

## Conference Program

### Sunday

2:00 pm - 9:00 pm Arrival and Check-in

6:00 pm - 7:00 pm Dinner

7:30 pm - 7:40 pm Introductory Comments by GRC Site Staff / Welcome from the GRC Chair

7:40 pm - 9:30 pm Keynote Session: Origin of Life, Evolution and Aging

Discussion Leader: Ivan Matic (INSERM U1001 / Universite Paris Descartes, France)

7:40 pm - 7:50 pm Opening Remarks

7:50 pm - 8:30 pm Nigel Goldenfeld (University of Illinois, USA)

"Evolutionary Transitions in the First 1,000,000,000 Years of Life: Emergence of Homochirality and the Genetic Code"

8:30 pm - 8:40 pm Discussion

8:40 pm - 9:20 pm Tom Kirkwood (Institute for Ageing, Newcastle University, United Kingdom)

"Evolution and the Origins of Aging"

9:20 pm - 9:30 pm Discussion

### Monday

7:30 am - 8:30 am Breakfast

8:30 am - 9:00 am Group Photo

9:00 am - 12:30 pm Setting Evolutionary Rates: Mutation and Recombination

Discussion Leader: Olivier Tenaillon (INSERM, France)

9:00 am - 9:05 am Introduction by Discussion Leader

9:05 am - 9:25 am Daniel Fisher (Stanford University, USA)

"How Much Recombination Is Enough?"

9:25 am - 9:35 am Discussion

9:35 am - 9:55 am Laurent Duret (University of Lyon, CNRS, France)

"Biased Gene Conversion: The Dark Side of Recombination"

9:55 am - 10:05 am Discussion

10:05 am - 10:35 am Coffee Break

10:35 am - 10:55 am Kirsten Bomblies (John Innes Centre, United Kingdom)

"Causes and Consequences of the Evolution of Meiosis and Recombination"

10:55 am - 11:05 am Discussion

11:05 am - 11:25 am Johan Paulsson (Harvard University, USA)

"Fluctuations and Control of Macromolecules in Bacteria"

11:25 am - 11:35 am Discussion

11:35 am - 11:45 am Selected from Poster Abstracts: Marina Elez (Pierre and Marie Curie University, France)

"Mutation Dynamics and Fitness Effects Followed in Single Cells"

11:45 am - 11:50 am Discussion

11:50 am - 12:00 pm Selected from Poster Abstracts: Lana Talmane (The University of Edinburgh, United Kingdom)

"The Landscape of Replication-Associated Mutations in Human and Mouse Germlines"

12:00 pm - 12:05 pm Discussion

12:05 pm - 12:15 pm Selected from Poster Abstracts: Chi Xue (University of Illinois at Urbana-Champaign, USA)

"Even Parasites Have Parasites: Oscillatory Population Dynamics of Mobile Genetic Elements in Your Genome"

12:15 pm - 12:20 pm Discussion

12:20 pm - 12:30 pm General Discussion

12:30 pm - 1:30 pm Lunch

1:30 pm - 4:00 pm Free Time

3:00 pm - 4:00 pm Power Hour

The GRC Power Hour is an optional informal gathering open to all meeting participants. It is designed to help address the challenges women face in science and support the professional growth of women in our communities by providing an open forum for discussion and mentoring.

Organizer: Susan Rosenberg (Baylor College of Medicine, USA)

4:00 pm - 6:00 pm Poster Session

6:00 pm - 7:00 pm Dinner

7:30 pm - 9:30 pm Stress-Inducible Genetic Variation and Evolution

Discussion Leader: Susan Rosenberg (Baylor College of Medicine, USA)

7:30 pm - 7:50 pm Tom Kuhlman (University of Illinois, USA)

"Real Time Transposable Element Activity in Live Cells"

7:50 pm - 8:00 pm Discussion

8:00 pm - 8:20 pm Thomas Ferenci (University of Sydney, Australia)

"Non-Linearity Between Inputs and Outputs in Stress-Induced Mutagenesis"

8:20 pm - 8:30 pm Discussion

8:30 pm - 8:50 pm Judith Berman (Tel Aviv University, Israel)

"Eukaryotic Mechanisms of Overcoming Antimicrobial Drug Stress"

8:50 pm - 9:00 pm Discussion

9:00 pm - 9:20 pm Reuben Harris (Howard Hughes Medical Institute, USA)

"Tumor Evolution by APOBEC-Catalyzed DNA Deamination"

9:20 pm - 9:30 pm Discussion

Tuesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm Non-Genetic Variation and Inheritance

Discussion Leader: Martin Ackermann (ETH Zurich, Switzerland)

9:00 am - 9:05 am Introduction by Discussion Leader

9:05 am - 9:25 am Andreas Wagner (University of Zurich, Switzerland)

"On the Role of Mistranslation in Adaptive Evolution"

9:25 am - 9:35 am Discussion

9:35 am - 9:55 am Raul Andino (University of California, San Francisco, USA)

"Genome Variation, Population Size and Selection During RNA Virus Infection"

9:55 am - 10:05 am Discussion

10:05 am - 10:35 am Coffee Break

10:35 am - 10:55 am Christophe Herman (Baylor College of Medicine, USA)

"Transcription Fidelity Impedes DNA Break Repair"

10:55 am - 11:05 am Discussion

11:05 am - 11:15 am Selected from Poster Abstracts: Lilach Hadany (Tel Aviv University, Israel)

"Non-Genetic Inheritance and the Evolution of Cooperation"

11:15 am - 11:20 am Discussion

11:20 am - 11:30 am Selected from Poster Abstracts: Dragan Stajic (Fundacao Calouste Gulbenkian, Instituto Gulbenkian de Ciencia, Portugal)

"The Role of Epigenetic Mechanisms in the Adaptive Evolution"

11:30 am - 11:35 am Discussion

11:35 am - 11:45 am Selected from Poster Abstracts: Naomi Ziv (University of California, San Francisco, USA)

"Molecular Analysis of Bistability in a Eukaryotic Transcriptional Network"

11:45 am - 11:50 am Discussion

11:50 am - 12:00 pm Selected from Poster Abstracts: Xinzhu Wei (University of Michigan, USA)

"A New Theory on the Cause of Genetic Dominance"

12:00 pm - 12:05 pm Discussion

12:05 pm - 12:15 pm Selected from Poster Abstracts: Lei Sun (ETH Zurich, Switzerland)

"Effective Polyploidy Causes Phenotypic Delay and Influences Bacterial Evolvability"

12:15 pm - 12:20 pm Discussion

12:20 pm - 12:30 pm General Discussion

12:30 pm - 1:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm - 7:00 pm Dinner

7:30 pm - 9:30 pm Phenotypic Noise and Evolution

Discussion Leader: Christophe Herman (Baylor College of Medicine, USA)

7:30 pm - 7:35 pm Introduction by Discussion Leader

7:35 pm - 7:55 pm Martin Ackermann (ETH Zurich, Switzerland)

"An Evolutionary Perspective on Phenotypic Heterogeneity in Microbes"

7:55 pm - 8:05 pm Discussion

8:05 pm - 8:25 pm Leor Weinberger (University of California, San Francisco, USA)

"Adaptations for Harnessing 'Noise' to Control Fate Specification"

8:25 pm - 8:35 pm Discussion

8:35 pm - 8:45 pm Selected from Poster Abstracts: Angela Phillips (Massachusetts Institute of Technology, USA)

"Influenza Evolution Is Modulated by Host Proteostasis"

8:45 pm - 8:50 pm Discussion

8:50 pm - 9:00 pm Selected from Poster Abstracts: Joel Stavans (Weizmann Institute of Science, Israel)  
"One Day in the Life, Development and Evolution of a One-Dimensional Organism"

9:00 pm - 9:05 pm Discussion

9:05 pm - 9:15 pm Selected from Poster Abstracts: Zoran Marinkovic (Paris Diderot University, France)  
"Growth, Differentiation and Self-Organization of *S. cerevisiae* Colonies in Controlled Spatially Structured Dynamically Changing Environments"

9:15 pm - 9:20 pm Discussion

9:20 pm - 9:30 pm General Discussion

Wednesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm Evolution of Novelty  
Discussion Leader: Joe Thornton (University of Chicago, USA)

9:00 am - 9:05 am Introduction by Discussion Leader

9:05 am - 9:25 am Manyuan Long (University of Chicago, USA)  
"The Sibling Paradox: Rapid Evolution of Genetic Systems for Phenotypic Control by New Genes"

9:25 am - 9:35 am Discussion



9:35 am - 9:55 am Shelley Copley (University of Colorado Boulder, USA)  
"Promiscuity, Serendipity and Metabolic Innovation"

9:55 am - 10:05 am Discussion

10:05 am - 10:35 am Coffee Break

10:35 am - 10:55 am Marie-Anne Felix (Institut de Biologie de l'Ecole Normale Supérieure, France)  
"Phenotypic Effects of Random Mutation"

10:55 am - 11:05 am Discussion

11:05 am - 11:15 am Selected from Poster Abstracts: Avihu Yona (Massachusetts Institute of  
Technology, USA)  
"Random Sequences Rapidly Evolve into De Novo Promoters"

11:15 am - 11:20 am Discussion

11:20 am - 11:30 am Selected from Poster Abstracts: Victor Luria (Harvard Medical School, USA)  
"Variation and Novelty in Evolution: De Novo Genes Arise and Enable Protein  
Structural Innovation"

11:30 am - 11:35 am Discussion

11:35 am - 11:45 am Selected from Poster Abstracts: Debora Marks (Harvard Medical School, USA)  
"Evolutionary Couplings from Sequences: Prediction of 3D Structure and Fitness"

11:45 am - 11:50 am Discussion

11:50 am - 12:00 pm Selected from Poster Abstracts: Krishna Swamy (Institute of Molecular Biology, Academia Sinica, Taiwan)

"Proteotoxic Stress Due to Loss of Interaction Partners Induces Reproductive Isolation in Yeast Hybrids"

12:00 pm - 12:05 pm Discussion

12:05 pm - 12:15 pm Selected from Poster Abstracts: Yu-Ying Hsieh (Harvard University, USA)

"Repurposing the Function of a Meiotic Cohesin Protein in Budding Yeast"

12:15 pm - 12:20 pm Discussion

12:20 pm - 12:30 pm General Discussion

12:30 pm - 1:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm - 7:00 pm Dinner

7:00 pm - 7:30 pm Business Meeting  
Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair

7:30 pm - 9:30 pm Evolution of Complexity

Discussion Leader: Marie-Anne Felix (Institut de Biologie de l'Ecole Normale Supérieure, France)

7:30 pm - 7:35 pm Introduction by Discussion Leader

7:35 pm - 7:55 pm Gunter Wagner (Yale University, USA)

"Evolving Complex Body Plans Through Cell Type Diversity: Molecular and Cellular Mechanisms"

7:55 pm - 8:05 pm Discussion

8:05 pm - 8:25 pm Annalise Paaby (Georgia Institute of Technology, USA)

"Conditionally Functional Variation and the Evolution of Complex Traits"

8:25 pm - 8:35 pm Discussion

8:35 pm - 8:55 pm Joe Thornton (University of Chicago, USA)

"Ancient Mechanisms for the Evolution of a New Molecular Signaling System"

8:55 pm - 9:05 pm Discussion

9:05 pm - 9:15 pm Selected from Poster Abstracts: Tyler Starr (University of Chicago, USA)

"Alternative Evolutionary Histories in the Sequence Space of an Ancient Protein"

9:15 pm - 9:20 pm Discussion

9:20 pm - 9:30 pm General Discussion

Thursday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm Somatic Evolution: Cancer

Discussion Leader: Darryl Shibata (Keck School of Medicine, University of Southern California, USA)

9:00 am - 9:05 am Introduction by Discussion Leader

9:05 am - 9:25 am Marco Gerlinger (The Institute of Cancer Research, United Kingdom)

"Dissecting Cancer Evolution: Patterns, Dynamics and Clinical Implications"

9:25 am - 9:35 am Discussion

9:35 am - 9:55 am Richard White (Memorial Sloan Kettering Cancer Center, USA)

"Error-Prone DNA Polymerases in Melanoma Progression and Drug Resistance"

9:55 am - 10:05 am Discussion

10:05 am - 10:35 am Coffee Break

10:35 am - 10:55 am Susan Rosenberg (Baylor College of Medicine, USA)

"E. coli Identifies New Cancer Gene Functions that Promote Evolvability"

10:55 am - 11:05 am Discussion

11:05 am - 11:15 am Selected from Poster Abstracts: Muhammad Sufyan Bin Masroni (National University of Singapore, Singapore)

"Regenerable Altruism in Clonal Cancer Cells"

11:15 am - 11:20 am Discussion

11:20 am - 11:30 am Selected from Poster Abstracts: Cemalettin Bekpen (Max-Planck Institute for Evolutionary Biology, Germany)

"High Copy Number of SPATA31 Genes Correlates with Somatic Mutation Rate and Shorter Life Span in Humans"

11:30 am - 11:35 am Discussion

11:35 am - 11:45 am Selected from Poster Abstracts: Joanna Masel (University of Arizona, USA)

"Intercellular Competition and the Inevitability of Multicellular Aging"

11:45 am - 11:50 am Discussion

11:50 am - 12:00 pm Alesia McKeown (University of Utah School of Medicine, USA)

"Novel Roles for Retrogenes in Host Immunity"

12:00 pm - 12:05 pm Discussion

12:05 pm - 12:15 pm Selected from Poster Abstracts: Amir Mitchell (University of Massachusetts Medical School, USA)

"Extracellular Stimuli Dynamics Can Undermine Optimal Cell Response: Detrimental Misperception by the MAPK Signaling Network in Yeast"

12:15 pm - 12:20 pm Discussion

12:20 pm - 12:30 pm General Discussion

12:30 pm - 1:30 pm Lunch

1:30 pm - 4:00 pm Free Time

4:00 pm - 6:00 pm Poster Session

6:00 pm - 7:00 pm Dinner

7:30 pm - 9:30 pm Replaying the Tape of Life: Experimental Evolution and Evolutionary Contingency  
Discussion Leader: Andrew Murray (Harvard University, USA)

7:30 pm - 7:35 pm Introduction by Discussion Leader

7:35 pm - 7:55 pm Olivier Tenailon (INSERM, France)  
"The Long-Term Molecular Fate of Mutator Genomes"

7:55 pm - 8:05 pm Discussion

8:05 pm - 8:25 pm Tim Cooper (University of Houston, USA)  
"Gene Interactions Cause Repeatable Changes in E. coli Evolvability"

8:25 pm - 8:35 pm Discussion

8:35 pm - 8:55 pm Michael Desai (Harvard University, USA)  
"The Dynamics of Molecular Evolution over 60,000 Generations"

8:55 pm - 9:05 pm Discussion

9:05 pm - 9:15 pm Selected from Poster Abstracts: Yuping Li (Stanford University, USA)  
"Understanding Adaptation and Fitness Trade-Offs in Yeast"

9:15 pm - 9:20 pm Discussion

9:20 pm - 9:30 pm Closing Remarks

Friday

7:30 am - 8:30 am Breakfast

9:00 am Departure

Contributors

		
		
		

<i>Conference:</i>	Molecular Mechanisms in Evolution							
<i>Meeting Date:</i>	6/11/2017 - 6/16/2017							
<i>Attendees Supported By:</i>	NASA ASTROBIOLOGY INSTITUTE, THE							
<b>Conferee</b>	<b>Status</b>	<b>Organization</b>	<b>Role</b>	<b>Prof. Status</b>	<b>Reg</b>	<b>Travel</b>	<b>Discretionary</b>	<b>Total</b>
Cooper, Tim	R	University of Houston	Speaker	Associate Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Copley, Shelley	R	University of Colorado Boulder	Speaker	Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Desai, Michael	R	Harvard University	Speaker	Professor	\$1,053.00	\$0.00	\$0.00	\$1,053.00
Fisher, Daniel	R	Stanford University	Speaker	Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Gerlinger, Marco	R	The Institute of Cancer Research	Speaker	Physician/Physician Scientist	\$400.00	\$0.00	\$0.00	\$400.00
Goldenfeld, Nigel	R	University of Illinois at Urbana-Champaign	Speaker	Professor	\$1,053.00	\$369.40	\$0.00	\$1,422.40
Harris, Reuben	R	Howard Hughes Medical Institute	Speaker	Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Herman, Christophe	R	Baylor College of Medicine	Speaker	Associate Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Kuhlman, Thomas	R	University of Illinois at Urbana-Champaign	Speaker	Assistant Professor	\$1,053.00	\$0.00	\$0.00	\$1,053.00
Long, Manyuan	R	University of Chicago	Speaker	Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Paaby, Annalise	R	Georgia Institute of Technology	Speaker	Assistant Professor	\$1,053.00	\$400.00	\$0.00	\$1,453.00
Paulsson, Johan	R	Harvard University	Speaker	Professor	\$1,053.00	\$0.00	\$0.00	\$1,053.00
Rosenberg, Susan	R	Baylor College of Medicine	Speaker	Professor	\$1,014.00	\$0.00	\$0.00	\$1,014.00
Thornton, Joe	R	University of Chicago	Speaker	Professor	\$830.60	\$0.00	\$0.00	\$830.60
Weinberger, Leor	R	University of California, San Francisco	Speaker	Professor	\$1,053.00	\$0.00	\$0.00	\$1,053.00
<b>Total Disbursements:</b>								<b>\$18,050.00</b>