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## Uniting Eggs and Sperm, from Fundamentals to Applications

July 16 - 21, 2017

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### Chair

Mariana F. Wolfner

### Vice Chair

Steven W. L'Hernault

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### Holderness School

33 Chapel Lane

Holderness, NH, US

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### Conference Description

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The union of egg and sperm creates a new totipotent cell – the zygote. In addition to starting the development of a new organism, fertilization also provides an excellent system in which to investigate important questions in developmental biology, physiology and cell/molecular biology, evolutionary biology, and basic and applied reproductive biology. All of these areas are brought together in this Gordon Research Conference, the 22nd in an exciting and stimulating series of conferences. The conference will consider mechanisms that lead to formation of fertilization-competent gametes, that bring these gametes together and fuse them to form the zygote, and that cause this zygote to transition to undertake early development. Through invited presentations by junior and senior field leaders who study these areas, enriched by late-breaking research presentations chosen from abstracts submitted by conference participants, we will hear the latest advances on these topics as they occur in a range of organisms. The GRC will be linked to, and immediately preceded by a Gordon Research Seminar in which graduate students, postdoctoral fellows, and early career scientists gather to present and exchange findings and ideas to one another, in a mentored setting. Findings and ideas to be presented at the GRC and GRS range from basic mechanistic work and evolutionary aspects, to applications such as environmental effects on fertility, assisted reproductive technologies, and the fertility of vectors or pathogens of diseases such as Zika and malaria, respectively. Intense, friendly, and lively discussion occurs during platform sessions, moderated by discussion leaders, and at poster sessions. The GRC keynote speaker, Dr. Allan Spradling, will emphasize the incredible conservation that underlies fertility across organisms, as well as the long-term effects on development, health, and biology of this critical early life stage. In addition to the formal sessions, the meeting has large blocks of time during the afternoons and after the evening session




reserved for further informal discussion including interactions that can lead to collaboration or at least to "cross-fertilization" of approaches and ideas. These open times will also include some mentoring activities open to everyone but aimed at students, postdoctoral fellows, and junior faculty.

## Related Meeting



This GRC will be held in conjunction with the "Fertilization and Activation of Development (GRS)" Gordon Research Seminar (GRS). Those interested in attending both meetings must submit an application for the GRS in addition to an application for the GRC. Refer to the [associated GRS program page](#) for more information.

## 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	<b>Epigenetic, Environmental, and Aging Effects on Fertilization and the Early Embryo</b> Discussion Leader: <b>Carmen Williams</b> (National Institute of Environmental Health Sciences, NIH, USA)
7:40 pm - 7:45 pm	Opening Remarks
7:45 pm - 7:55 pm	Introduction by Discussion Leader
7:55 pm - 8:20 pm	<b>Patricia Hunt</b> (Washington State University, USA) "Environmental Effects on Gametogenesis and Reproductive Tract Development"
8:20 pm - 8:25 pm	Discussion
8:25 pm - 8:50 pm	<b>Marisa Bartolomei</b> (University of Pennsylvania, USA) "Epigenetic Reprogramming in the Germline and Early Embryo" 

8:50 pm - 8:55 pm	Discussion
8:55 pm - 9:20 pm	<b>Miguel Ramalho-Santos</b> (University of California, San Francisco, USA) "Epigenetic Regulation of Pluripotency and Inheritance"
9:20 pm - 9:30 pm	Discussion
<b>Monday</b>	
7:30 am - 8:30 am	Breakfast
8:30 am - 9:00 am	Group Photo
9:00 am - 12:30 pm	<b>Influences of the Reproductive Tract on Fertilization, Gametes, and Early Embryos</b> Discussion Leader: <b>Sylvie Breton</b> (Massachusetts General Hospital / Harvard Medical School, USA)
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:35 am	<b>Rachel Mullen</b> (University of Texas MD Anderson Cancer Center, USA) "Reproductive Tract Development, Cell Types, and Function"
9:35 am - 9:45 am	Discussion
9:45 am - 10:10 am	<b>Wipawee Winuthayanon</b> (Washington State University, USA) "Estrogen Signals: Roles During Pre- and Post-Fertilization in the Mouse Model"
10:10 am - 10:20 am	Discussion
10:20 am - 10:50 am	Coffee Break
10:50 am - 11:15 am	<b>Mark Siegal</b> (New York University, USA) "Are the Two Spermathecae of a <i>D. melanogaster</i> Female Identical?"
11:15 am - 11:20 am	Discussion
11:20 am - 11:45 am	<b>Clemence Belleannee</b> (Universite Laval, Canada) "DICER-phering the Role of MicroRNA in the Epididymis"



11:45 am - 11:55 am	Discussion
11:55 am - 12:20 pm	<b>Clive Wilson</b> (University of Oxford, United Kingdom) "Behavioural and Hormonal Effects on Exosome and Other Secretion by <i>Drosophila</i> Reproductive Tissues"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
3:00 pm - 4:00 pm	<b>Power Hour</b> <i>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.</i> Organizer: <b>Mariana Wolfner</b> (Cornell University, USA)
4:00 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<b>Sperm</b> Discussion Leader: <b>George Gerton</b> (University of Pennsylvania, USA)
7:30 pm - 7:40 pm	Introduction by Discussion Leader
7:40 pm - 8:05 pm	<b>Haifan Lin</b> (Stem Cell Center, Yale University, USA) "The Epigenetic Function of piRNAs During Spermatogenesis"
8:05 pm - 8:15 pm	Discussion
8:15 pm - 8:40 pm	<b>Polina Lishko</b> (University of California, Berkeley, USA) "Steroids, Endocannabinoids and Sperm Ion Channels"
8:40 pm - 8:50 pm	Discussion
8:50 pm - 9:15 pm	<b>Pablo Visconti</b> (University of Massachusetts, USA) "Sperm Signaling as Subject for ART and Science"
9:15 pm - 9:30 pm	Discussion



## Tuesday

7:30 am - 8:30 am Breakfast

9:00 am - 12:30 pm **Sperm Function / Finding, Binding, and Fusing with the Egg**

Discussion Leader: **Jurrien Dean** (National Institute of Diabetes and Digestive and Kidney Diseases, NIH, USA)

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

9:05 am - 9:25 am **Tomer Avidor-Reiss** (University of Toledo, USA)

"Centriole Remodeling During Spermatogenesis and Its Role in Fertilization"

9:25 am - 9:35 am Discussion

9:35 am - 9:55 am **Benjamin Loppin** (Laboratoire de Biométrie et Biologie Évolutive, University of Lyon, France)

"Unlocking Sperm Chromatin at Fertilization in Insects"

9:55 am - 10:05 am Discussion

10:05 am - 10:25 am **Laura Harrington** (Cornell University, USA)

"Aedes Mosquito Sperm and Control of Reproduction of Disease Vectors"

10:25 am - 10:35 am Discussion

10:35 am - 11:00 am Coffee Break

11:00 am - 11:20 am **Mariano Buffone** (Instituto de Biología y Medicina Experimental, CONICET, Argentina)

"Mechanisms of Fertilization in Mammals: New Insights About Sperm Acrosomal Exocytosis and Hyperactivation"

11:20 am - 11:30 am Discussion

11:30 am - 11:50 am **Jeff Lee** (University of Toronto, Canada)

"Molecular Architecture of the Human Sperm Izumo1 and Egg Juno Fertilization Complex"

11:50 am - 12:00 pm Discussion



12:00 pm - 12:20 pm	<b>Benjamin Podbilewicz</b> (Technion - Israel Institute of Technology, Israel) "FUSEXINS: FUSion Proteins Essential for Sexual Reproduction and EXoplasmic Merger of Plasma Membranes"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<b>Fertilization Interactions and New Findings in Fertilization, Sperm, and Environment</b> Discussion Leader: <b>William Kinsey</b> (University of Kansas Medical Center, USA)
7:30 pm - 7:40 pm	Introduction by Discussion Leader
7:40 pm - 8:00 pm	<b>Anja Geitmann</b> (McGill University, Canada) "Sperm Delivery in Plants Requires a Cellular Catheter"
8:00 pm - 8:10 pm	Discussion
8:10 pm - 8:30 pm	<b>Marcelo Jacobs-Lorena</b> (Johns Hopkins Bloomberg School of Public Health, USA) "Molecular Mechanisms of <i>Plasmodium</i> Fertilization"
8:30 pm - 8:40 pm	Discussion
8:40 pm - 8:45 pm	Introduction by Discussion Leader
8:45 pm - 8:55 pm	<b>Anna Allen</b> (Howard University, USA) "Novel Functions for the RNA-Binding Protein ETR-1 in <i>Caenorhabditis elegans</i> Reproduction and Engulfment of Germline Apoptotic Cell Corpses"
8:55 pm - 9:00 pm	Discussion



9:00 pm - 9:10 pm	<b>Miranda Bernhardt</b> (National Institute of Environmental Health Sciences, NIH, USA) "TRPM7 and CaV3.2 Channels Are Key Mediators of Calcium Influx in Mouse Oocytes and Eggs"
9:10 pm - 9:15 pm	Discussion
9:15 pm - 9:25 pm	<b>Edgar Vogt</b> (National Institutes of Health, USA) "Loss of Mater, a Maternal-Effect Gene, Delays Cortical Granule Exocytosis in Mouse Eggs"
9:25 pm - 9:30 pm	Discussion
<b>Wednesday</b>	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>Eggs, Egg Activation, and Early Embryos</b> Discussion Leader: <b>Rafael Fissore</b> (University of Massachusetts, USA)
9:00 am - 9:05 am	Introduction by Discussion Leader
9:05 am - 9:30 am	<b>Laurinda Jaffe</b> (University of Connecticut, USA) "Regulation of Mammalian Oocyte Meiosis by Intercellular Communication Within the Ovarian Follicle"
9:30 am - 9:35 am	Discussion
9:35 am - 10:00 am	<b>Monica Colaiacovo</b> (Harvard Medical School, USA) "Aneuploidy and Environmental Exposures: Mechanistic Insights from <i>C. elegans</i> "
10:00 am - 10:05 am	Discussion
10:05 am - 10:30 am	<b>Karl Swann</b> (Cardiff University, United Kingdom) "Ca <sup>2+</sup> Oscillations During Egg Activation: From Mechanism to Clinical Potential"
10:30 am - 10:35 am	Discussion
10:35 am - 11:00 am	Coffee Break



11:00 am - 11:25 am	<b>Masahito Ikawa</b> (Osaka University, Japan) "Fertilization and Oocyte Activation: New Insights Using Genome Editing"
11:25 am - 11:30 am	Discussion
11:30 am - 11:55 am	<b>Marco Conti</b> (University of California, San Francisco, USA) "The Translational Program at the Oocyte-to-Zygote Transition"
11:55 am - 12:00 pm	Discussion
12:00 pm - 12:25 pm	<b>Jay Baltz</b> (Ottawa Hospital Research Institute, Canada) "Initiation of Cell Volume Homeostasis During Meiosis and Egg Activation"
12:25 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 7:00 pm	Dinner
7:00 pm - 7:30 pm	<b>Business Meeting</b> <i>Nominations for the Next Vice Chair; Fill in Conference Evaluation Forms; Discuss Future Site and Scheduling Preferences; Election of the Next Vice Chair</i>
7:30 pm - 9:30 pm	<b>Evolution</b> Discussion Leader: <b>Susan Suarez</b> (Cornell University, USA)
7:30 pm - 7:40 pm	Introduction by Discussion Leader
7:40 pm - 8:00 pm	<b>Erin Kelleher</b> (University of Houston, USA) "Host Tolerance of TE Activity in the <i>Drosophila</i> Female Germline"
8:00 pm - 8:10 pm	Discussion
8:10 pm - 8:30 pm	<b>Eric Haag</b> (University of Maryland, USA) "Rapid Evolution of Sperm Function in Self-Fertile <i>Caenorhabditis</i> Nematodes"





8:30 pm - 8:40 pm	Discussion
8:40 pm - 9:00 pm	<b>Coleen Murphy</b> (Princeton University, USA) "Revenge of the Hermaphrodite: How <i>C. elegans</i> Kills Males Through Its Own Pheromone"
9:00 pm - 9:10 pm	Discussion
9:10 pm - 9:30 pm	General Discussion
<b>Thursday</b>	
7:30 am - 8:30 am	Breakfast
9:00 am - 12:30 pm	<b>New Findings on Fertilization, Eggs, and Early Embryos, and Cross-Cutting Themes</b> Discussion Leader: <b>Steven L'Hernault</b> (Emory University, USA)
9:00 am - 9:10 am	Introduction by Discussion Leader
9:10 am - 9:20 am	<b>Maria Gracia Gervasi</b> (University of Massachusetts, Amherst, USA) "Structural Organization of the Actin Cytoskeleton of the Mouse Sperm Flagellum"
9:20 am - 9:25 am	Discussion
9:25 am - 9:35 am	<b>John Parrington</b> (University of Oxford, United Kingdom) "PLCzeta Is the Physiological Trigger of Embryogenesis in Mammals, but Offspring Can Be Conceived Naturally in Its Absence"
9:35 am - 9:40 am	Discussion
9:40 am - 9:50 am	<b>Isha Raj</b> (Karolinska Institutet, Sweden) "Structural Basis of Egg Coat-Sperm Recognition at Fertilization"
9:50 am - 9:55 am	Discussion
9:55 am - 10:05 am	<b>Chih-kuan Tung</b> (North Carolina Agricultural and Technical State University, USA) "Fluid Viscoelasticity Promotes Collective Swimming of Sperm"
10:05 am - 10:10 am	Discussion



10:10 am - 10:45 am	Coffee Break
10:45 am - 10:50 am	Introduction by Discussion Leader
10:50 am - 11:00 am	<b>Michelle Panzica</b> (University of California, Davis, USA) "F-Actin Prevents Interaction Between the Sperm and Meiotic Spindle in <i>C. elegans</i> "
11:00 am - 11:05 am	Discussion
11:05 am - 11:15 am	<b>Enrico Maria Daldello</b> (University of California, San Francisco, USA) "Single-Cell Analysis of Cdk1 Substrate Phosphorylation in Mouse Oocytes Reveals New Mechanisms of MPF Regulation in Space and Time"
11:15 am - 11:20 am	Discussion
11:20 am - 11:30 am	<b>Jennifer Forcina</b> (Brown University, USA) "The Membrane Interaction Surface of HAP2(GCS1), the Ancient Gamete Fusion Protein"
11:30 am - 11:35 am	Discussion
11:35 am - 11:40 am	Introduction by Discussion Leader
11:40 am - 12:20 pm	<b>Allan Spradling</b> (Carnegie Institution for Science / Howard Hughes Medical Institute, USA) "Evolutionary Conservation of Mechanisms Needed to Produce High Quality Eggs"
12:20 pm - 12:30 pm	Discussion
12:30 pm - 1:30 pm	Lunch
1:30 pm - 4:00 pm	Free Time
4:00 pm - 6:00 pm	<b>Poster Session</b>
6:00 pm - 7:00 pm	Dinner
7:30 pm - 9:30 pm	<b>Translating our Results: Applications and Implications</b> Discussion Leader: <b>Christopher Barratt</b> (University of Dundee, United Kingdom)



7:30 pm - 7:40 pm	Introduction by Discussion Leader
7:40 pm - 8:05 pm	<b>Joseph Nadeau</b> (Pacific Northwest Research Institute, USA) "Do Gametes Woo? Evidence for Non-Random Union at Fertilization"
8:05 pm - 8:15 pm	Discussion
8:15 pm - 8:40 pm	<b>Mary Herbert</b> (Newcastle University, United Kingdom) "Uncoupling the Inheritance of Nuclear DNA from Mitochondrial DNA to Avoid Transmission of Mitochondrial DNA Disease"
8:40 pm - 8:50 pm	Discussion
8:50 pm - 9:15 pm	<b>Paolo Rinaudo</b> (University of California, San Francisco, USA) "ART and the Developmental Origin of Health and Disease"
9:15 pm - 9:25 pm	Discussion
9:25 pm - 9:30 pm	Closing Remarks
<b>Friday</b>	
7:30 am - 8:30 am	Breakfast
9:00 am	Departure

## Contributors

 <b>Gordon Research Conferences</b>	 <b>Carl Storm Underrepresented Minority Fellowship</b>	 <b>Carl Storm International Diversity Fellowship</b>
 <b>Predominantly Undergraduate Institution Fund (PUI)</b>	 Eunice Kennedy Shriver National Institute of Child Health and Human Development	 National Institute of Environmental Health Sciences
		
		 



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