

Frank William Avila

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CURRENT POSITION

2016-present **Max Planck Tandem Group Leader in Mosquito Reproductive Biology, University of Antioquia.**

EDUCATION

2006 **Ph.D., Genetics**, Columbia University, New York, New York, USA.

1998 **B.Sc., Biology**, University of Hawaii, Manoa, Hawaii, USA.

RESEARCH EXPERIENCE

2016-present **Max Planck Tandem Group Leader at The University of Antioquia**

- Identifying seminal fluid proteins that mediate *Ae. aegypti* sperm storage.
- Identifying female-secreted proteins required for female *Ae. aegypti* fertility.

2012-2015 **Post-doctoral research with Dr. Laura Harrington.**
Cornell University, Department of Entomology.

- The identification of seminal fluid proteins required for egg-laying and sexual refractoriness in *Ae. aegypti*.

2007 - 2015 **Post-doctoral research with Dr. Mariana Wolfner.**
Cornell University, Department of Molecular Biology and Genetics.

- Identifying female-interacting proteins of the *Drosophila* seminal protein Acp36DE.
- Identifying female-derived neuromodulators required in *Drosophila* sperm storage.
- Determining the reproductive function of the *Drosophila* mating plug.

1998-2006 **Ph.D. research with Dr. James Erickson.**
Columbia University, Department of Biological Sciences.

- The role of the JAK/STAT pathway in *Drosophila* sex determination.
- The role of the SWI/SNF chromatin re-modeling complex in the activation of the *Drosophila* sex determination gene *sex-lethal*.

GRANTS

2016-2021 Colciencias cooperation agreement 566-1 between Colciencias, Universidad

de Antioquia and the Max Planck Society.

2011-2012 NIH grant T32-HD052471 in *Reproductive Sciences and Genomics Training Program*.

PUBLICATIONS – Research Articles

Avila FW and Wolfner MF. Proteolytic cleavage of the *Drosophila* seminal protein Acp36DE increases its sperm storage activity. *J Insect Physiol* In Press.

Alfonso-Parra C, Ahmed-Braimah YH, Degner E, **Avila FW**, Villareal S, Pleiss JA, Wolfner MF and Harrington LC (2016) Mating-responsive transcriptome changes in the reproductive tracts of female *Aedes aegypti*. *PLoS Negl Trop Dis* 10(2):e0004451.

Avila FW, Wong A, Jessica S and Wolfner MF (2015) Don't pull the plug! The *Drosophila* mating plug preserves fertility. *Fly* 9: 62-7.

Avila FW, Cohen A, Ameerudeen FS, Duneau D, Suresh S, Mattei AL and Wolfner MF (2015) Retention of ejaculate by *Drosophila melanogaster* females requires the male-derived mating plug protein PEBme. *Genetics* 200: 1171-9.

Mattei A, Riccio M, **Avila FW** and Wolfner MF (2015) A macro view in micro detail: Insights into the reproductive anatomy of *Drosophila* using micro-CT scans. *Proc Natl Acad Sci USA* 112: 8475-80.

Avila FW, Mattei AL and Wolfner MF (2015) Sex Peptide Receptor is required for the release of stored sperm by mated *Drosophila melanogaster* females. *J Insect Physiol* 76: 1-6.

Chow CY, **Avila FW**, Clark AG and Wolfner MF (2015) Induction of the unfolded protein response impairs male reproductive gland function in *Drosophila*. *PLoS One* 10(3):e0119386.

Alfonso C, **Avila FW**, Deewatthanawong P, Sirot LK, Wolfner MF and Harrington LC (2014) Synthesis, depletion and cell-type expression of a protein from the male accessory glands of the dengue vector mosquito *Aedes aegypti*. *J Insect Physiol* 70: 117-24.

Sirot LS, Findlay GD, Sitnik JL, Frasheri D, **Avila FW** and Wolfner MF (2014) Molecular characterization and evolution of a gene family encoding both female- and male-specific reproductive proteins in *Drosophila*. *Mol Biol Evol* 31: 1554-67.

LaFlamme BA, **Avila FW**, Michalski K and Wolfner MF (2014) A *Drosophila* protease cascade member, seminal metalloprotease-1, is activated stepwise by male factors and requires female factors for full activity. *Genetics* 196: 1117-29.

Avila FW, Findlay GD, Niño EL and Gothilf A (2012) BARD Workshop Review: Insect Reproductive Molecules—From Model Systems to Agricultural Applications. *Mol Reprod Dev* 79: 816-20.

Avila FW, Bloch Qazi M, Rubinstein CD and Wolfner MF (2012) A requirement for the neuromodulators octopamine and tyramine in female *D. melanogaster* sperm storage. *Proc Natl Acad Sci USA* 109: 4562-7.

Avila FW, Sirot LK, LaFlamme BA, Rubinstein CD and Wolfner MF (2011) Seminal Fluid Proteins: Identification and Function. *Ann Rev Entomol* 56: 21-40.

Avila FW, Ravi Ram K, Bloch Qazi M and Wolfner MF (2010) Sex peptide is required for the efficient release of stored sperm in mated *Drosophila* females. *Genetics* 186: 95-600.

Sirot LK, LaFlamme BA, Sitnik JL, Rubinstein CD, **Avila FW**, Chow CY and Wolfner MF (2009) Molecular social interactions: *Drosophila melanogaster* seminal fluid proteins as a case study. *Adv Genet* 68: 23-56.

Avila FW and Wolfner MF (2009) Acp36DE is required for uterine conformational changes in mated *Drosophila* females. *Proc Natl Acad Sci USA* 106: 15796-800.

Lu H, Kozhina E, Mahadevaraju S, Yang D, **Avila FW** and Erickson JW (2008). Maternal Groucho and bHLH repressors amplify the dose-sensitive X chromosome signal in *Drosophila* sex determination. *Dev Biol* 323: 248-60.

Avila FW and Erickson JW (2007) *Drosophila* JAK/STAT pathway reveals distinct initiation and reinforcement steps in early transcription of *Sxl*. *Curr Biol* 17: 643-8.

- Accompanying highlight (2007) Sex Determination: Controlling the Master. *Curr Biol* 17: R328-30.

Möller A, **Avila FW**, Erickson JW and Jäckle H (2005) *Drosophila* BAP60 is an essential component of the Brahma complex, required for gene activation and repression. *J Mol Biol* 352: 329-37.

Avila FW and Goff ML (1998) Arthropod succession patterns onto burnt carrion in two contrasting habitats in the Hawaiian Islands. *J Forensic Sci* 43: 581-6.

PUBLICATIONS – Book Chapter

Avila FW, Sánchez-López JA, McGlaughon JL, Raman S, Wolfner MF, Heifetz Y (2016). Extracellular Composite Matrices in Arthropods. Chapter: Nature and Functions of Glands and Ducts in the *Drosophila* Reproductive Tract. Springer Press, pp 411-444.

SUBMITTED MANUSCRIPTS & MANUSCRIPTS IN PREPARATION

Avila FW, Qazi S, Soiseth N, Weeks I, Wolfner MF and Bloch Qazi M. A genetic screen for modulators of sperm storage identifies a role for the serine protease spermathecal endopeptidase 2 (Send2) in female sperm use. In preparation.

Avila FW and Wolfner MF. Development and anatomy of reproductive organs: Insect accessory glands. In preparation for The Encyclopedia of Reproduction, Second Edition (Elsevier).

TEACHING EXPERIENCE

- 2010-2012** Guest Lecturer, Model Organisms (BioGD6210).
Department of Molecular Biology and Genetics, Cornell University.
- 2010** Workshop Instructor, Cornell Institute for Biology Teachers (CIBT).
Department of Molecular Biology and Genetics, Cornell University.
- 2008-2009** Workshop Instructor, Introduction to Biology (Biol 1101).
Department of Molecular Biology and Genetics, Cornell University.
- 2001-2002** Teaching Assistant, Introduction to Molecular and Cellular Biology (C2005).
Department of Biological Sciences, Columbia University.

SELECTED SCIENTIFIC PRESENTATIONS

- 2017** **Seminal fluid proteins and sperm storage: Novel targets of vector control.** Congreso 2017 de la Sociedad Colombiana de Entomología, Bogotá, Colombia. Plenary Talk.
- 2016** **Sex, seminal fluid proteins and fertility.** Universidad Eafit, Antioquia, Medellín, Colombia. Invited Biology Seminar.
- 2014** **Male seminal fluid proteins and female fertility.** Universidad El Bosque, Bogotá D.C., Colombia. Invited Biology Seminar.
- 2014** **The male and female molecules required for *Drosophila* sperm storage.** University of Antioquia, Medellín, Colombia. Invited Biology Seminar.
- 2014** **The molecular basis of *Drosophila* sperm storage.** Universidad CES, Medellín, Colombia. Invited Biology Seminar.
- 2014** **Seminal proteins as a model for the mechanism and control of extracellular proteolysis cascades.** 55th annual *Drosophila* research conference, San Diego CA. Workshop presentation: *Drosophila* Male Fertility as a Cell Biological Model.
- 2012** **The role of the neuromodulators octopamine and tyramine in the release of sperm from storage in *D. melanogaster* females.** Insect Reproductive Molecules meeting, Jerusalem, Israel. Platform presentation.
- 2010** **Acps and sperm storage: the role of Acp36DE and sex peptide.** 51st annual *Drosophila* research conference, Washington DC. Workshop presentation: Everything You Ever Wanted to Know About Sex.

2009 Acp36DE mediates the uterine conformational changes required for efficient sperm storage. 50th annual *Drosophila* research conference, Chicago, IL. Poster presentation.

2008 The effect of individual Acps on sperm competition and uterine muscle contraction. 49th annual *Drosophila* research conference, San Diego CA. Poster presentation.

PROFESSIONAL INVOLVEMENT

Reviewer: *Proceedings of the National Academy of Sciences, Proceedings of the Royal Society, Heredity, Genetics, Journal of Insect Physiology, Journal of Experimental Biology, Fly, Evolutionary Biology*

Member: Genetics Society of America