

# KEYSTONE SYMPOSIA

on Molecular and Cellular Biology

## Higher-Order Chromatin Architecture in Time and Space (X3)

Scientific Organizers: Jennifer E. Phillips-Cremins, Job Dekker and Stavros Lomvardas

Supported by the Directors' Fund

## Skirting Mendel: Non-Classical Mechanisms of Phenotypic Variation, Inheritance and Disease (X4)

Scientific Organizers: J. Andrew Pospisilik, Anne C. Ferguson-Smith and Ben Lehner

March 15-19, 2020 • Whistler Conference Centre • Whistler, British Columbia, Canada

Supported by the Directors' Fund

Abstract & Scholarship Deadline: November 12, 2019 / Abstract Deadline: December 11, 2019 / Discounted Registration Deadline: January 15, 2020

### SUNDAY, MARCH 15

#### Arrival and Registration

### MONDAY, MARCH 16

#### Welcome and Keynote Address (X3)

**Xiaowei Zhuang**, Harvard University, USA  
*Imaging the 3D Organization of the Genome*

#### Welcome and Keynote Address (X4)

**Stanislas Leibler**, Rockefeller University, USA  
*Bet Hedging, Variation and Generational effects on Evolution*

#### Genome Reconfiguration in the Cell Cycle (X3)

**Job Dekker**, University of Massachusetts Medical School, USA  
*Genome Folding and Re-Folding during the Cell Cycle*

**Gerd A. Blobel**, Children's Hospital of Philadelphia, USA  
*Regulation of Genome Folding in Mitotic Exit*

**Amos Tanay**, Weizmann Institute, Israel  
*Chromosomal Conformation and Cellular Commitment at Single Cell Resolution*

#### Short Talks Chosen from Abstracts

#### Non-Mendelian Variation in Humans (X4)

**Emma Farley**, University of California San Diego, USA  
*High-Throughput Genotype to Phenotype Assays to Pinpoint Enhancer Mutations Underlying Disease*

**Jordana T. Bell**, King's College London, UK  
*Heritable and Non-Heritable Variation at Birth: Lessons from Twins*

#### Speaker to be Announced

#### Short Talks Chosen from Abstracts

#### Workshop 1: Leading Computational Methods to Identify Biologically Relevant Patterns in Hi-C Data (X3)

#### Short Talks Chosen from Abstracts

#### Causes and Consequences of Genome Folding on Genome Function (X3)

**Daniele Canzio**, University of California, San Francisco, USA  
*The Role of Chromosome Architecture in Generating a Code for Neural Self-Recognition*

**Jennifer E. Phillips-Cremins**, University of Pennsylvania, USA  
*Connecting 3D Genome Structure to Repeat Instability in Neurological Disorders*

**Bas van Steensel**, Netherlands Cancer Institute, Netherlands  
*Functional Role of Lamina Associated Domains*

#### Short Talks Chosen from Abstracts

#### The Repeat Genome, Heritability and the Stabilization of Phenotypes (X4)

**Maria-Elena Torres-Padilla**, Helmholtz Centre Munich, Germany  
*Programming the Earliest Cell Fates*

**Anne C. Ferguson-Smith**, University of Cambridge, UK  
*Variable Silencing of the Repeat Genome: Implications for Inheritance*

**Robert A. Martienssen**, Cold Spring Harbor Laboratory, USA  
*Regulation of Transposons in Eukaryotes: Functions and Implications*

#### Short Talks Chosen from Abstracts

#### Poster Session 1

### TUESDAY, MARCH 17

#### Genome Misfolding in Human Disease (X3)

**Stefan Mundlos**, Max Planck Institute for Molecular Genetics, Germany  
*TAD Boundary Disruption in Diseases of Mammalian Limb Development*

**Ana Pombo**, Max-Delbrück-Centrum für Molekulare Medizin, Germany  
*Genome Architecture Mapping in Rare Cell Types in the Brain*

**Benoit G. Bruneau**, Gladstone Institute of Cardiovascular Disease, USA  
*Chromatin Organization in Heart Development*

**Rafael Casellas**, NIAMS-NCI, National Institutes of Health, USA  
*Cohesin Loading Impacts Transcriptional Regulation*

#### Short Talks Chosen from Abstracts

#### Modelling Bi-Stability, Buffering, Bursting (X4)

**Martin Howard**, John Innes Centre, UK  
*Modelling Epigenetic Memories and Transcriptional Responsiveness*

#### Speaker to be Announced

**Thomas Gregor**, Princeton University, USA  
*Gradients to Genomics: Quantitative approaches to Development*

#### Speaker to be Announced

**Short Talks Chosen from Abstracts**

#### Visualizing Genome Folding in Single Cells (X3)

**Ting (C.-ting) Wu**, Harvard Medical School, USA  
*Visualizing Compartments, TADs, and Loops in Single Cells*

**Clodagh C. O'Shea**, The Salk Institute for Biological Studies, USA  
*ChromEMT: Visualizing 3D Chromatin Structure and Compaction of the Human Genome in Interphase and Mitotic Cells*

**Long Cai**, California Institute of Technology, USA  
*Simultaneous Visualization of Gene Expression and Genome Structure in Single Cells*

#### Short Talks Chosen from Abstracts

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### Mechanisms of Tuning Variation I – Quantitative in vivo Systems (X4)

**Shelley L. Berger**, University of Pennsylvania, USA  
*From Ants to Cancer Evolution: Epigenetic Systems Control*

**Robert A. Waterland**, Baylor College of Medicine, USA  
*Environmental Effects on Stochastic Establishment of DNA Methylation in Humans*

**Oded Rechavi**, Tel Aviv University, Israel  
*Transgenerational Memory in *C.elegans**

Short Talks Chosen from Abstracts

### Poster Session 2

### WEDNESDAY, MARCH 18

#### Mechanisms Governing Long-Range Looping (X3)

**Bing Ren**, Ludwig Institute for Cancer Research, USA  
*Long-Range Regulation of Enhancer Promoter Interaction*

**Stavros Lomvardas**, Columbia University, USA  
*Role for Genome Folding in Olfaction*

**François Spitz**, Institut Pasteur, France  
*Functions and Regulation of 3D Genome Architecture*

**Suzana Hadjur**, University College London, UK  
*Evolution of the 3D Genome*

Short Talks Chosen from Abstracts

#### Inter- / Trans-Generational Mechanisms (X4)

**Oliver J. Rando**, University of Massachusetts Medical School, USA  
*Paternal Mechanisms of Intergenerational Control in Mice*

**Ben Lehner**, Centre for Genomic Regulation, Spain  
*Inter- and Trans-Generational Epigenetic Memory*

**Qi Chen**, University of California, Riverside, USA  
*Sperm RNA Code: How Many Secrets in Programming Offspring Phenotypes*

Speaker to be Announced

Short Talks Chosen from Abstracts

#### Spatiotemporal Genome Folding Dynamics (X3)

**Joanna Wysocka**, Stanford University, USA  
*Visualizing the Dynamics of Long-Range Enhancer Promoter Contacts*

**Bradley R. Cairns**, HHMI/University of Utah, USA  
*Dynamics of Genome Folding in Zebrafish Development*

**Karen L. Reddy†**, Johns Hopkins University, USA  
*Talk Title to be Announced*

**Jeannie T. Lee**, Massachusetts General Hospital / Harvard Medical School, USA

*Folding and Unfolding the X-Chromosome Origami*

Short Talks Chosen from Abstracts

### Histone based Mechanisms of Rewiring and Feedback (X4)

**Robert Schneider**, Helmholtz Center Munich, Germany  
*Capturing Transcriptional Memories, One-Cell at a Time*

**Victor G. Corces**, Emory University, USA  
*Non-Genetic Inheritance of Chromatin Architecture*

**Mofang Liu**, Shanghai Institutes for Biological Sciences, Chinese Academy of Sciences, China

*Establishing the Human Sperm Epigenome - Small RNA Mechanisms*

Short Talks Chosen from Abstracts

### Poster Session 3

### THURSDAY, MARCH 19

#### Phase Separation in the 3D Nucleus (X3)

**Clifford P. Brangwynne**, Princeton University, USA  
*Optical Control over Nuclear Bodies*

**Leonid Mirny**, Massachusetts Institute of Technology, USA  
*Biophysical Mechanisms of Chromosome Organization*

**Gary Karpen**, University of California, Berkeley, USA  
*Do Liquid-Like Properties Regulate Genome Organization and Function?*

Short Talks Chosen from Abstracts

#### Mechanisms of Tuning Variation II: Buffering and Canalizing Genetic Programs (X4)

**J. Andrew Pospisilik**, Van Andel Institute, USA  
*Multi-Stabilities and Developmental Switch Genes in Disease*

**Daniel F. Jarosz**, Stanford University School of Medicine, USA  
*Prions and Genetic Capacitors in Robustness*

**Ralf Sommer**, Max Planck Institute for Developmental Biology, Germany  
*Predatory Feeding Plasticity in Nematodes: Genetics, Epigenetics and Trans-Generational Effects*

**Eric A. Miska**, University of Cambridge, UK  
*Cichlid Evolutionary Radiation*

Short Talk Chosen from Abstracts

#### Workshop 2: New Genome Mapping and Imaging Technologies (X3)

Short Talks Chosen from Abstracts

#### New Technologies for Imaging, Engineering, and Mapping the 3D Genome (X3)

**Anders Sejr Hansen**, Massachusetts Institute of Technology, USA  
*Dynamics of 3D Genome Organization in Live Cells at Single-Molecule Resolution*

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**Erez Lieberman-Aiden**, Baylor College of Medicine, USA

*Models and Mechanisms of Loop Extrusion*

**Speaker to be Announced**

**Short Talk Chosen from Abstracts**

### Rewire the Germline - Rewire the Zygote (X4)

**Petra Hajkova**, Imperial College London, UK

*Epigenetics Transitions Defining the Zygote*

**Mary A. Gehring**, Whitehead Institute for Biomedical Research, USA

*Control of Epigenetic Dynamics in Plants*

**Nicola Iovino**, Max Planck Institute of Immunobiology and  
Epigenetics, Germany

*Establishment of the Zygotic Epigenome in Drosophila*

**Short Talks Chosen from Abstracts**

**Meeting Wrap-Up: Outcomes and Future Directions (Organizers)**  
(X3)

**Meeting Wrap-Up: Outcomes and Future Directions (Organizers)**  
(X4)

**FRIDAY, MARCH 20**

**Departure**