

Join Keystone Symposia for  
the 2015 conference on:

# The Arthropod Vector: The Controller of Transmission

May 12–17, 2015

Sagebrush Inn and Conference Center  
Taos, New Mexico, USA

Scientific Organizers: Serap Aksoy, Stephen K. Wikel and David S. Schneider

Organizing Committee: Adriana Costero-Saint Denis, Tonu M. Wali and Wolfgang Leitner

*Vector innate immunity studies have been ongoing for about a decade, and the field has advanced understanding of the complex interactions between pathogens and vectors. Vector **saliva** contains powerful molecules with translational potential, and vectors also ingest various **bioactive factors of human origin** which affect the development and survival of pathogens within the vector. This meeting integrates the multiple levels of influence on disease transmission by the arthropod vector. Its goal is to translate immunological and microbiological insights into new approaches for combating vector-borne diseases, including manipulation of the microbiome and identification of novel, non-traditional vaccine targets, such as arthropod saliva proteins.*

#### Session Topics:

- Innate Immunity: Models and Midguts
- Innate Immunity: From Cells to Host Factors
- Microbiota of Vectors: The New Frontier?
- Microbiome Impact on Innate Immunity
- The Use of Symbionts to Prevent Transmission
- Vector Spit: from Alchemy to Public Health Solutions
- Saliva Proteins to Prevent and Track Transmission
- Novel Approaches to Disease Control



Discounted Abstract/Scholarship Deadline: Jan 13, 2015  
Abstract Deadline: Feb 11, 2015  
Discounted Registration Deadline: March 11, 2015

To see the full program and for additional details,  
visit [www.keystonesymposia.org/15E2](http://www.keystonesymposia.org/15E2).

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

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### TUESDAY, MAY 12

#### Arrival and Registration

### WEDNESDAY, MAY 13

#### Welcome Remarks

\***Serap Aksoy**, Yale University School of Public Health, USA

\***Adriana Costero-Saint Denis**, NIAID, National Institutes of Health, USA

#### Keynote Address

**Shirley Luckhart**, University of California, Davis, USA  
*Six Degrees of Separation: Shared Biology to Empower Novel Translational Approaches to Vector-Borne Disease Control*

#### Innate Immunity: Models and Midguts

\***Kristin Michel**, Kansas State University, USA

\***Michael A. Riehle**, University of Arizona, USA

**Bruno Lemaître**, École Polytechnique Fédérale de Lausanne, Switzerland  
*The Drosophila Antimicrobial Response at the Time of the Cas9/CRISPR Gene Targeting Revolution*

**Carolina V. Barillas-Mury**, NIAID, National Institutes of Health, USA  
*Anopheles/Plasmodium Interactions: The Tale of the Invisible Parasite!*

**B. Joseph Hinnebusch**, NIAID, National Institutes of Health, USA  
*Short Talk: Comparative Evaluation of Two Ways that Fleas Transmit Yersinia pestis*

**Rushika Perera**, Colorado State University, USA  
*Short Talk: Metabolic Pathways that May Regulate Vector Competence in Aedes aegypti during Dengue Virus Infection*

**Daniel P. Dulebohn**, Rocky Mountain Laboratories, NIAID, National Institutes of Health, USA  
*Short Talk: Analyzing the Role of Histidine Kinase-2 in Spirochete Transmission from Ticks*

**Berlin Londono-Renteria**, Kansas State University, USA  
*Short Talk: Effect of Human Complement on Dengue Virus Infectivity in Aedes aegypti Midgut*

**Barbara S. Drolet**, USDA, Agricultural Research Service, USA  
*Short Talk: Immunomodulatory Effects of Culicoides Blood Feeding: A Murine Model*

#### Workshop 1

\***David S. Schneider**, Stanford University School of Medicine, USA

\***Ulrike Munderloh**, University of Minnesota, USA

**Jacob I. Meyers**, Colorado State University, USA  
*Mosquitocidal Properties and Antibody Passage of IgG Targeting the Glutamate-Gated Chloride Channel of Three Diverse Mosquito Disease Vectors*

**Dana K. Shaw**, University of Maryland, School of Medicine, USA  
*Non-Canonical Activation of the Immune Deficiency Pathway in Ticks*

**Jose E. Pietri**, University of California, Davis, USA  
*Two Insulin-Like Peptides Regulate Resistance to Plasmodium falciparum Infection in Anopheles stephensi through Distinct Effects on Immunity, Metabolism and Midgut Homeostasis*

**Jose Luis Ramirez**, NIAID, National Institutes of Health, USA  
*Molecular Mechanisms Mediating Innate Immune Priming in An. gambiae Mosquitoes*

**Mathilde Gendrin**, Imperial College, UK  
*Antibiotics in Ingested Human Blood Affect the Mosquito Microbiota and Capacity to Transmit Malaria*

**Gong Cheng**, Tsinghua University, China  
*A Transmission-Blocking Vaccine Strategy for Dengue Prevention*

**Jiannong Xu**, New Mexico State University, USA  
*Identification of CRISPR/Cas Systems in the Mosquito Gut Microbiome: Implications for the Ecological Phage-CRISPR Interactions*

**Karina Mondragon-Shem**, Liverpool School of Tropical Medicine, UK  
*Sweet Mysteries: Unravelling the Salivary Glycome of Sandflies*

#### Innate Immunity: From Cells to Host Factors

\***Carolina V. Barillas-Mury**, NIAID, National Institutes of Health, USA

\***Bruno Lemaître**, École Polytechnique Fédérale de Lausanne, Switzerland

**Michael R. Strand**, University of Georgia, USA  
*Vector-Microbiome Interactions: Impacts on Mosquito Immunity and Development*

**Kristin Michel**, Kansas State University, USA  
*Immunomodulation Therapy to Control Mosquito Vectors*

**Michael A. Riehle**, University of Arizona, USA  
*The Effects of Ingested Mammalian Blood Factors on Vector Arthropod Immunity and Physiology*

**Ondrej Hajdusek**, Institute of Parasitology, Czech Republic  
*Short Talk: Tick Immune System and its Interaction with the Transmitting Pathogens*

**Veronika Urbanova**, Biology Centre ASCR, v.v.i., Czech Republic  
*Short Talk: Complement System of the Ticks and its Role in the Immune Response to Borrelia*

#### Poster Session 1

### THURSDAY, MAY 14

#### Microbiota of Vectors: The New Frontier?

\***Elizabeth A. McGraw**, Monash University, Australia

\***Jason L. Rasgon**, Pennsylvania State University, USA

**Angela E. Douglas**, Cornell University, USA  
*How the Taxonomic and Functional Diversity of Gut Microbiota Shapes Insect Traits*

**Serap Aksoy**, Yale University School of Public Health, USA  
*Insights into the Microbiome of a Viviparous Dipteran*

**George Dimopoulos**, Johns Hopkins University, USA  
*Exploring the Mosquito Microbiome for Disease Control*

**Sassan Asgari**, University of Queensland, Australia  
*Role of MicroRNAs in Regulation of Symbiont-Pathogen Interactions in a Vector System*

**Kerri L. Coon**, University of Georgia, USA  
*Short Talk: Specific Gut Bacteria Promote Autogeny in Mosquitoes*

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**Daniel LePage**, Vanderbilt University, USA

*Short Talk: Investigating the Genetic Basis of Wolbachia-Induced Cytoplasmic Incompatibility*

### Microbiome Impact on Innate Immunity

\***Angela E. Douglas**, Cornell University, USA

\***Sassan Asgari**, University of Queensland, Australia

**Nicole M. Gerardo**, Emory University, USA

*The Intersection of Symbionts, Pathogens and Immunity in Insect Systems*

**Zhiyong Xi**, Michigan State University, USA

*Interaction of Mosquito Immunity with Wolbachia and its Impact on Symbiosis Establishment and Vector Competence for Malaria and Dengue Virus*

**Rod Dillon**, Lancaster University, UK

*The Gut Microbiome of Lutzomyia Sand Flies*

**Zhee Sheen Wong**, University of Pittsburgh, USA

*Short Talk: Oxidative Stress Correlates with Wolbachia-Mediated Antiviral Protection in Naturally Infected Insects*

**Brian L. Weiss**, Yale School of Public Health, USA

*Short Talk: An Endosymbiont-Regulated Tsetse Odorant Binding Protein Mediates Host Immune System Maturation Processes*

### Poster Session 2

### FRIDAY, MAY 15

#### The Use of Symbionts to Prevent Transmission

\***Nicole M. Gerardo**, Emory University, USA

\***Rod Dillon**, Lancaster University, UK

**Marcelo Jacobs-Lorena**, Johns Hopkins Bloomberg School of Public Health, USA

*Fighting Malaria with Engineered Symbiotic Bacteria from Vector Mosquitoes*

**Ulrike Munderloh**, University of Minnesota, USA

*Paratransgenic Approaches to Manipulate Tick Infectivity*

**Pamela Pennington**, Universidad del Valle de Guatemala, Guatemala

*Applying Paratransgenic Approaches to Control Disease*

**Jason L. Rasgon**, Pennsylvania State University, USA

*Microbiome as a Driving Mechanism for Gene Spread*

**Elizabeth A. McGraw**, Monash University, Australia

*Short Talk: Wolbachia Affects Dengue Virus Infection Dynamics in the Mosquito*

**Christine L. Sansone**, University of Pennsylvania, USA

*Short Talk: Microbiota-Dependent Activation of Antiviral Intestinal Immunity in Drosophila*

**Sarah M. Short**, Johns Hopkins University, USA

*Short Talk: Investigating Mosquito Molecular Factors that Control Gut Microbiota Variability in Aedes aegypti*

#### Vector Spit: From Alchemy to Public Health Solutions

\***Esther von Stebut-Borschitz**, Johannes Gutenberg University, Germany

\***Jan Van den Abbeele**, Institute of Tropical Medicine Antwerp, Belgium

**Stephen K. Wikel**, Quinnipiac University, USA

*Vector Saliva: A Powerful Immunomodulator*

**Jesus G. Valenzuela**, NIAID, National Institutes of Health, USA

*Basic and Translational Research on Sand Fly Saliva: From Pharmacology to Biomarkers and Vaccines*

**João H. F. Pedra**, University of Maryland School of Medicine, USA

*Mitigation of Nod-Like Receptor Sensing by a Tick Salivary Protein*

**Erol Fikrig**, Yale University, USA

*Keynote Address: The Translation of Saliva Proteins into Tools to Prevent Vector-Borne Disease Transmission*

### Poster Session 3

### SATURDAY, MAY 16

#### Saliva Proteins to Prevent and Track Transmission

\***Stephen K. Wikel**, Quinnipiac University, USA

\***João H. F. Pedra**, University of Maryland School of Medicine, USA

**Esther von Stebut-Borschitz**, Johannes Gutenberg University, Germany

*Immune Cells in the Human Skin: Modulatory Properties of Vector Saliva*

**Jan Van den Abbeele**, Institute of Tropical Medicine Antwerp, Belgium

*Using Tsetse Fly Saliva Proteins as Biomarkers of Vector Exposure*

**Franck Remoue**, UMR 224 MIVEGEC, France

*Epidemiological Applications of Assessing Mosquito Exposure in a Malaria-Endemic Area*

**Shaden Kamhawi**, NIAID, National Institutes of Health, USA

*Unique Features of Vector-Transmitted Leishmaniasis and their Relevance to Disease Progression and Control*

**Guy Caljon**, Institute of Tropical Medicine, Belgium

*Short Talk: Early Immunological Responses upon Tsetse Fly Mediated Trypanosome Inoculation*

**Donald Champagne**, University of Georgia, USA

*Short Talk: Characterization of a Lymphocyte-Depleting Factor in Saliva of the Yellow Fever Mosquito, Aedes aegypti*

**Dennis A. Bente**, University of Texas Medical Branch, USA

*Short Talk: Early Pathogenesis of Crimean-Congo Hemorrhagic Fever: Tick Salivary Gland Extract Immunomodulates Human Cutaneous Antigen-Presenting Cell Response to Infection*

### Panel

\***Tonu Wali**, NIAID, National Institutes of Health, USA

\***Wolfgang W. Leitner**, NIAID, National Institutes of Health, USA

**Shaden Kamhawi**, NIAID, National Institutes of Health, USA

**Shirley Luckhart**, University of California, Davis, USA

**Michael R. Strand**, University of Georgia, USA

**Marcelo Jacobs-Lorena**, Johns Hopkins Bloomberg School of Public Health, USA

**João H. F. Pedra**, University of Maryland School of Medicine, USA

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### Novel Approaches to Disease Control

\***Serap Aksoy**, Yale University School of Public Health, USA

\***George Dimopoulos**, Johns Hopkins University, USA

**Matthew B. Thomas**, Pennsylvania State University, USA

*Novel Strategies for Delivery of Bioactives Against Adult Malaria Mosquitoes in Field Settings*

**Luciano A. Moreira**, Instituto de Pesquisas René Rachou-Fiocruz, Brazil

*Using an Endosymbiont to Control Dengue*

**David S. Schneider**, Stanford University School of Medicine, USA

*Tracing the Path Hosts Travel through "Disease Space"*

### Meeting Wrap-Up

**Serap Aksoy**, Yale University School of Public Health, USA

**Adriana Costero-Saint Denis**, NIAID, National Institutes of Health, USA

### SUNDAY, MAY 17

#### Departure