



LIFE SCIENCES INSTITUTE
UNIVERSITY OF MICHIGAN

THE POWER OF **ONE**

FRONTIERS IN SINGLE CELL BIOLOGY

SALTIEL LIFE SCIENCES SYMPOSIUM

SEPTEMBER 5, 2018

SEVENTEENTH ANNUAL LSI SYMPOSIUM

FORUM HALL, PALMER COMMONS
100 WASHTENAW AVE, ANN ARBOR

#LSIsymposium2018



This year's art theme:
Paintings by Odra Noel (CC BY-NC)
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Special thanks to the Saitel Life Sciences Symposium organizing committee:

Jiandie Lin, Ph.D., U-M Life Sciences Institute; Department of Cell & Developmental Biology, U-M Medical School (committee chair)

Jun Li, Ph.D., Department of Human Genetics, Department of Computational Medicine and Bioinformatics, U-M Medical School

Stephen J. Weiss, M.D., U-M Life Sciences Institute; Department of Internal Medicine, U-M Medical School

Bing Ye, Ph.D., U-M Life Sciences Institute; Department of Cell & Developmental Biology, U-M Medical School

SCHEDULE

8:45 A.M.

Welcome

Roger D. Cone, Ph.D.

*Vice Provost and Director, Biosciences Initiative;
Mary Sue Coleman Director, Life Sciences Institute;
Professor of Molecular and Integrative Physiology,
Medical School; Professor of Molecular, Cellular, and
Developmental Biology, College of Literature, Science,
and the Arts, University of Michigan*

Martin Philbert, Ph.D.

*Provost and Executive Vice President for Academic
Affairs; Professor of Toxicology, School of Public Health,
University of Michigan*

8:55 A.M.

Introduction of the Mary Sue and Kenneth Coleman Life
Sciences Lecturer

Alan R. Saltiel, Ph.D.

*Professor and Director, Institute for Diabetes and
Metabolic Health, University of California, San Diego
School of Medicine; Director, Life Sciences Institute,
University of Michigan (2002–2015)*

9:00 A.M.

Mary Sue and Kenneth Coleman Life Sciences Lecture:
Single cell genomics: When stochasticity meets precision

Xiaoliang Sunney Xie, Ph.D.

*Lee Shau-kee Professor; Director, Biomedical Pioneering
Innovation Center; Director, Beijing Advanced Innovation
Center for Genomics, Peking University*

9:50 A.M.

Morning break

10:10 A.M.

Solving biomedical challenges through single cell
genomics approaches

Alexandra-Chloé Villani, Ph.D.

*Principal Investigator and Director, Single Cell Genomics
Research Program, Center for Immunology and
Inflammatory Diseases, Massachusetts General Hospital;
Member of the Faculty of Medicine, Harvard Medical
School; Assistant Scientist, Broad Institute of MIT and
Harvard*

11:00 A.M.

Exploring the biological basis of neuronal identity and
diversity: From transcription mechanism to circuit
function

Z. Josh Huang, Ph.D.

*Charles and Marie Robertson Professor of Neuroscience,
Cold Spring Harbor Laboratory*

11:50 A.M.

Poster session & lunch (Great Lakes Rooms)

1:20 P.M.

Spatial genomics and single cell lineage dynamics by
seqFISH and MEMOIR

Long Cai, Ph.D.

*Research Professor, Division of Biology and Biological
Engineering, California Institute of Technology*

2:10 P.M.

Analytics of single cell RNA-SEQ: Lessons from
heterogeneity of immune cells

Nir Yosef, Ph.D.

*Assistant Professor, Department of Electrical Engineering
& Computer Science, University of California, Berkeley*

3:00 P.M.

Afternoon break

3:20 P.M.

Myeloid cell contribution to tumor outcome

Miriam Merad, M.D., Ph.D.

*Professor and Director of the Precision Immunology
Institute, Department of Oncological Sciences and
Medicine, Icahn School of Medicine at Mount Sinai*

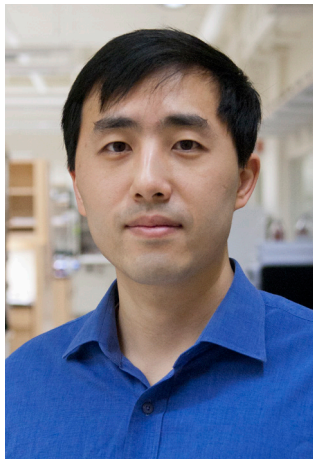
4:10 P.M.

Closing Remarks

Roger D. Cone, Ph.D.

LIGHT REFRESHMENTS WILL BE AVAILABLE DURING BREAKS.
ATTENDEES ARE INVITED TO ENJOY LUNCH DURING THE POSTER SESSION.

SPEAKER BIOGRAPHIES



Long Cai, Ph.D.

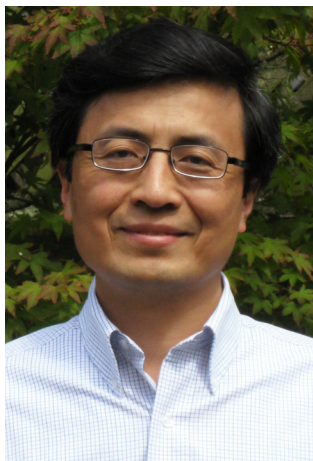
Research Professor, Division of Biology and Biological Engineering, California Institute of Technology

Long Cai received his Ph.D. from Harvard University before completing postdoctoral work at the California Institute of Technology, where he is now a research professor in the Division of Biology and Biological Engineering.

Cai's lab solved a major challenge in single cell in situ analysis by showing that a large number of mRNAs can be profiled in single cells in their native environments. The group accomplished this by developing a sequential barcoding method that is akin to sequencing RNAs in cells with sequential fluorescence in situ hybridization (seqFISH). They are now translating this method to solve fundamental questions in developmental biology and neuroscience.

Building upon seqFISH, Cai's lab recently developed a method called Memory through Engineered Mutagenesis with Optical In situ Readout (MEMOIR), which allows researchers to record cellular events into the genome of cells using CRISPR-based genome editing tools. MEMOIR has the potential to be a powerful tool in understanding cell identity and fate decisions that are fundamental to a wide range of questions in neuroscience, developmental biology and human diseases.

Cai's awards and honors include the McKnight Technology Innovation Award and being named an Allen Brain Institute Distinguished Investigator.



Z. Josh Huang, Ph.D.

Charles and Marie Robertson Professor of Neuroscience, Cold Spring Harbor Laboratory

Z. Josh Huang obtained his Ph.D. in molecular biology at Brandeis University and completed postdoctoral training at the Massachusetts Institute of Technology. He has been an investigator at Cold Spring Harbor Laboratory since 2000 and is currently the Charles and Marie Robertson Professor of Neuroscience.

Huang's framework for discovering and classifying specific types of neurons advanced understanding of the diverse range of cell types operating within the brain's neural circuits and how altered circuit development contributes to mental disorders. He has received numerous awards, including the Pew Scholar Award, McKnight Scholar Award, and Distinguished Investigator Award of the NARSAD-Brain and Behavior Research Foundation.

SPEAKER BIOGRAPHIES



Miriam Merad, M.D., Ph.D.

Professor and Director of the Precision Immunology Institute, Department of Oncological Sciences and Medicine, Icahn School of Medicine at Mount Sinai

After earning her M.D. at the University of Algiers, Algeria, Miriam Merad completed her residency in hematology and oncology in Paris, France, and completed her Ph.D. in immunology through a collaboration between Stanford University and University of Paris VII. She was then recruited to Mount Sinai, where she has obtained an endowed chair professorship in cancer immunology.

Merad's laboratory studies the contribution of macrophages and dendritic cells to cancer and inflammatory disease in mice and humans. Her pioneering work mapping the regulatory network of dendritic cells (DCs) resulted in identification of a lineage of DCs, the CD103+ DC, that is now considered a key target to improve antiviral and antitumor immunity.

Merad has authored more than 160 primary papers and reviews in high-profile journals. She receives funding from the National Institutes of Health (NIH) for her research on innate immunity and its contribution to human disease, and belongs to several NIH consortia. She is an elected member of the American Society of Clinical Investigation and lectures around the world on her work.



Alexandra-Chloé Villani, Ph.D.

Principal Investigator and Director, Single Cell Genomics Research Program, Center for Immunology and Inflammatory Diseases, Massachusetts General Hospital; Member of the Faculty of Medicine, Harvard Medical School; Assistant Scientist, Broad Institute of MIT and Harvard

Alexandra-Chloé Villani is a geneticist and immunologist specializing in developing and implementing systems immunology approaches and single cell genomics strategies to advance understanding of human immune system regulation. She received her Ph.D. in experimental medicine from McGill University and completed her postdoctoral research at the Broad Institute of MIT and Harvard.

During her postdoctoral fellowship, Villani discovered and characterized novel human blood immune cell populations by developing and implementing single cell genomics experimental and analytical strategies, along with complementary functional studies. This groundbreaking work positioned her as an emerging leader in the field of single cell genomics. Her lab at Massachusetts General Hospital now focuses on defining at high resolution the pillars underlying healthy human immune response regulation as a foundation for understanding how immunity is dysregulated in diseases, with particular emphasis on immune disorders bridging between chronic inflammation, autoimmunity and cancer.

Villani is the recipient of numerous awards, including the Massachusetts General Hospital Transformative Scholar Award, the Jonathan Kraft Translational Award, the Lawrence H. Summers Fellowship and the Janeway Award.

SPEAKER BIOGRAPHIES



Xiaoliang Sunney Xie, Ph.D.

Lee Shau-kee Professor; Director, Biomedical Pioneering Innovation Center; Director, Beijing Advanced Innovation Center for Genomics, Peking University

After earning a Ph.D. from the University of California, San Diego, Xiaoliang Sunney Xie joined the Pacific Northwest National Laboratory and became chief scientist. In 1999, he was appointed professor of chemistry at Harvard University, and then the Mallinckrodt Professor of Chemistry and Chemical Biology at Harvard. Currently, Xie is the Lee Shau-kee Chair Professor, Director of the Beijing Innovation Center for Genomics, and Director of the Biomedical Pioneering Innovation Center at Peking University.

Xie's research group has been developing tools for biology and medicine for more than 20 years. Through this research, Xie became a world leader in utilizing these tools to make fundamental discoveries in biochemistry and molecular biology. He has made groundbreaking contributions in three areas: single-molecule enzymology, single-molecule gene expression in live cells and single-cell genomics. His innovations in single-cell genomics have direct impacts on human health and provide a clear example of precision medicine at the single-molecule level.

Among his honors are the Albany Prize in Medicine and Biomedical Research, and the National Institute of Health Director's Pioneer Award. He is also a fellow of the American Academy of Arts and Sciences and a member of the National Academy of Sciences and National Academy of Medicine.



Nir Yosef, Ph.D.

Assistant Professor, Department of Electrical Engineering & Computer Science, University of California, Berkeley

Nir Yosef received his Ph.D. in computer science from the Tel Aviv University. He then completed postdoctoral training at the Broad Institute, where he worked on inference of transcriptional regulatory models of T cell development. He is now an assistant professor of computer science and a core member of the Center for Computational Biology at the University of California, Berkeley. He is also an associate member of the Ragon Institute of Massachusetts General Hospital, MIT and Harvard and a Chan Zuckerberg Biohub investigator.

The Yosef lab is developing and applying computational methods that leverage single cell RNA-sequencing data, focusing on normalization and visualization, inference of sub-populations and characterization of metabolic programs. A second area of research is method development for studying regulatory regions in the genome, based on chromatin profiles and massively parallel reporter assays. These tools are developed through close collaboration with experimental labs, with applications including T cell development, HIV control and neural differentiation.

POSTER SESSION

"High resolution identification of immune cells in the metastatic microenvironment"

Aqila Ahmed, Keller Lab, Urology, U-M Medical School

"Single cell analysis in cancer research: Applications and challenges"

Ebrahim Azizi, Single Cell Analysis Core, Rogel Cancer Center, Michigan Medicine

"Single cell RNA profiling to map the effects of developmental lead exposure on the hippocampus"

Kelly Bakulski, Bakulski Lab, Epidemiology, U-M School of Public Health

"Distinct mechanisms associated with HP1 dynamics mediate stable epigenetic inheritance"

Saikat Biswas, Ragunathan Lab, Biological Chemistry, U-M Medical School

"Deconstructing in vivo adipogenesis with single cell expression profiling"

Rayanne Burl, Granneman Lab, Wayne State University School of Medicine

"Single-cell and cell-type-specific transcriptomic profiling of major cell types in human term villous tissue"

Kyle Campbell, Bakulski Lab, Epidemiology, U-M School of Public Health

"Population-specific gene expression changes in a pituitary disease model identified by single-cell RNAseq"

Leonard Cheung, Camper Lab, Human Genetics, U-M Medical School

"Identifying endogenous reference genes for single-cell RNA-sequencing"

Julie Deeke, Gagnon-Bartsch Lab, Statistics, U-M College of Literature, Science, and the Arts

"A scalable high-throughput method for RNA-seq analysis of thousands of single cells"

Steven Hoffman, Illumina

"A rare cell platform for multi-parameter phenotypic characterization and single-cell molecular analysis in fluid and tissue samples"

Eric Kaldjian, RareCyte

"Cellular and molecular basis of altered GABAergic signaling in Down syndrome"

Hao Liu, Ye Lab, U-M Life Sciences Institute; Cell & Developmental Biology, U-M Medical School

"Single cell analysis of adipose tissue stromal cells in obesity"

Carey Lumeng, Lumeng Lab, Pediatrics and Communicable Diseases and Molecular & Integrative Physiology, U-M Medical School

"Matrin 3-dependent neurotoxicity is modified by nucleic acid binding and nucleocytoplasmic localization"

Ahmed Malik, Barmada Lab, Neurology, U-M Medical School

"Investigating differentiation defects during cortical development with single-cell RNA sequencing"

Brian McGrath, Bielas Lab, Human Genetics, U-M Medical School

"Isolation of oxindoles that target an allosteric site within the mitotic kinesin Kif15"

Ryoma Ohi & April Solon, Ryoma Ohi Lab, Cell & Developmental Biology, U-M Medical School

"A single cell transcriptome landscape of the bone marrow stromal cell lineage"

Noriaki Ono, Ono Lab, Orthodontics, U-M School of Dentistry

"Fiber type-selective effects of exercise on insulin-stimulated glucose uptake by single muscle fibers from insulin resistant rats"

Mark Pataky, Cartee Lab, Muscle Biology Laboratory, U-M School of Kinesiology

"Deciphering the tumor microenvironment cell by cell"

Egon Ranghini, 10x Genomics

"Transcription factor network activity driving prostate cancer drug resistance"

Patricia M. Schnepf, Keller Lab, Urology, U-M Medical School

"Single cell analysis of taxol resistance"

Greg Shelley, Keller Lab, Urology, U-M Medical School

POSTER SESSION

"Single cell profiling of pancreatic tumors"

Nina Steele, Allen and Pasca di Magliano Labs, Cell & Developmental Biology and Surgery, U-M Medical School

"Differentiating transcriptomic changes of human mammary cells pre- and post-conditional reprogramming using single cell analyses"

Tasha Thong, Colacino Lab, Environmental Health Sciences, U-M School of Public Health

"Dissecting individual and collective regenerative behavior of muscle stem cells during aging"

Pete Ulintz, NOBEL/Aguilar Lab, U-M Biomedical Engineering

"Identifying neuronal lineages in the *Drosophila* peripheral nervous system with an advanced Brainbow system"

Macy Veiling, Ye Lab, U-M Life Sciences Institute; Cell & Developmental Biology, U-M Medical School

"Developmental modulation of transcriptional bursting during organ of corti development"

Joerg Waldhaus, Waldhaus Lab, Kresge Hearing Research Institute, U-M Medical School

"Unsupervised cluster-relevant gene ranking for single-cell RNA-sequencing data"

Yutong Wang, SPADA Lab, Scott Lab and Michigan Center for Single-Cell Genomic Data Analytics

"Investigating the regulation of nucleolar dominance during *Drosophila melanogaster* development"

Natalie Warsinger-Pepe, Yamashita Lab, U-M Life Sciences Institute; Cell & Developmental Biology, U-M Medical School

"Landscape of cell-cell signaling in fatty liver disease revealed by single-cell secretome analysis"

Xuelian Xiong and Henry Kuang, Lin Lab, U-M Life Sciences Institute; Cell & Developmental Biology, U-M Medical School

"Poly-ubiquitination of Rheb induces amino acid-independent lysosomal mTORC1 localization and its activation"

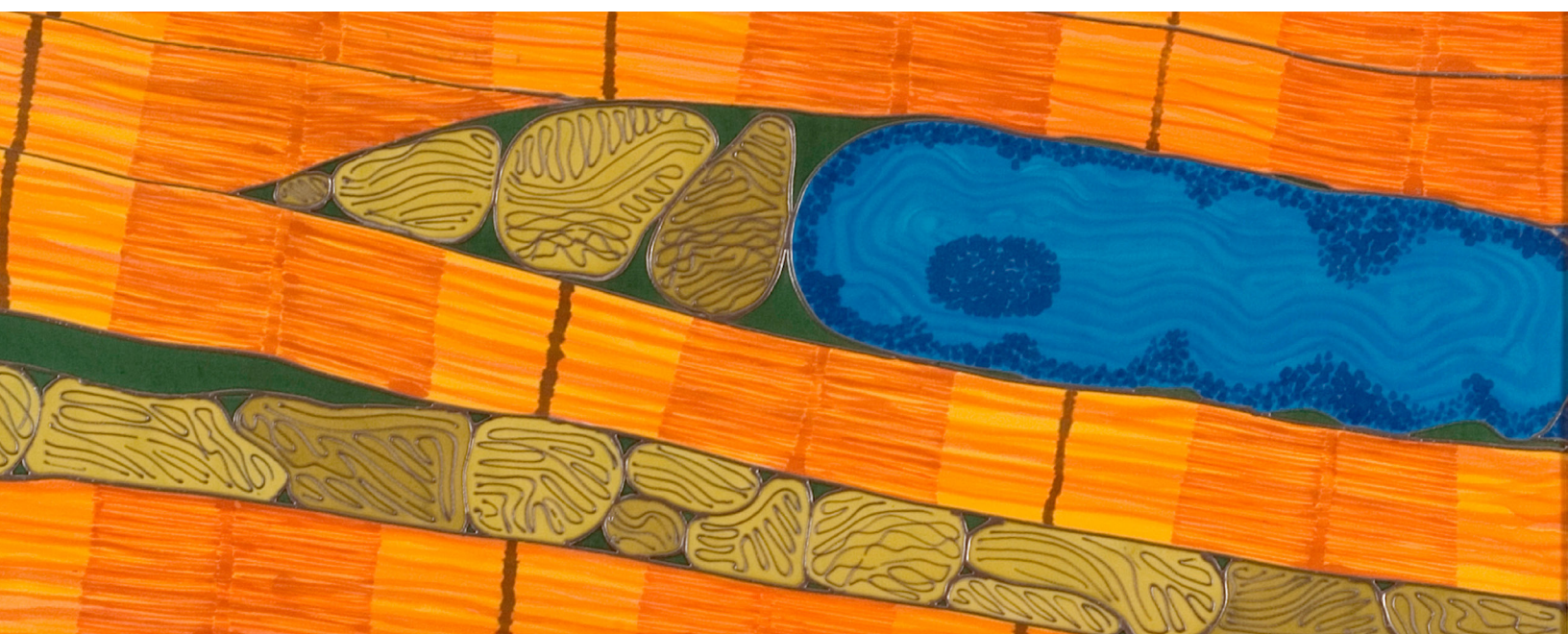
Yao Yao, Inoki Lab, U-M Life Sciences Institute; Molecular & Integrative Physiology, U-M Medical School

"Transcriptomic characterization of breast cancer cell lines SUM149 and SUM190 using Fluidigm single-cell analysis platform"

Hongjiu Zhang, Guan Lab, Computational Medicine & Bioinformatics, U-M Medical School

"Measuring gene expression inequality in single cells using adjusted Gini index"

Xianing Zheng, Jun Li Lab, Human Genetics, U-M Medical School



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SALTIEL LIFE SCIENCES SYMPOSIUM

SEPTEMBER 25, 2019



I am a scientist



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ABOUT THE LIFE SCIENCES INSTITUTE

The Life Sciences Institute is a hub for collaborative bioscience discovery at the University of Michigan. Our faculty, who hold joint appointments in schools and colleges across the campus, work to advance the understanding of fundamental biology in important areas of human health and disease. In addition to faculty labs, the LSI houses a world-class cryo-electron microscopy facility, a high-throughput screening center with extensive chemical libraries, a unique library of natural products and a comprehensive protein production and X-ray crystallography facility. The LSI is also the administrative home for the U-M Program in Chemical Biology, the U-M Center for the Discovery of New Medicines and the Michigan Life Sciences Fellows.

ABOUT THE ANNUAL SYMPOSIUM

In 2002, while construction of the institute was still underway, the LSI held its first symposium. The event continues to represent the LSI's most important values: excellence in science, investment in high-impact research and especially the synergy that happens when top scientists from a range of fields meet and share their work around a common theme.

In 2016, the annual LSI symposium was named the Saltiel Life Sciences Symposium thanks to an endowment made possible by the generous support of the LSI's faculty, Leadership Council, Scientific Advisory Board and friends. The name recognizes the leadership and scientific contributions made by former LSI Director Alan R. Saltiel during his 13-year tenure.

PAST SYMPOSIA

2017	Game Changers: Technologies that Are Rewriting the Future of the Life Sciences	2010	Macromolecular Complexes in Cell Biology
2016	Chemical Biology: Rise of the Cellular Machine	2009	Evolutionary Biology
2015	Defense Mechanisms in Life: From Bacteria to the Human Body	2008	Focus on Chemical Biology
2014	Victors for Discovery: Biomedicine at Michigan	2007	Frontiers in Stem Cell Biology
2013	Exploring Epigenetics and RNA	2006	Molecular Insights into Metabolic Disease
2012	Development and Diseases of the Nervous System	2005	Cancer Insights: Molecules to Medicine
2011	Autophagy	2004	Exploring the Complexity of Life
		2003	Genetic Insights into Biology and Disease
		2002	Structural Biology of Cell Signaling

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