



Join Keystone Symposia  
for the 2016 conference on:

# Positive-Strand RNA Viruses

May 1–5, 2016

Hyatt Regency Austin | Austin, Texas | USA

Scientific Organizers: Raul Andino and Peter D. Nagy

*Positive-stranded RNA viruses are important and emerging human pathogens worldwide. Virus-host interactions and innate responses by the host are intensively studied areas, which promise novel broad-range and durable antiviral approaches against dangerous viruses. Topics covered by the meeting include basic advances in research on viral replication structures, virus entry and virus evolution; virus-host interactions, discussed from the virus view on changing the host (including systems biology) and host responses and defense mechanisms; and emerging therapeutics. It is anticipated that rapidly emerging new concepts on virus-host interactions will help the participants to test various host factors for a large number of positive-strand RNA viruses to expand the arsenal of antiviral approaches. This meeting will bring together experts on positive-stranded RNA viruses that will facilitate the rapid progress and dissemination of new concepts in the complex field of virus-host interactions. Also, speakers who are expert with other groups of viruses will be invited to facilitate cross-talk with other areas in virology. Among the speakers will be interdisciplinary scientists who would not normally meet with this group of researchers. Virology, cell biology, genetics, evolution, macromolecular structures/assembly, systems biology and imaging will all be brought together.*

#### Session Topics:

- Systems Biology: From “Omics” to Function
- Entry, Trafficking and Exiting
- Replication Organelles, Membranes, Proteins, Lipids and Stuff...
- Replication Enzymes and Other Factors
- Virus Modulations of Host Pathways
- Evolution, Adaptation and Virus Fitness
- Immunity and Stress Responses
- Therapeutic Interventions



Submitting an abstract is a great way of participating in the conference through poster presentation and possible selection for a short talk.

**Scholarship & Discounted Abstract Deadline: Jan 6, 2016**

**Abstract Deadline: Feb 3, 2016**

**Discounted Registration Deadline: Mar 2, 2016**

For additional details, visit [www.kestonesymposia.org/16N1](http://www.kestonesymposia.org/16N1).

**KEYSTONE SYMPOSIA™**  
on Molecular and Cellular Biology  
*Accelerating Life Science Discovery*

[www.kestonesymposia.org/meetings](http://www.kestonesymposia.org/meetings) | 1.800.253.0685 | 1.970.262.1230

a 501(c)(3) nonprofit educational organization

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Positive-Strand RNA Viruses (N1)

May 1-5, 2016 • Hyatt Regency Austin • Austin, Texas, USA

Scientific Organizers: Raul Andino and Peter D. Nagy

Sponsored by Merck & Co., Inc.

Abstract & Scholarship Deadline: January 6, 2016 / Abstract Deadline: February 3, 2016 / Discounted Registration Deadline: March 2, 2016

### SUNDAY, MAY 1

#### Arrival and Registration

### MONDAY, MAY 2

#### Welcome and Keynote Address

\***Raul Andino**, University of California, San Francisco, USA

**Anna Marie Pyle**, Yale University, USA

*Viral RNA Structure and its Recognition by Host and Viral Proteins*

#### Systems Biology: From "Omics" to Function

\***Peter D. Nagy**, University of Kentucky, USA

**Priya S. Shah**, University of California, Davis, USA

*Proteomics, Functional Genomics, eMAPs on Dengue Virus*

*Replicating in Humans and Mosquitoes*

**Shin-Ru Shih**, Chang Gung University, Taiwan

*Host-Factors Involved in Enterovirus Replication*

**Benjamin R. TenOever**, Icahn School of Medicine at Mount Sinai, USA

*Functional Antiviral Genomics through in vivo RNAi Screens*

**Jan E. Carette**, Stanford University, USA

*Short Talk: Genetic Knockout Screens Identify Host Genes Required*

*For Dengue Virus Replication*

**Sunnie R. Thompson**, University of Alabama, Birmingham, USA

*Short Talk: Identification of Host Factors that Interact with Dengue*

*Virus RNA in Cell Culture*

#### Workshop 1: Recombination and Replication Fidelity, RdRp Structure

\***Karla A. Kirkegaard**, Stanford University School of Medicine, USA

**David J. Barton**, University of Colorado School of Medicine, USA

*Polymerase Structure-Function and Picornavirus RNA Recombination*

**Patrick T. Dolan**, Stanford University, USA

*Population Sequencing Reveals the Host-Specific Adaptive*

*Landscapes of Dengue Virus*

**Gonzalo Moratorio**, Institut Pasteur, France

*Cornering RNA Viruses by Constraining their Sequence Space*

**Craig E. Cameron**, Pennsylvania State University, USA

*New, Functional Forms of HCV NS5A Protein in vivo?*

**Alexander E. Gorbalenya**, Leiden University Medical Center,

Netherlands

*NiRAN, Nidovirus RdRp-Associated Nucleotidyltransferase: First*

*Enzyme Exclusively Associated with an Order of +RNA Viruses*

**James Bert Flanagan**, University of Florida, USA

*Poliovirus Multifunctional Precursor Proteins Required for Replication*

*Complex Assembly, VPgUpU Synthesis and RNA Replication*

**Kay Choi**, University of Texas Medical Branch, USA

*Dengue Virus Nonstructural Protein 5 (NS5) Assembles into a Dimer*

*with a Unique Methyltransferase and Polymerase Interface*

**Chloé Jaubert**, Université de Bordeaux, France

*RNA Genomic Dimerization and Hepatitis C Virus Replication*

#### Entry, Trafficking and Exiting

\***Andres Merits**, University of Tartu, Estonia

**Félix Rey**, Institut Pasteur, France

*Eliciting Cross-Reactive Antibodies Neutralizing Dengue Virus: A*

*Structural View*

**Carolyn B. Coyne**, University of Pittsburgh, USA

*Roadblocks: Polarized Cells as Barriers to RNA Virus Entry and*

*Infection*

**Julie K. Pfeiffer**, University of Texas Southwestern Medical Center,

USA

*Enteroviruses and the Microbiota*

**Maria Guadalupe Martinez**, Albert Einstein College of Medicine, USA

*Short Talk: Alphavirus Budding: How Viruses Remodel the Cell During*

*Exit*

#### Poster Session 1

### TUESDAY, MAY 3

#### Replication Organelles, Membranes, Proteins, Lipids and Stuff...

\***Raul Andino**, University of California, San Francisco, USA

**Ralf Bartenschlager**, Heidelberg University, Germany

*Cell Biology of Viral Replication Cycles: A Comparison of Hepatitis C*

*Virus and Dengue Virus*

**Richard J. Kuhn**, Purdue University, USA

*Structure-Function Studies of Flavivirus Replication Proteins*

**Frank van Kuppeveld**, Utrecht University, Netherlands

*Short Talk: An Enterovirus Mutant that can Replicate in the Absence*

*of Replication Organelles*

**Paul Ahlquist**, University of Wisconsin-Madison, USA

*Protein, RNA and Membrane Interactions in Positive-Strand RNA*

*virus Genome Replication*

**Michael S. Diamond**, Washington University School of Medicine, USA

*A Genome-Wide CRISPR/Cas9 Screen Identifies Novel Host Factors*

*Required for Flavivirus Infection*

**Hongliang Wang**, University of Michigan, USA

*Short Talk: Pulse-Chase Imaging Reveals Continuous and Rapid*

*Turnover of Hepatitis C Virus Replication Organelles*

#### Poster Session 2

#### Replication Enzymes and Other Factors

\***Richard William Hardy**, Indiana University, USA

**K. Andrew White**, York University, Canada

*Regulation of Tombusvirus Processes by Long-range RNA-RNA*

*Interactions*

**Eric J. Snijder**, Leiden University Medical Center, Netherlands

*An Unprecedented Protein-Stimulated -2/-1 Ribosomal Frameshift*

*Mechanism in Arteriviruses*

**John T. Patton**, Indiana University, USA

*How Rotaviruses Do It? RNA Synthesis in Double-Stranded RNA*

*Viruses*

**Tero Ahola**, University of Helsinki, Finland

*Short Talk: There is One Defined Pathway for Alphavirus RNA*

*Replication*

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Positive-Strand RNA Viruses (N1)

May 1-5, 2016 • Hyatt Regency Austin • Austin, Texas, USA

Scientific Organizers: Raul Andino and Peter D. Nagy

Sponsored by Merck & Co., Inc.

Abstract & Scholarship Deadline: January 6, 2016 / Abstract Deadline: February 3, 2016 / Discounted Registration Deadline: March 2, 2016

**Eric Poeschla**, University of Colorado School of Medicine, USA  
*Short Talk: Broad Spectrum Antiviral Protection via Positive Strand RNA Virus RdRp-Mediated Stable Activation of RIG-I-Like Receptor-dependent Innate Immunity*

### WEDNESDAY, MAY 4

#### Virus Modulations of Host Pathways

\***Ralf Bartenschlager**, Heidelberg University, Germany  
**Peter D. Nagy**, University of Kentucky, USA  
*Tombusvirus Replicase Complex Usurps the Glycolytic Pathway for Robust Replication*

**Sean P. Whelan**, Harvard Medical School, USA  
*VSV Polymerase Architecture and Activity Regulated by Host Cell Factors*

**William Jackson**, University of Maryland School of Medicine, USA  
*Short Talk: A Novel Signaling Mechanism Induces Autophagy in Poliovirus-Infected Cells*

**Karla A. Kirkegaard**, Stanford University School of Medicine, USA  
*Noncoding RNAs and Virus Infection*

**Michael Gale, Jr.**, University of Washington, USA  
*Pathogen Sensing and Response in RNA Virus Infection*

**Tristan X. Jordan**, University of Chicago, USA  
*Short Talk: AMPK Inhibition of mTOR Activity is Required for Dengue Virus-Induced Lipophagy*

#### Workshop 2: Emerging Concepts and Landscapes

\***Eva Harris**, University of California, Berkeley, USA  
**Craig B. Wilen**, Washington University, USA  
*Discovery of a Proteinaceous Cellular Receptor for a Norovirus*  
**Sue E. Crawford**, Baylor College of Medicine, USA  
*Human Noroviruses Replicate in Stem-cell Derived Human Intestinal Enteroids*  
**Jason Mackenzie**, University of Melbourne, Australia  
*Norovirus Translation: Control at the Stress Granule-PKR-p-elf2Alpha axis*

**Alexandra Schäfer**, University of North Carolina at Chapel Hill, USA  
*The Epigenetic Landscape during MERS-CoV Infection*

**Mohsan Saeed**, Rockefeller University, USA  
*Development of an Efficient Pan-Genotype Cell Culture System for Hepatitis C Virus*

**Ann Palmenberg**, University of Wisconsin-Madison, USA  
*Atomic Resolution Structures of Rhinovirus C15a by Cryo-EM Show Unique Topographies and Virion Properties*

**Jessica L. Smith**, Oregon Health and Sciences University, USA  
*A microRNA Screen Identifies the miR-34 Family as Potent Inhibitors of Flavivirus Infection and Reveals an Intersection Between the Wnt and Interferon Signaling Pathways*

**Shangmei Hou**, University of Alberta, Canada  
*Flavivirus Infection Impairs Peroxisome Biogenesis and Early Anti-Viral Signaling*

#### Evolution, Adaptation and Virus Fitness

\***Craig E. Cameron**, Pennsylvania State University, USA  
**Claus Wilke**, University of Texas at Austin, USA  
*Next-Gen Virology: Use of Microfluidics and Live-Cell Imaging to Study Poliovirus Replication at the Single-Cell Level*

**Paul Turner**, Yale University, USA  
*Rate of Novel Host Invasion affects Adaptability of Evolving RNA Virus Lineages*

**Raul Andino**, University of California, San Francisco, USA  
*RNA Virus Population Dynamics and the Mechanisms of Adaptation*

**Johan Neyts**, University of Leuven, Belgium  
*Towards Antivirals against Flavi-, Picorna-, Alpha- and Noroviruses*

**Mark R. Denison**, Vanderbilt University Medical Center, USA  
*Short Talk: Identification of Coronavirus Fidelity Determinants Following Long-Term Passage of Murine Hepatitis Virus Lacking nsp14-Exon Mediated Fidelity*

#### Poster Session 3

### THURSDAY, MAY 5

#### Immunity and Stress Responses

\***Michael Gale, Jr.**, University of Washington, USA  
**Ana Fernandez-Sesma**, Mount Sinai School of Medicine, USA  
*Innate Immunity to Dengue Virus*

**Nihal Altan-Bonnet**, NHLBI, National Institutes of Health, USA  
*Intercellular Transmission of Viral Populations with Vesicles*

**Scott Benjamin Biering**, University of Chicago, USA  
*Short Talk: Replication Complexes of Positive-Strand RNA Viruses are Disrupted by Interferon-Gamma Inducible GTPases*

**Richard E. Lloyd**, Baylor College of Medicine, USA  
*Enterovirus Antagonism of RNA Granules*

**Maria-Carla Saleh**, Institut Pasteur, France  
*Systemic Spread of Antiviral RNAi Immunity through Extracellular Vesicles Containing Viral RNAs*

**Eva Harris**, University of California, Berkeley, USA  
*Short Talk: Mechanisms of Dengue Virus NS1-Induced Endothelial Permeability and Vascular Leak*

#### Workshop 3: Discussion on the Emergence of ZIKA Virus and Other Flaviviruses

\***Michael S. Diamond**, Washington University School of Medicine, USA

**Nicholas Barrows**, Duke University, USA  
*Repurposed Drug Candidates to Treat Zika Virus Infection in Pregnancy*

**Bryan C. Mounce**, Institut Pasteur, France  
*Interferon-induced Spermidine-spermine N1-Acetyltransferase and Polyamine Depletion Restrict Chikungunya and Zika Virus Transcription and Translation*

**Hengli Tang**, Florida State University, USA  
*Zika Virus Infection Leads to Cell Cycle Arrest and Stunted Growth of Human Cortical Neural Progenitors*

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Positive-Strand RNA Viruses (N1)

May 1-5, 2016 • Hyatt Regency Austin • Austin, Texas, USA

Scientific Organizers: Raul Andino and Peter D. Nagy

Sponsored by Merck & Co., Inc.

Abstract & Scholarship Deadline: January 6, 2016 / Abstract Deadline: February 3, 2016 / Discounted Registration Deadline: March 2, 2016

**Douglas G. Widman**, University of North Carolina at Chapel Hill, USA  
*A Reverse Genetics Platform to Generate Zika Virus Infectious Clones and Evaluate Viral Determinants of Pathogenesis*

**Devika Sirohi**, Purdue University, USA  
*The Cryo-EM Structure of Zika Virus*

### Therapeutic Interventions

\***Maria-Carla Saleh**, Institut Pasteur, France

**Judith Frydman**, Stanford University, USA  
*Host Protein Homeostasis Machinery as an Antiviral Target*

**Susan C. Baker**, Loyola University Chicago, USA  
*Targeting Coronavirus Papain-like Proteases to Block Viral Replication and Pathogenesis*

**Matthew Frieman**, University of Maryland, USA  
*Short Talk: Identification and Characterization of ABL Kinase Inhibitors as Potent Inhibitors of SARS-CoV and MERS-CoV Fusion*

**Ying Kai Chan**, Harvard Medical School, USA  
*Short Talk: Dengue Virus NS3 Antagonizes Innate Immunity Using a Phosphomimetic-Based Mechanism*

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

### FRIDAY, MAY 6

### Departure