

KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

AAA+ Proteins: From Atomic Structures to Organisms (A5)

January 26-29, 2020 • Granlibakken Tahoe • Tahoe City, CA, USA

Scientific Organizers: Walid A. Houry, James Shorter, Antonina Roll-Mecak and Phyllis I. Hanson

Supported by the Directors' Fund

Discounted Abstract & Scholarship Deadline: September 26, 2019 / Abstract Deadline: November 6, 2019 / Discounted Registration Deadline: November 21, 2019

SUNDAY, JANUARY 26

Arrival and Registration

MONDAY, JANUARY 27

Welcome and Keynote Address

***Walid A. Houry**, University of Toronto, Canada

***James Shorter**, University of Pennsylvania, USA

***Antonina Roll-Mecak**, NINDS, National Institutes of Health, USA

***Phyllis I. Hanson**, University of Michigan, USA

Bob T. Sauer, Massachusetts Institute of Technology, USA
Is ClpXP Unique or a Model for Other AAA+ Proteases and Protein Remodelers?

Insights into AAA+ Mechanism of Function by CryoEM

***Antonina Roll-Mecak**, NINDS, National Institutes of Health, USA

Daniel Southworth, University of California, San Francisco, USA
Structures and Mechanisms of Protein Unfolding Machines by Cryo-EM

Axel T. Brunger, Stanford University, USA
SNARE Complex Recycling and Quality Control by the AAA+ NSF ATPase

Andreas Martin, University of California, Berkeley, USA
Mechanisms of ATPase-Coupled Substrate Translocation by the 26S Proteasome and Related AAA+ Motors

Carol Soomin Cho, Korea Advanced Institute of Science and Technology, South Korea
Short Talk: Nucleotide-Dependent Structural Changes of the Abo1 AAA+ Histone Chaperone

Steven E. Glynn, Stony Brook University, USA
Short Talk: Structure of the AFG3L2 Mitochondrial AAA+ Protease Reveals the Molecular Basis for Activity in Health and Disease

Workshop 1

***Phyllis I. Hanson**, University of Michigan, USA

Kevin D. Corbett, University of California, San Diego, USA
Regulation of a Bacterial Innate-Immune Pathway by a TRIP13-Like ATPase

Ryan R. Cupo, University of Pennsylvania, USA
Function of Skd3, a Mitochondrial AAA+ Protein

Stephanie Gates, University of California, Berkeley, USA
VCP/p97 N-Terminal Domain Conformational Switching Regulates Cofactor Binding and Substrate Processing

Irina Gutsche, Institut de Biologie Structurale, France
An Enterobacterial Stress Response Triad from a Cryo-EM Perspective

Julia Kardon, Brandeis University, USA
Directed Unfolding by Mitochondrial ClpX Controls an Essential Biosynthetic Enzyme

Saikrishnan Kayarat, Indian Institute of Science Education and Research, India
Mechanism of Activation of the AAA+ GTPase McrB by the Endonuclease McrC

Teru Ogura, IMEG, Kumamoto University, Japan

Function of the p97-20S Proteasome and Nanodynamics of Novel and Canonical Proteasomal Pathway Components

AAA+ Proteins of the Cytoskeleton

***James Shorter**, University of Pennsylvania, USA

Antonina Roll-Mecak, NINDS, National Institutes of Health, USA
Mechanism and Regulation of Microtubule Severing Enzymes

David W. Ehrhardt, Stanford University, USA
Mechanisms of Acentrosomal Microtubule Array Organization in Higher Plants

Samara Reck-Peterson, University of California, San Diego, USA
Mechanisms of Dynein Regulation

Arne Gennerich, Albert Einstein College of Medicine, USA
Short Talk: Force Generation of Mammalian Dynein-Dynactin is Augmented by Lis1

Chun-che Tseng, Mayo Clinic Graduate School of Biomedical Sciences, USA
Short Talk: Conserved Regulation of AAA-ATPase Vps4 by V Domain of Bro1 Family Proteins Contributes to ESCRT-III Function

Poster Session 1

TUESDAY, JANUARY 28

Role of AAA+ Proteins in Cellular Remodeling

***Teru Ogura**, IMEG, Kumamoto University, Japan

Phyllis I. Hanson, University of Michigan, USA
Role of AAA+ Protein in Late Endosomes

Conrad C. Wehl, Washington University School of Medicine, USA
Multisystem Proteinopathy Mutations Define New Functions for p97/VCP

James H. Hurley, University of California, Berkeley, USA
Roles of VPS4 and Spastin in ESCRT-III Membrane Scission and Disassembly

Xiaodong Zhang, Imperial College London, UK
Mechanistic Insights into Non-Translocating AAA ATPases: From INO80 Chromatin Remodeller to Transcription Activators

Aaron L. Lucius, University of Alabama at Birmingham, USA
Short Talk: Falling Off: ClpB and Hsp104 Operate as Non-Processive Translocases

Zev A. Ripstein, Hospital for Sick Children, Canada
Short Talk: A Processive Rotary Mechanism Couples Substrate Unfolding and Proteolysis in the ClpXP Degradation Machinery

Role of AAA+ Proteins in Regulating DNA and RNA Complexes

***Andreas Martin**, University of California, Berkeley, USA

Robin E. Stanley, NIEHS, National Institutes of Health, USA
Role of AAA-ATPases in Ribosome Assembly

James M. Berger, Johns Hopkins University School of Medicine, USA
Conformational Coupling and Substrate-Recognition Plasticity in Replicative AAA+ ATPases

KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

AAA+ Proteins: From Atomic Structures to Organisms (A5)

January 26-29, 2020 • Granlibakken Tahoe • Tahoe City, CA, USA

Scientific Organizers: Walid A. Houry, James Shorter, Antonina Roll-Mecak and Phyllis I. Hanson

Supported by the Directors' Fund

Discounted Abstract & Scholarship Deadline: September 26, 2019 / Abstract Deadline: November 6, 2019 / Discounted Registration Deadline: November 21, 2019

Leemor Joshua-Tor, HHMI/Cold Spring Harbor Laboratory, USA
Twist and Pinch, Rock and Roll – The Dynamic States of the Human Origin Recognition Complex

Helmut Bergler, Karl-Franzens University Graz, Austria
Short Talk: Mechanism of Chemical Inhibition of the Essential Ribosome Assembly

Andrew Frank Neuwald, University of Maryland School of Medicine, USA
Short Talk: Deep Analysis of Residue Constraints (DARC): Identifying Determinants of AAA+ ATPase Functional Specificity

Poster Session 2

WEDNESDAY, JANUARY 29

AAA+ Proteins in Disease Pathways

***Arne Gennerich**, Albert Einstein College of Medicine, USA

Walid A. Houry, University of Toronto, Canada
Role of the ClpXP Protease in Pathogenesis

Rose E. Goodchild, VIB/ KU Leuven, Belgium
How Torsins Regulate Cellular Lipid Metabolism

Christopher P. Hill, University of Utah, USA
Translocation Mechanism of AAA Unfoldases

Tania A. Baker, Massachusetts Institute of Technology, USA
Are Two Rings Better than One? Deciphering Roles of the ATPase Modules in the Double Ring AAA+ Unfoldase ClpA

Daisuke Morito, Showa University, Japan
Short Talk: The 591 kDa AAA+/Ubiquitin Ligase Regulates the Cellular Fat Metabolism

Nina Marie Wolf, University of Illinois, Chicago, USA
Short Talk: Structures of ClpC1 from Mycobacterium Tuberculosis in Complex with Macrocyclic Inhibitors from Natural Products Reveal Critical Binding Interactions

Minglei Zhao, University of Chicago, USA
Short Talk: Mechanistic Insights into p97 Inhibition through Disulfiram Derivative

Workshop 2

***Xiaodong Zhang**, Imperial College London, UK

Kyle E. Lopez, University of California, San Francisco, USA
Conformational Plasticity of the ClpAP AAA+ Protease Couples Protein Unfolding and Proteolysis

Ying Lu, Harvard Medical School, USA
An Empirical Free-Energy Landscape Reveals the Global Conformational Dynamics of Proteasomal ATPases

Wen Ma, University of California, San Diego, USA
Molecular Mechanism of Polypeptide Translocation by a AAA+ Unfoldase Studied by Long Timescale Atomistic Simulations

Oliver Mueller-Cajar, Nanyang Technological University, Singapore
Insights into the Mechanism and Regulation of the CbbQO-type Rubisco Activase, a MoxR AAA+ ATPase

Thomas U. Schwartz, Massachusetts Institute of Technology, USA
On the Unusual Assembly States of the AAA+ ATPase TorsinA

Mia Shin, The Scripps Research Institute, USA
Structural Basis for Distinct Operational Modes and Protease Activation in Lon Protease

David Smith, West Virginia University School of Medicine, USA
Functional and Regulatory Roles Played by the N-Domain of the Proteasomal ATPase PAN

AAA+ Proteins and Therapeutics

***Samara Reck-Peterson**, University of California, San Diego, USA

James Shorter, University of Pennsylvania, USA
AAA+ Disaggregases as Therapeutic Agents

Tarun M. Kapoor, Rockefeller University, USA
Chemical Probes for AAA+ Proteins

Sriram Subramaniam, University of British Columbia, Canada
Targeting p97 using Cryo-EM Structures

Meeting Wrap-Up: Outcomes and Future Directions (Organizers)

THURSDAY, JANUARY 30

Departure