10 PM -

Gabriel Travis (UCLA, USA)
Functional re-evaluation of two visual-cycle proteins

Vladimir Kefalov (Washington Univ, St. Louis, USA)
Cone visual cycle in the mammalian retina

Wednesday Morning (8:30 – 12:00 PM)

Session IV. Microbial Sensory Rhodopsins II: SR-Htr Complexes

Discussion Leader: **Naoki Kamo** (Matsuyama Univ, Japan)

Speakers:

Martin Engelhard (Max-Planck-Institute, Dortmund, Germany)
Sensory rhodopsin II signalling complexes

Yuki Sudo (Nagoya Univ, Japan)
Sensory signal transduction from the sensory rhodopsins to their cognate transducer proteins in microbes

Vlad Bergo (Boston Univ, USA)
Time-resolved FTIR of SRII-HtrII signaling in vivo

- 30' Break 10:10 AM -

Fritz Siebert (Univ Freiberg, Germany)

Using an infrared probe to monitor conformational and electrostatic changes in pharaonis SRII during its light activation

Minitalks:

Ramona Schlesinger (Forschungszentrum Jülich, Germany)

Signal relay from sensory rhodopsin I to the cognate transducer HtrI: Assessing the critical change in hydrogen-bonding between Tyr-210 and Asn-53

Jun Sasaki (Univ of Texas, Houston, USA)

Opposite displacement of Helix F in attractant and repellent signaling by SR-Htr complexes

Jihong Wang (Univ of Texas, Houston, USA)

SR-Htr dimeric complexes in nanodiscs for HAMP domain study

Gabriel Ozorowski (Univ of California, Irvine, USA)

The crystal structure of a phototaxis signaling mutant of bacteriorhodopsin

12:45 PM *Lunch*

Wednesday Afternoon:

Free time – Monterey Bay Aquarium

6:15 PM *Dinner*

8:00 – 10:00 PM *Poster Session I*

Wednesday Evening (7:30 – 10:15 PM)

Session V. Retinylidene Proteins – Additional Fundamental & Novel Aspects

Discussion Leader: **Roberto Bogomolni** (UC Santa Cruz, USA)

Speakers:

Richard Mathies (UC Berkeley, USA)

Direct experimental characterization of the femtosecond photo-isomerization reaction in rhodopsin

David Farrens (Oregon Health and Science Univ, Portland, USA)

Spectroscopic studies of rhodopsin: structural changes induced by retinal binding, activation and release

Klaus Gerwert (Ruhr Univ, Bochum, Germany)

Proton-transfer via protein-bound water molecules in retinal proteins

- 30' Break 9:10 PM -

Chii-Shen Yang (Taiwan National Univ, Teipei)

A six-photoreceptor system in *Haloarcula marismortui*

Minitalk:

David Kliger (UC Santa Cruz, USA)
Structural interpretation of rhodopsin mutations and artificial chromophore substitutions on physiological photointermediate spectra and kinetics

Thursday Morning (8:30 – 11:30 AM)

Session VI. Protein Dynamics and Conformational Changes in Retinylidene Photoreceptors

Discussion Leader: **Georg Büldt** (Research Centre Jülich, Germany)

Speakers:

Hideki Kandori (Nagoya Univ, Japan)

FTIR study of rhodopsins

Judith Herzfeld (MIT, Cambridge, USA)

Mapping the active site in bacteriorhodopsin intermediates

Vlad Ladizhansky (University of Guelph, Canada)

Solid-state NMR structural studies of retinal binding proteins

- 30' Break 10:10 AM -

Masahide Terazima (Kyoto University, Japan) Photoreaction dynamics of rhodopsins studied by the time-resolved diffusion method

Minitalks:

Akira Naito (Yokohama National Univ, Japan)

Detection of photo-intermediates in phoborhodopsin as revealed by in-situ photo-irradiated solid-state NMR spectroscopy

Andrei Dioumaev (Univ of California, Irvine, USA)

Multiple K intermediates in the photocycles of bacteriorhodopsin and xanthorhodopsin

12:45 PM *Lunch*

Thursday Afternoon (2:00 – 5:00 PM)

Session VII. Light-driven Ion Pump Mechanisms

Discussion Leader: **Hartmut Luecke** (UC Irvine, USA)

Speakers:

Janos Lanyi (UC Irvine, USA)

Structural divergence between archaeal and eubacterial proton transport rhodopsins

Tsutomu Kouyama (Nagoya Univ, Japan)

Crystal structure of halorhodopsin from *Natronomonas pharaonis*

Sergei Balashov (UC Irvine, USA)

Light-harvesting carotenoid antennae of retinal proteins

- 30' Break 3:40 PM -

Mudi Sheves (Weizmann Institute, Rehovot, Israel)
Anions bind to proteorhodopsins and affect Asp97 pKa

Leonid Brown (University of Guelph, Canada)
New proton-pumping rhodopsins from lower eucaryotes

Thursday Evening:

Banquet, Poster Viewing, International Advisory Committee Meeting

Friday Morning (8:30 – 11:45 AM)

**Session VIII. Microbial Rhodopsins in Neural Photocontrol,
Vision Restoration, and Other New Directions**

Discussion Leader: **Ernst Bamberg** (Max-Planck-Inst, Frankfurt, Germany)

Speakers:

Karl Deisseroth (Stanford Univ, USA)
Optogenetics: development and application

Ed Boyden (MIT, Cambridge, USA)
Optical control of biological and neural functions using retinal proteins

Alan Horsager (Univ Southern California, Los Angeles, USA)
Restoring functional vision using genetically-targeted opsin molecules

30' Break 10:10 AM

Robert Birge (Univ Conn, Storrs, USA)
Optimization of bacteriorhodopsin for bioelectronic devices by using directed evolution

Xavier Deupi (Universitat Autònoma, Barcelona, Spain)
A conserved activation mechanism for Class A GPCRs

Minitalk:

Adam Cohen (Harvard University, Cambridge, USA)
Optical recording of membrane potential with engineered microbial rhodopsins

12:45 PM *Lunch*

1:30 – 3:30 PM *Poster Session II*

Friday Afternoon (3:30 – 5:30 PM).

**Session IX. Other Opsins: Extraretinal Photoreception
and Invertebrate Visual Pigments**

Discussion Leader: **Maarten Heyn** (Freie Universität, Berlin, Germany)

Speakers:

Russell Foster (Oxford Univ, UK)
Non-visual light detection by VA and melanopsin photopigments

Akihisa Terakita (Osaka City University, Japan)
Functional characterization of non-visual bistable pigments

Adriana Briscoe (UC Irvine, USA)
Wings follow eyes: Positive selection of a duplicated ultra-violet sensitive visual pigment coincides with wing pigment evolution in *Heliconius* butterflies

John Spudich & Roberto Bogomolni
General Discussion, Concluding Remarks, & Announcements

5:30 PM Meeting Concluded

6:15 PM *Dinner*

For the convenience of participants staying over, breakfast and lunch are provided on Saturday at 7:00 AM and 12:45 PM.