

MATTHEW DEGENNARO

Laboratory of Tropical Genetics
Florida International University
Department of Biological Sciences & Biomolecular Sciences Institute
11200 SW 8th Street, OE-167, Miami, FL 33199
Lab: 305-348-6166 Office: 305-348-1358
matthew.degennaro@fiu.edu

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 Tropical Genetics
Florida International University

Assistant Professor, October 2014 to present

- Understanding how *Aedes aegypti* mosquitoes use olfaction to find or avoid their human hosts
- Population genetics, behavior, and vector ecology of wild *Aedes* mosquitoes in the Southeastern U.S.A.
- Establishing a genetic model for the study of coral symbiosis and dysbiosis in the laboratory

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

Postdoctoral Research Associate, January 2009 to June 2014

Mentor: Leslie Vosshall

- Made the first mutant mosquito to establish loss-of-function genetics in *Aedes aegypti*
- Studied mosquito host-seeking behavior and identified 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, Department of Stomatology

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

Publications

Original Research

Melo., N., Wolff, G., H., Costa-da-Silva, A., L., Arribas, R., Triana, M., F., Gugger, M., Riffell, J., A., **DeGennaro M.**, & Stensmyr, M. C. (2020) Geosmin attracts *Aedes aegypti* mosquitoes to oviposition sites. **Current Biology** 30; 1-8.

Onyango, M., Payne, A., Mathias, N., Kuo, L., Vigneron, A., **DeGennaro, M.**, Ciota, A., & Kramer, L. (2020) Increased temperatures reduce the vectorial capacity of *Aedes* mosquitoes for Zika virus. **Emerging Microbes & Infections** 9 (1); 67-77.

Raji, JI, Gonzalez, S, and **DeGennaro, M.** (2019) *Aedes aegypti* *Ir8a* mutant mosquitoes show increased attraction to standing water. **Communicative & Integrative Biology** 12:1, 181-186.

Raji, J. I., Melo., N., Castillo, J., S., Gonzalez, S., Saldana, V., Stensmyr, M. C., & **DeGennaro M.** (2019) *Aedes aegypti* mosquitoes detect acidic volatiles found in human odor. **Current Biology** 29; 1253–1262. (**Cover article**)

Flora, P., Schowalter S., Wong-Deyrup, S., **DeGennaro M.**, Ali Nasrallah M., & Rangan P. (2018) Transient transcriptional silencing alters the cell cycle to promote germline stem cell differentiation in *Drosophila*. **Developmental Biology** 434; 84-95.

Matthews, B. J., McBride C. S., **DeGennaro M.**, Despo O., Vossall 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., & Vossall, 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. **Methods in Enzymology** 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. **Developmental 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 Genetics** 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. **Current Biology** 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. **Journal of Biological Chemistry** 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

Barredo, E & **DeGennaro, M.** (2020) Not just from blood: Mosquito nutrient acquisition from nectar sources. **Trends in Parasitology** (in press).

Joshua I. Raji & **DeGennaro, M.** (2017) Genetic analysis of mosquito detection of humans. **Current Opinion in Insect Science** 20, 34-38.

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

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

Book chapters

Robbins, J., Cunningham, C., Dankers, R. **DeGennaro, M.**, Dolif, G., Duell, R. Marchenzini, V., Mills, B., Sarmiento, J. P., Silver, A., Trajber, R. and Watkins, A. (2019) "Communication and Dissemination of Forecasts and Engaging User Communities." *SUB-SEASONAL TO SEASONAL PREDICTION: The Gap Between Weather and Climate Forecasting*, edited by Robertson, A.W. & Vitart, F. Elsevier, pp. 400-418.

Rangan, P., **DeGennaro, M.**, & Lehmann, R. (2008) Regulating gene expression in the *Drosophila* germ line. *Cold Spring Harbor Symposium on Quantitative Biology* CSHL press. 73; 1-8.

White paper

DeGennaro, M., Stoddard, P. & Beier, J. (2017) Recommendation to establish a Mosquito Control District in Miami-Dade County submitted on behalf of the Environmental Committee to Miami-Dade County's Metrolab Fight the Bite Initiative: A collaborative initiative between local government and the academic institutions of Miami-Dade County.

Commentary & Opinion

J. Castillo & **DeGennaro, M.** (2019) The taste for human sweat. TheScienceBreaker, doi.org/10.25250/thescbr.brk280.

DeGennaro, M. (2016) With genetically modified mosquitoes, spraying is no longer needed. Miami Herald, OP-ED section, September 8, 2016.

Selected Press

-
- Zika outbreak, 2015-16
 - NPR, CBS News, ABC World News Tonight, Univision, PBS Newshour, Miami Herald, Al Jazeera America, Voice of America
 - Publication of IR8a paper, 2019
 - NPR All Things Considered, New York Times, Le Monde, Los Angeles Times, The Times of London, La Repubblica
 - Publication of Geosmin paper, 2020
 - Miami Herald

Presentations

Invited Talks

- 2019 Molecular and Population Biology of Mosquitoes and Other Disease Vectors
Kolymbari, Crete, Greece
"Aedes aegypti mosquitoes detect acidic volatiles found in human odor using the IR8a pathway"
- 2019 New avenues for the behavioral manipulation of disease vectors 2019
Tours, France
"Understanding mosquito olfactory behavior in the laboratory and the field"
- 2019 ReVector Proposer's Day, DARPA
Arlington, VA
"Eliminating acidic volatiles from human sweat to reduce mosquito attraction"
- 2019 3rd International Cassiopea Workshop
Key Largo, FL
"Genetic analysis of cnidarian symbiosis and dysbiosis"
- 2019 University of South Carolina, Department of Epidemiology and Biostatistics' research seminar series
Columbia, SC
"A mosquito olfactory receptor for human sweat"
- 2018 Florida International University, Bioseminar series
Miami, FL
"A mosquito receptor for human scent"
- 2018 University of Miami, Biology Departmental Seminar
Miami, FL
"A mosquito receptor for human sweat"
- 2018 5th Congress of the Latin American Association of Chemical Ecology
Valparaiso, Chile
"Aedes aegypti mosquitoes the IR8a olfactory receptor pathway to detect human odor"
- 2018 48th Annual Society for Vector Ecology Meeting
Yosemite, California
"Southeast Center of Excellence in VBD- Gateway Program: Molecular approaches to enhance mosquito surveillance"
- 2018 Coral Genetics Workshop
Corvallis, Oregon
"Genome editing: making new model organisms genetically accessible"
- 2018 3rd Annual FIU/Santa Fe College Faculty Seminar: Critical Cooperation: Latin America and the US
Gainesville, Florida
"Combating Infectious Diseases across Borders"
- 2018 The 15th Arbovirus Surveillance and Mosquito Control Workshop
Saint Augustine, Florida
"Identifying odors and olfactory receptors that attract mosquitoes"
- 2018 Molecular and Cellular Pharmacology Seminar Series, University of Miami, Miller School of Medicine
Miami, Florida
"Identifying odors and olfactory receptors that attract and repel mosquitoes"
- 2017 1st International Workshop on Insect Genome Editing
Shanghai, China
"Aedes aegypti Ir8a can detect human hosts"
- 2017 Molecular and Population Biology of Mosquitoes and Other Disease Vectors
Kolymbari, Crete, Greece
"Aedes aegypti Ir8a can detect human hosts"

- 2017 Society of Neuroscientists of Africa, 13th International Meeting
Entebbe, Uganda
“*Aedes aegypti* *Ir8a* can detect human hosts”
- 2017 German Neuroscience Society, 12th Annual Meeting
Göttingen, Germany
“*Aedes aegypti* *Ir8a* detects humans”
- 2016 TEDx at FIU, Florida International University
Miami, Florida
“*A Life-saving Perfume*”
- 2016 Deering Estate, Speaking Sustainably Seminar Series
Miami, Florida
“*Blood Theft: A Mosquito’s Obsession with Humans*”
- 2016 Sea and Learn
Saba, Dutch Antilles
“*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
Seoul, Korea
“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, Washington
“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

College of Arts, Science, and Education Award for Research, 2019, *Florida International University*

College of Arts, Science, and Education Award for Teaching, 2019, *Florida International University*

FIU-HHMI Faculty Scholar 2018-19, *Florida International University & Howard Hughes Medical Institute*

FIU-HHMI Faculty Scholar 2017-18, *Florida International University & Howard Hughes Medical Institute*

Top Scholar Award, 2017, *Florida International University*

Community Engagement Award, 2017, *Florida International University, College of Arts, Sciences & Education*

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

-
- 2020 – 2021 National Institute of Justice - 2019-DU-BX-0013: \$279,983
“Germ-Line Transformation of Forensically Important Flies”
J. Wells (PI) & M. DeGennaro (PI)
- 2018 – 2020 NIH/NIAID R21 Exploratory Grant - R21AI142140-01: \$393,748
“Identifying mosquito olfactory receptors for human odor by measuring mRNA expression levels”
M. DeGennaro (PI)
- 2017 – 2020 National Science Foundation, IOS EDGE
Subcontract amount from Oregon State University: \$650,410
“IOS EDGE: Functional-genomics tools for Cnidarian-dinoflagellate symbiosis”
M. DeGennaro (PI) & M. Rodriguez-Lanetty (PI)

- 2017 – 2018 Florida Department of Health, Zika Grant Initiative: \$198,468.00
“Identifying Molecular Targets for Spatial Mosquito Repellent Design”
M. DeGennaro (PI)
- 2016 – 2021 The Centers for Disease Control and Prevention - U01CK000510
Subcontract amount from University of Florida: \$1,218,448
“Southeastern Regional Center of Excellence in Vector-Borne Diseases: The Gateway Program”
M. DeGennaro (PI)
- 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 NIH/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

University and Professional Service

FIU committees

- IBC, Spring 2018 to present
- IUACUC, Summer 2019 to present
- Department of Biology, Bylaws committee, Fall 2019 to present
- Department of Biology, Differential Assignments committee, Fall 2019 to present
- Glaser seminar, MMC coordinator, 2018

Community Outreach

- Metrolab Fight the Bite Initiative: a collaborative initiative between local government and the academic institutions of Miami-Dade County
 - Environment Chair (2016-18)
- FIU Zika Teach-in, February 3, 2016
- Meeting with Congressman Carlos Curbelo, Zika Roundtable, August 18, 2016
- Engagement with Miami-Dade Mosquito Control Division (2016 to present)

Editorial, grant, and manuscript review

- Scientific Reports, editor since 2019
- NIH/NIAID study section, USA, grant review
- NIH/NIDCD study section, USA, fellowship review
- Medical Research Council, United Kingdom, grant review
- Selected manuscript review: Science, eLife, PNAS, PLoS Biology, PLoS Genetics, PLoS Neglected Tropical Diseases, Scientific Reports, Journal of Medical Entomology, Current Opinion in Insect Science, Trends in Parasitology

Teaching

Undergraduate courses PCB 3063 Genetics

- Reformed course to a “flipped” format with online lectures
- Interactive in-class lectures reinforce online lectures
- Organized students in the course into theoretical labs to make a scientific poster

PCB 4133 Topics in Structure/Development: Molecular Genetics

- Created new course based on scientific literature
- Students presented papers in pairs and molecular genetic concepts were discussed

PCB 3063L Genetics Lab

- Genetic analysis of coral symbiosis and dysbiosis using *Aiptasia*
- A course-based undergraduate research experience (CURE)
- Course reform was funded by HHMI

Graduate courses

BSC 6457 Introduction to Biological Research

- Course reformed to be based scientific literature discussion, building a set of cohesive figures that support an abstract, figure design, and presentation skills
- Reformed course with Dr. Phillip Stoddard

BSC 6936 Topics in Biology: Molecular Genetics

- Created new course based on scientific literature
- Students presented papers in pairs and molecular genetic concepts were discussed
- Graduate students paired with undergraduates

Guest lecturer

BSC4443 Functional genomics and proteomics (Instructor: Fernando Noriega)

- Lecture: Genomic modification
- Lecture: Olfaction

Graduate workshops

BSC6926-U02 Genome editing with CRISPR-Cas9
 BSC6926-U03 Embryo microinjection workshop

Mentoring

Current

André Luis da Costa da Silva, Ph.D.	Postdoctoral Fellow
Anthony Bellantuono, Ph.D.	Postdoctoral Fellow
Elina Barredo	FIU Biological Sciences Ph.D. student (McNair fellow)
John Castillo	FIU Biological Sciences Ph.D. student
Fredis Mappin	FIU Biological Sciences Ph.D. student
Justin Dalrymple	FIU Biological Sciences Ph.D. student
Helen Wagner	FIU Biological Sciences Ph.D. student
David Olayinka George	FIU Biological Sciences Ph.D. student
Christopher Clark	FIU Biological Sciences Ph.D. student
Sheng Hao Lin	FIU Biological Sciences Ph.D. student (co-mentor with Dr. Wells)
Silvia Cabal	Postbaccalaureate researcher
Maraiyah Baksh	Postbaccalaureate researcher
Sean Boyles	Postbaccalaureate researcher
Woodny Lazarre	FIU Master’s student
Carlos Marmolejo	FIU Undergraduate student
Jean Boloix	FIU Undergraduate student
Samantha Fernandes	FIU Undergraduate student (McNair fellow)
Jessica Quinones	FIU Undergraduate student
Brenda Hidalgo	FIU Undergraduate student
George Davis	FIU Undergraduate student
Grecia Rodriguez	FIU Undergraduate student
Kevin Sanchez	FIU Undergraduate student

Kristian Lopez	FIU Undergraduate student
Luciano Simonetta	FIU Undergraduate student
Michael Ramon	FIU Undergraduate student
Sergio Aymat	FIU Undergraduate student
<i>Former</i>	
Joshua Raji	FIU Biological Sciences Ph.D. student
Babak Ebrahimi, Ph.D.	Postdoctoral Fellow
John Parkinson, Ph.D.	Postdoctoral Fellow
Sergio Norat	FIU Undergraduate student
Lilia Curbelo Jalil	FIU Undergraduate student
Wissam Khalaf	FIU Undergraduate student
Brian Garcia Rodriguez	FIU Undergraduate student
Grace Munoz	FIU Undergraduate student
Valeria Saldana	FIU Undergraduate student
Blake Prieto	FIU Undergraduate student
Robert Arribas	FIU Undergraduate student
Paola Martinez	FIU Undergraduate student
Benjamin Obando	FIU Undergraduate student
Demitri Rodriguez	FIU Undergraduate student
Renata Gallegos	FIU Undergraduate student (McNair fellow)
Hans Lapica	FIU Undergraduate student
Kevin Cabrera	FIU Undergraduate student
Malik Saaka	FIU Undergraduate student
Olivia Wills	FIU Undergraduate student
Reinier Alvarez	FIU Undergraduate student
Ileana Corsi	FIU Undergraduate student
Sheyla Gonzalez	FIU Undergraduate student
Marni Ruiz	FIU Undergraduate student
Nicholas Ramos	FIU Undergraduate student
Priscilla Polo	FIU Undergraduate student
Alejandro Casas	FIU Research Technician
Heather Schneider	RU Summer Undergraduate Research Fellow
Emily Dennis	RU Ph.D. Candidate
Felix Baier	RU Summer Undergraduate Research Fellow
Emma Schatoff	RU Undergraduate student
Louise Malle	RU Summer High School Outreach Student
Nareh Marukian	RU Summer Undergraduate Research Fellow
Ryan Cinalli	NYUMC Graduate rotation student
Ronald Totong	NYUMC Graduate rotation student

Memberships

Latin American Association of Chemical Ecology (ALAEQ)
 Society for Vector Ecology
 American Association for the Advancement of Science