

MATTHEW J. DEGENNARO, PH.D.

Laboratory of Mosquito Genetics and Behavior
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Education

New York University School of Medicine, New York, New York
Ph.D., Developmental Genetics, May 2008

Bard College, Annandale-on-Hudson, New York
B.A., History and Philosophy of Science & Gender Studies, May 1996

Bard College at Simon's Rock, Great Barrington, Massachusetts
A.A., Natural Sciences, May 1993

Research Experience

Laboratory of Mosquito Genetics and Behavior
Florida International University

Assistant Professor, October 2014 to present

- Laboratory takes a genetic approach to understand mosquito host detection and appetitive behavior
- Current projects are focused on how *Aedes aegypti* mosquitoes use olfaction to find their human and plant hosts

Laboratory of Neurogenetics and Behavior / Howard Hughes Medical Institute
The Rockefeller University

Postdoctoral Research Associate, January 2009 to June 2014

Mentor: Leslie Vosshall

- Established loss-of-function genetics in *Aedes aegypti* to study host-seeking behavior and identify suitable molecular targets for mosquito behavior control
- Generated the *Aedes aegypti* neurotranscriptome to facilitate discovery of genes that regulate host odor responses and the gonotrophic cycle

Skirball Institute of Biomolecular Medicine / Howard Hughes Medical Institute
New York University School of Medicine

Doctoral Student, August 2002 to December 2008

Mentor: Ruth Lehmann

- Performed a reverse genetic screen of germline-expressed genes that identified genes necessary for germ cell formation, migration, and adhesion
- Uncovered redox regulation of E-cadherin-dependent adhesion in *Drosophila* embryogenesis

Skirball Institute of Biomolecular Medicine / Howard Hughes Medical Institute
New York University School of Medicine

Lab Manager, August 2000 to July 2002

Lab head: Dan Littman

- Managed expenditures and laboratory organization
- Generated mutations in PKC theta to uncover its role in insulin signaling

Department of Pharmacology, Columbia University

Research Associate, April 2000 to August 2000

Lab head: Gareth Tibbs

- Used electrophysiology to investigate the structure and function of HCN ion channels

Center for Neurobiology and Behavior / Howard Hughes Medical Institute

Columbia University

Research Technician II, September 1998 to April 2000

Lab head: Steven Siegelbaum

- Studied the structure and function of HCN ion channels
- Established and maintained mammalian cell culture system for the laboratory

Oral AIDS Center, University of California, San Francisco

Staff Research Associate I, June 1996 to August 1998

Lab head: Joel Palefsky

- Focused on interactions between Epstein-Barr virus and HIV in the oral epithelium

Environmental Medicine Center, New York University School of Medicine

Research Associate, June 1992 to August 1992

Lab head: Seymour Garte

- Focused on retinoblastoma tumor suppressor gene expression in mouse tissue

Peer-Reviewed Publications

Matthews, B. J., McBride C. S., **DeGennaro M.**, Despo O., Vosshall L.B. (2016) The neurotranscriptome of the *Aedes aegypti* mosquito. **BMC Genomics** 17:32.

DeGennaro, M., McBride, C., Seeholzer, L., Nakagawa, T., Dennis, E.J., Goldman, C., Jasinskiene, N., James, A. A., & Vosshall, L. B. (2013) *orco* mutant mosquitoes lose strong preference for humans and are not repelled by volatile DEET. **Nature** 498; 487-491.

Hurd, T., Leblanc, M., Jones, L., **DeGennaro, M.**, & Lehmann, R. (2013) Genetic modifier screens to identify components of a H₂O₂-regulated cell adhesion and migration pathway. **Meth. Enzymol.** 528; 197-215.

DeGennaro, M.*, Hurd, T.*, Siekhaus, D., Biteau, B., Jasper, H., & Lehmann, R. (2011) Peroxiredoxin stabilization of DE-cadherin promotes primordial germ cell adhesion. **Dev. Cell** 20; 233-243.

Biteau, B., Karpac, J., Supoyo, S., **DeGennaro, M.**, Lehmann, R. & Jasper, H. (2010) Lifespan extension by preserving proliferative homeostasis in *Drosophila*. **PLoS Genet.** 6(10).

Rangan, P., **DeGennaro, M.**, Jaime-Bustamante, K., Coux R.X., Martinho R.G., & Lehmann, R. (2009) Temporal and spatial control of germ plasm RNAs. **Curr. Biol.** 19; 72-77.

Li, Y., Soos, T.J., Xinghai, L., Wu, J., **DeGennaro, M.**, Sun, X., Littman, D.R., Birnbaum, M.J., & Polakiewicz, R.D. (2004) Protein Kinase C theta inhibits insulin signaling by phosphorylating IRS1 at ser1101. **J. Biol. Chem.** 279; 45304-45307.

Wainger, B.J., **DeGennaro, M.**, Santoro, B., Siegelbaum, S.A., & Tibbs, G.R. (2001) Molecular mechanism of cAMP-modulation of HCN pacemaker channels. **Nature** 411; 805-810.

Invited Review Articles

DeGennaro, M. (2015) The mysterious multi-modal repellency of DEET. *Fly*. 9:1, 45-51.

Hurd, T., DeGennaro, M., & Lehmann, R. (2012) Redox regulation of cell migration and adhesion. *Trends in Cell Biology*. 22; 107-115.

Rangan, P., DeGennaro, M., & Lehmann, R. (2008) Regulating gene expression in the *Drosophila* germ line. *Cold Spring Harb. Symp. Quant. Biol.* 73; 1-8.

Presentations

Invited Talks

- 2016 TEDx at FIU, Miami, Florida
Speaker “*A Life-saving Perfume*”
- 2016 Deering Estate, Speaking Sustainably Seminar Series, Miami, Florida
Speaker “*Blood Theft: A Mosquito’s Obsession with Humans*”
- 2016 Sea and Learn, Saba, Dutch Antilles
Speaker “*The Blood Thief: A Mosquito’s Obsession with Humans*”
- 2016 International Congress of Entomology 2016, Orlando, Florida
Speaker and Organizer of symposium “*Mosquito Host Detection*”
- 2015 University of Florida, TREC, Homestead, Florida
“Genetic analysis of mosquito host detection”
- 2015 Biomolecular Sciences Institute, Florida International University, Miami, Florida
“Genome editing in the mosquito: a case study”
- 2013 Bard College, Annandale-on-Hudson, New York
“Genetic analysis of mosquito attraction and repulsion”
- 2013 Institute for Science and Technology Austria, Klosterneuberg, Austria
“Genetic analysis of mosquito attraction and repulsion”
- 2012 Trends in Molecular Insect Science & Biotechnology, Seoul National University
“Disrupting mosquito attraction to host odor using targeted mutagenesis”
- 2012 International Congress of Entomology, Daegu, Korea
“Disrupting mosquito attraction to host cues by targeted mutagenesis of the *orco* olfactory co-receptor”
- 2011 Molecular and Population Biology of Disease Vectors, Kolymbari, Greece
“Disrupting mosquito attraction to host odor using targeted mutagenesis”

- 2010 Grand Challenges in Global Health, Bill and Melinda Gates Foundation, Seattle
“Chemical approaches to alter olfactory-driven behaviors of insect disease vectors: validating new targets for control of vector behavior”
- 2007 New York Academy of Sciences, New York Fly Club, New York, NY
“Redox regulation of germ cell adhesion in *Drosophila*”

Posters

- 2015 Molecular and Population Biology of Mosquitoes, Kolymbari, Greece
“Genetic analysis of ionotropic receptor function in *Aedes aegypti*”
- 2012 Pels Family Chemical & Structural Biology Retreat, Briarcliff Manor, NY
“*orco* mutant mosquitoes lose strong preference for humans and are not repelled by volatile DEET”
- 2012 International Symposium on Olfaction and Taste, Stockholm, Sweden
“Disruption of mosquito preference for humans and DEET sensitivity through targeted mutagenesis of the *orco* olfactory co-receptor”
- 2010 HHMI Scientific Meeting: Neurons, Systems, & Neural Disease, Janelia Farm, VA
“Mosquito attraction to host odor requires *Aedes aegypti* Orco”
- 2010 Biology of Mosquito Vectors, Johns Hopkins Malaria Research Institute
“Targeted mutagenesis of an olfactory co-receptor in *Aedes aegypti*”
- 2009 Grand Challenges in Global Health, Bill and Melinda Gates Foundation, Tanzania
“Molecular genetic analysis of host-seeking behavior in *Aedes aegypti*”
- 2008 Thiol-based Redox Regulation & Signaling, Gordon Conference, Il Ciocco, Italy
“Redox regulation of germ cell migration in *Drosophila*”
- 2007 Society for Developmental Biology, Cancun, Mexico
“Redox regulation of germ cell migration in *Drosophila*”
- 2006 Germ Cell Meeting, Cold Spring Harbor Laboratory
“A Thioredoxin peroxidase regulates germ cell migration in *Drosophila*”
- 2004 Germ Cell Meeting, Cold Spring Harbor Laboratory
“Germ genes: using reverse genetics to understand germ plasm formation and function in *Drosophila*”

Awards

Community Engagement Award, 2016
Florida International University, College of Arts, Sciences & Education

Career Development Award, 2012
The Rockefeller University

Gender Studies Award, 1996
Bard College

Funding

- 2016 – 2017 FDACS Mosquito Control Grant: \$92,702.14
 “Highly Attractive Biological Insecticide Trap (HABIT) to Reduce *Aedes* Mosquito Populations”
 M. DeGennaro (PI), B. Ebrahimi (Co-PI)
- 2016 – 2017 FIU Biomolecular Sciences Institute Seed Grant: \$10,000
 “A Genetic Toolkit for Analyzing Mosquito Reproduction and Behavior”
 M. DeGennaro (PI), F. Noriega & F. Leng (Co-PIs)
- 2015 – 2017 NIAID K22 Career Transition Award - K22 AI AI112585-01: \$267,600
 “Identifying Mosquito Receptors that Detect Human Odor”
 M. DeGennaro (PI)
- 2014 – 2018 Florida International University startup funds: \$320,000
 M. DeGennaro (PI)
- 2010 – 2012 Vectorbase DBP Subcontract (NIH/NIAID): \$300,000
 “Comparative neurotranscriptome of *Aedes aegypti*”
 L. B. Vosshall (PI), C. McBride & M. DeGennaro (Co-PIs)
- 2009 – 2014 Postdoctoral Research Associate, Howard Hughes Medical Institute

Teaching

- Undergraduate course PCB 3063 Genetics
- Guest lecturer BSC4443 Functional genomics and proteomics
- Lecture: Genomic modification
 - Lecture: Olfaction
- Graduate workshop BSC6926 Genome editing with CRISPR/Cas9

Mentoring

Current

Babak Ebrahimi, Ph.D., Postdoctoral Fellow
 Joshua Raji, FIU Biological Sciences Ph.D. student
 Elina Barredo, FIU Biological Sciences Ph.D. student
 John Castillo, FIU Biological Sciences Ph.D. student
 Fredis Mappin, FIU Biological Sciences M.S.
 Kevin Cabrera, FIU Undergraduate student
 Renata Gallegos, FIU Undergraduate student, Current
 Brian Garcia Rodriguez, FIU Undergraduate student, Current
 Hans Lapica, FIU Undergraduate student, Current

Grace Munoz, FIU Undergraduate student, Current
Valeria Saldana, FIU Undergraduate student, Current
Blake Prieto, FIU Undergraduate student, Current
Robert Arribas, FIU Undergraduate student, Current
Paola Martinez, FIU Undergraduate student, Current
Olivia Wills, FIU Undergraduate student, Current
Benjamin Obando, FIU Undergraduate student, Current
Malik Saaka, FIU Undergraduate student, Current
Maraiyah Baksh, FIU Undergraduate student, Current

Former

Reinier Alvarez, FIU Undergraduate student
Ileana Corsi, FIU Undergraduate student
Sheyla Gonzalez, FIU Department of Biology graduate
Heather Schneider, RU Summer Undergraduate Research Fellow, Summer 2013
Emily Dennis, RU Ph.D. Candidate, Fall 2012
Felix Baier, RU Summer Undergraduate Research Fellow, Summer 2011
Emma Schatoff, RU Undergraduate student, Summer 2009 & 2010
Louise Malle, RU Summer High School Outreach Student, Summer 2009
Nareh Marukian, RU Summer Undergraduate Research Fellow, Summer 2009
Ryan Cinalli, NYUMC Graduate rotation student, Spring 2005
Ronald Totong, NYUMC Graduate rotation student, Fall 2004