Peter Armbruster

Curriculum Vitae

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EDUCATION

Ph.D. 1997. University of Oregon (Biology). Thesis title: *Consequences of, and opportunities for, genetic differentiation among populations of the pitcher-plant mosquito, Wyeomyia smithii*. William E. Bradshaw, Advisor.

B.A. 1989. University of California, San Diego (Ecology, Behavior, and Evolution).

PROFESSIONAL APPOINTMENTS

Davis Family Distinguished Professor. Department of Biology, Georgetown University, Washington, DC. 2018- present.

Professor. Department of Biology, Georgetown University, Washington, DC. 2016-2018.

Associate Professor. Department of Biology, Georgetown University. Washington, DC. 2010-2016.

Assistant Professor. Department of Biology, Georgetown University. Washington, DC. 2003-2010.

National Institutes of Health NRSA Postdoctoral Fellow. University of Vermont, Burlington, VT. 2000-2003. Jan Conn, Advisor.

Postdoctoral Research Fellow. Institute of Zoology, Zoological Society of London, London, UK. 1997- 2000. Georgina Mace, Advisor.

University Research Fellow. Department of Biology, University of Oregon, Eugene, OR. 1996-1997.

National Science Foundation Graduate Research Fellow supported by "Genetic Mechanisms of Evolution Research Training Grant" to Department of Biology, University of Oregon, Eugene, OR. 1992-1995.

AWARDS AND HONORS

February, 2013. Outstanding Graduate Mentor Award. Department of Biology, Georgetown University, Washington, DC

June, 2008. National Academies of Sciences Education Mentor. National Academies of Sciences, USA.

June, 2006. National Academies of Sciences Education Fellow. National Academies of Sciences, USA.

REFEREED PUBLICATIONS

(† graduate student, * undergraduate student)

Batz, Z.B. †, and **P.A. Armbruster**. 2018. Diapause-associated changes in the lipid and metabolite profile of the Asian tiger mosquito, *Aedes albopictus*. *Journal of Experimental Biology*. 13;221.

Armbruster, P.A. 2018. Molecular pathways to nonbiting mosquitoes. *Proceedings of the National Academy of Sciences USA*. 115:836-838.

Batz, Z.B. †, Goff, A.C. and **Armbruster, P.A.** 2017. MicroRNAs are differentially abundant during *Aedes albopictus* diapause maintenance but not diapause induction. *Insect Molecular Biology*, 26:721-733.

Mogi, M., **Armbruster**, **P.A.**, Tuno, N., Aranda, C., and Yong, H.S. 2017. The climate range expansion of *Aedes albopictus* (Diptera: Culicidae) in Asia inferred from the distribution of *albopictus* subgroup species of *Aedes* (*Stegomyia*). *Journal of Medical Entomology*, 54:1615-1625.

Kotsakiozi, P., Richardson, J.B., Favia, G., Martins, A.J., Urbanelli, S., **Armbruster, P.A.**, and Caccone, A. 2017. Population genomics of the Asian tiger mosquito, *Aedes albopictus*: insights into the recent worldwide invasion. *Ecology and Evolution*,7:10143-10157.

Huestis, D.L., Artis, M.L., **Armbruster, P.A.**, and Lehmann, T. 2017. Effects of photoperiod on longevity of two Sahelian Anophelines. *Parasites and Vectors*, 10:621.

Huang, X.†, Chen, X.G., and **Armbruster, P.A.** 2016. Comparative performance of transcriptome assembly methods for non-model organisms. *BMC Genomics*, 17:523.

Armbruster, P.A. 2016. Photoperiodic diapause and the establishment of *Aedes albopictus* (Diptera: Culicidae) in North America. *Journal of Medical Entomology*, 53:1013-1023.

Chen, X., Jiang, X., Gu, J., Xu, M., Yang, W., Deng, Y., Zhang, C., Bonizzoni, M., Dermauw, W., Vontas, J., **Armbruster, P.**, Huang, X. †, Yang, Y., Hao, Z., He, W., Peng, H., Liu, Y., Wu, K., Chen, J., Lirakis, M., Topalis, P.,Van Leeuwen, T., Hall, A.B., Jiang, X., Thorpe, C., Mueller, R.L., Sun, C., Waterhouse, R.M., Yan, G., Tu, Z., Fang, X., James, A.A. 2015. The genome sequence of the Asian tiger mosquito, *Aedes albopictus*, reveals insights into its biology, genetics and evolution. *Proceedings of the National Academy of Sciences USA*. 112:E5907-5915.

Huang, X. †, Poelchau, M.F., **Armbruster, P.** 2015. Global transcriptional dynamics of diapause induction in non-blood-fed and blood-fed *Aedes albopictus*. *PLoS Neglected Tropical Disease*s, 9:e0003724.

Mogi, M., **Armbruster, P.**, Tuno, N., Campos, R., Eritja, R. 2015. Simple indices provide insight to climate attributes delineating the geographic range of *Aedes albopictus* (Diptera: Culicidae) prior to worldwide invasion. *Journal of Medical Entomology*, 52:647-657.

Denlinger, D.L. and **Armbruster, P.** 2014. Mosquito diapause. *Annual Review of Entomology*, 59:73-93.

Poelchau, M.F., Huang, X. †, Goff, A., **Armbruster, P.** 2014. An experimental and bioinformatics protocol for RNA-Seq analysis of photoperiodic diapause in the Asian tiger mosquito. *Journal of Visualized Experiments*, 30:e51961.

Dowling Z., **Armbruster P.**, LaDeau S.L., DeCotiis M.*, Mottley J.*, Leisnham P.T. 2013a. Linking mosquito infestation to resident socioeconomic status, knowledge and source reduction practices in suburban Washington, DC. *EcoHealth* 10:36-47.

Dowling Z., Ladeau, S.L. **Armbruster, P.**, Biehler, D., Leisnham, P.T. 2013b. Socioeconomic status affects mosquito (Diptera:Culicidae) larval habitat type availability and infestation level. *Journal of Medical Entomology*, 50:764-772.

Poelchau M.F., Reynolds J.A., Elsik C.G., Denlinger D.L., **Armbruster P.** 2013a. RNA-Seq reveals early distinctions and late convergence of gene expression between diapause and quiescence in the Asian tiger mosquito, *Aedes albopictus*. *Journal of Experimental Biology*, 216: 4082-4090.

Poelchau M.F., Reynolds J.A., Elsik C.G., Denlinger D.L. and **Armbruster, P.** 2013b. Deep sequencing reveals complex mechanisms of diapause preparation in the invasive mosquito, *Aedes albopictus*. *Proceedings of the Royal Society of London B*, 280:1759.

Poelchau M.F., Reynolds J.A., Elsik C.G., Denlinger D.L. and **Armbruster P.** 2013c. Transcriptome sequencing as a platform to elucidate molecular components of the diapause response in *Aedes albopictus. Physiological Entomology*, 38:173-181.

Mogi, M., **Armbruster, P.** and Fonseca, D.M. 2012. Analyses of the northern distributional limit of *Aedes albopictus* (Diptera: Culicidae) with a simple thermal index. *Journal of Medical Entomology*, 49:1233-1243.

Reynolds, J.A., Poelchau, M.F., Rahman, Z.*, **Armbruster, P.** and Denlinger, D. 2012. Transcript profiling reveals mechanisms for lipid conservation during diapause in the mosquito, *Aedes albopictus*. *Journal of Insect Physiology*, 58:966-973.

Summa*, K., Urbanski†, J.M., Zhao, X., Poelchau, M. and **P. Armbruster**. 2012. Cloning and sequence analysis of the circadian clock genes *period* and *timeless* in the Asian tiger mosquito, *Aedes albopictus* (Diptera: Culicidae). *Journal of Medical Entomology*, 49:777-782.

Urbanski†, J., M. Mogi, D. O'Donnell, M. DeCotiis*, T. Toma, and **P. Armbruster**. 2012. Rapid adaptive evolution of photoperiodic response during invasion and range expansion across a climatic gradient. *American Naturalist*, 179:490-500.
Featured in Nature's "Research Highlights" (March 1, 2012)

Poelchau, M., J. Reynolds, D. Denlinger, C. Elsik, and **P. Armbruster**. 2011. A de novo transcriptome of the Asian tiger mosquito, *Aedes albopictus*, to identify candidate transcripts for diapause preparation. *BMC Genomics* 12:619.
Featured in "Faculty of 1000"

Hueffer, K., **P. Armbruster**, C. Daehler, M. Ferzli, J. Godwin, C. Mulder and A. Sherwood. 2010. Species interactions along a continuum: the Fig Wasp mutualism. *EcoEdNet* (http://esa.org/ecoed/index.php?P=FullRecord&ID=318).

O'Donnell†, D.L. and **P. Armbruster**. 2010. Inbreeding depression affects life-history traits but not susceptibility to infection by *Plasmodium gallinaceum* in the Asian tiger mosquito, *Aedes albopictus*. *Infection, Genetics and Evolution,*10:669-677.

Urbanski†, J.M., A. Aruda* and **P. Armbruster**. 2010. A transcriptional element of the diapause program in the Asian tiger mosquito, *Aedes albopictus*, identified by suppressive subtractive hybridization. *Journal of Insect Physiology,* 56:1147-1154.

Urbanski†, J. M., J. B. Benoit, M. R. Michaud, D. L. Denlinger and **P. Armbruster**. 2010. The molecular basis of increased desiccation resistance during diapause in the Asian tiger mosquito, *Aedes albopictus*. *Proceedings of the Royal Society of London,* 277:2683-2692.

Armbruster, P., M. Patel, E. Johnson and M. Weiss. 2009. Active learning and student-centered pedagogy improve student attitudes and performance in introductory biology. *CBE Life Sciences Education*, 8:203-213.

Armbruster, P., S. White, J. Dzundza*, J. Crawford and X. Zhao. 2009. Identification of genes encoding atypical odorant-binding proteins in *Aedes albopictus* (Diptera: Culicidae*). Journal of Medical Entomology*, 46:271-280.

O'Donnell†, D.L. and **P. Armbruster**. 2009. Evolutionary differentiation of fitness traits across local and regional geographic scales in the Asian tiger mosquito, *Aedes albopictus*. *Annals of the Entomological Society of America*, 102:1135-1144.

O'Donnell†, D.L. and **P. Armbruster**. 2007. Comparison of larval foraging behavior of *Aedes albopictus* and *Aedes japonicus* (Diptera: Culicidae). *Journal of Medical Entomology* 44:984-989.

Armbruster, P. and J.E. Conn. 2006. Geographic variation of larval growth in North American *Aedes albopictus* (Diptera: Culicidae). *Annals of the Entomological Society of America* 99:1234-1243.

Armbruster, P., and D.H. Reed. 2005. Inbreeding depression in benign and stressful environments. *Heredity* 95:235-242.

McCleery, R.H., R.A. Pettifor, **P. Armbruster**, K. Meyer, B. Sheldon, and C.M. Perrins. 2004. Components of variance underlying fitness in a natural population of the great tit, *Parus major*. *American Naturalist* 164*:* E62-E72.

Armbruster, P., W. E. J. Damsky*, R. Giordano, J. Birungi, L. E. Munstermann, and J. E. Conn. 2003. Infection of New- and Old-World *Aedes albopictus* (Diptera: Culicidae) by the intracellular parasite *Wolbachia*: implications for host mitochondrial DNA evolution. *Journal of Medical Entomology* 40:356-360.

Armbruster, P., and R.A. Hutchinson. 2002. Pupal mass and wing length as indicators of fecundity in *Aedes albopictus* (Skuse) and *Aedes geniculatus* (Oliver) (Diptera: Culicidae). *Journal of Medical Entomology,* 39: 699-704.

Armbruster, P. R.A. Hutchinson, and P. Cotgreave. 2002. Factors influencing community structure in a South American tank bromeliad fauna. *Oikos* 96: 225-234.

Armbruster, P., W.E. Bradshaw, K. Ruegg*, and C.M. Holzapfel. 2001. Geographic variation and the evolution of reproductive allocation in the pitcher-plant mosquito, *Wyeomyia smithii*. *Evolution* 55: 439-404

Armbruster, P., R.A. Hutchinson, and T. Linvell†. 2000. Equivalent inbreeding depression under laboratory and field conditions in a tree-hole breeding mosquito. *Proceedings of the Royal Society of London B* 267:1939-1945.

Armbruster, P., P. Fernando, and R. Lande. 1999a. Time frames for population viability analysis of species with long generations: An example with Asian elephants. *Animal Conservation* 2:69-73.

Armbruster, P., W.E. Bradshaw, A.L. Steiner*, and C.M. Holzapfel. 1999b. Evolutionary responses to environmental stress by the pitcher-plant mosquito, *Wyeomyia smithii*. *Heredity* 83:509-519.

Armbruster, P., W.E. Bradshaw, and C.M. Holzapfel. 1998. Effects of postglacial range expansion on allozyme and quantitative genetic variation of the pitcher-plant mosquito, *Wyeomyia smithii*. *Evolution* 52:1697-1704.

Bradshaw, W. E., **P**. **Armbruster**, and C. M. Holzapfel. 1998. Fitness consequences of hibernal diapause in the pitcher-plant mosquito, *Wyeomyia smithii*. *Ecology* 79:1458-1462.

Armbruster, P., W.E. Bradshaw, and C. M. Holzapfel. 1997. Evolution of the genetic architecture underlying fitness in the pitcher-plant mosquito, *Wyeomyia smithii*. *Evolution* 51:451-458.

Armbruster, P., and R. Lande. 1993. A population viability analysis for African elephant (*Loxodonta africana*): How big should reserves be? *Conservation Biology* 7:602-610.

BOOK CHAPTERS

Denlinger, D.L. and **Armbruster, P.** 2016. Physiology of mosquito diapause. In: A. Raikhel, editor, *Advances in Insect Physiology*, v.51, pp. 329-361. Oxford: Academic Press.

NON-REFEREED PUBLICATIONS

Armbruster, P. 2008. The sun rises (slowly) on Darwinian medicine. *Trends in Ecology and Evolution*. 23:422-423. (book review)

EXTERNAL GRANTS AND FELLOWSHIPS

Current

National Institutes of Allergy and Infectious Disease, National Institutes of Health, 1 R21 AI144266-01. Evolution of non-biting in mosquito disease vectors. April 2019-March 2021 (**P. Armbruster PI/PD**, co-PIs C.M. Holzapfel and M. Meuti. Total costs =$444,155).

National Institutes of Allergy and Infectious Disease, National Institutes of Health, 1 R01 AI132409-01A1. Population genomics of a globally distributed arbovirus vector, *Aedes albopictus.* June 2018-May 2023 (A. Caccone PI/PD, **P. Armbruster MPI**, Total costs = $3,407,924, Georgetown subcontract = $788,645).

Complete

National Institutes of Allergy and Infectious Disease, National Institutes of Health, 1 R15AI111328-01. The genetic basis of diapause in the Asian tiger mosquito, *Aedes albopictus*. August 2014-July 2018 (**P. Armbruster PI,** Total costs = $466,500).

United States Department of Agriculture sub-contract. A test of mitochondrial associated fitness effects in the Asian tiger mosquito, *Aedes albopictus*. July 2014- September 2014. (**P. Armbruster PI,** Total costs = $21,145).

United States Department of Agriculture sub-contract. A test of mitochondrial associated fitness effects in the Asian tiger mosquito, *Aedes albopictus*. November 2012- March 2013. (**P. Armbruster PI,** Total costs = $18,000).

National Institutes of Allergy and Infectious Disease, National Institutes of Health, 5R21AI081041-02. Massively parallel sequencing of the diapause transcriptome in *Aedes albopictus*. June 2009-May 2012. (**P. Armbruster PD/PI**, D.L. Denlinger co-PI, C. Elsik co-PI. Total costs = $432,889).

National Science Foundation. ULTRA-Ex: Collaborative research: Urban sustainability and push-pull drivers of residential change: Washington, D.C., Baltimore, Maryland, and the Chesapeake Bay. January 2010-December 2011. (A. Whitmer-PI, **P. Armbruster co-PI**, M. Galvin co-PI, S. Kaushal co-PI, M. Grove, co-PI. Total costs = $258,400).

National Science Foundation. DISSERTATION RESEARCH: Effects of vector population structure on immune function and pathogen susceptibility**.** July 2008- June 2010 (**P. Armbruster PI**, D.L. O'Donnell co-PI. Total costs = $7,129).

National Geographic Society Committee for Research and Exploration. Life-history evolution during invasion and range expansion. June 2008- May 2009. (**P. Armbruster PI**, Total costs = $17,893).

National Institutes of Health NRSA Postdoctoral Fellowship. (J. Conn PI, **P. Armbruster co-PI**. Total costs = $128,564).

The Leverhulme Trust. The influence of environmental and genetic interactions on extinction dynamics. March 1999-March 2000. (**P. Armbruster PI**, £25,420, approx. $43,000 U.S.).

INTERNAL GRANTS AND FELLOWSHIPS

Georgetown University Senior Research Fellowship. January-May, 2019 (one semester teaching release).

Georgetown University Summer Academic Grant. June-August, 2018 ($10,000).

Georgetown Graduate School Senior Research Fellowship. August-December 2014 (one semester teaching release).

Georgetown Graduate School Summer Academic Grant. June-August, 2013 ($10,000).

Georgetown University Environment Initiative Award. May, 2013 ($9,500).

Georgetown Global Health Initiative Award. May, 2013 (R. Padmanabhan, PI, **P. Armbruster co-PI**, $45,000).

Georgetown Graduate School Pilot Research Project Award. May, 2012 ($18,000).

Georgetown University Medical Center Dean's Pilot Research Project. March, 2012 (R.Padmanabhan PI, **P. Armbruster co-PI**, $15,000).

Georgetown Graduate School Pilot Research Project Award. July, 2007 (M. Hamilton PI, G. Wimp co-PI, **P. Armbruster co-PI**, $10,000).

Georgetown Graduate School Summer Academic Grant. June-August, 2008 ($10,500).

Georgetown Graduate School Competitive Grant in Aid. March, 2007 ($1,734).

Georgetown Graduate School Pilot Research Project Award. March, 2007 ($10,000).

Georgetown Graduate School Junior Faculty Research Fellowship. Fall 2006 (one semester teaching release).

Undergraduate Learning Initiative, Center for New Designs in Learning and Scholarship, Georgetown University. July, 2006 (**P. Armbruster PI**, Weiss co-PI, E. Johnson co-PI $7,750).

College Curriculum Renewal Project, Georgetown University. "Bringing biology to life: inquiry-based learning in a large enrollment, introductory science course." April, 2006 (**P. Armbruster PI**, M. Weiss co-PI, E. Johnson co-PI, $18,750).

International Collaborative Research Grant, Office of the Provost, Georgetown University. January, 2006 ($6,000).

Georgetown Graduate School Research Infrastructure Award (on behalf of the Department of Biology, Georgetown University). January, 2005 ($20,181).

Georgetown Graduate School Summer Academic Grant. June-August 2004 ($10,500).

TEACHING

Formal Courses

Introductory Biology II/Foundations Biology II (Biology 104). Introduction to fundamental principles of ecology, evolution and organismal diversity. In this class, required of all biology majors and pre-medical students, I teach three 70 minute periods per week and one approx. 60 minute recitation per week. I also help coordinate six three-hour laboratory sections per week, which are directly supervised by a laboratory assistant professor. Approximately 170 students per year, 2004-2008, 2012-2014.

Biology Gateway (Biology 191). This course serves as a gateway to upper-division course work for the Biology and Environmental Biology majors. A major focus is on scientific communication in written and oral form as well as critical analysis of

primary literature. The course covers four main topics: biological responses to climate change, epigenetics, steroid hormones and the biology of aging. These topics are considered from a number of different biological perspectives (e.g., molecular function, evolution) and also with respect to human and social implications. 20-25 students per year, 2016-2018.

Evolutionary Processes (Biology 251). A survey course in evolutionary biology that focuses on forces that cause evolutionary change at the population and species level. Emphasis is placed on the genetic basis of evolution, Darwinian selection, random genetic drift, molecular evolution, speciation and phylogenetics. The course includes three 50 minute lectures per week and a one-hour weekly recitation section to discuss classic literature. A two-week phylogeny reconstruction laboratory exercise is also included. 22 students, 2010.

Senior Thesis (Biology 311/312, 321/322, 331/332). Most Biology majors at Georgetown complete a Senior Thesis. The Department of Biology provides three Senior Thesis options: 1) Laboratory research: students develop an original research project including experimental design, execution and data analysis. 2) Critical analysis of the literature: involves in-depth analysis of published literature to address a novel hypothesis. 3) Teaching biology: students perform original pedagogical research while conducting supervised teaching in D.C. public high schools. I have mentored a total of 27 students, in all three categories, from 2003- present.

Conservation Biology (Biology 365). An upper-division course covering basic principles of population biology relevant to the conservation of biological diversity. The course involves weekly reading of the primary literature and culminates in a research project that requires students to obtain data from the primary literature and conduct an original quantitative analysis. This original research project is written up in the form of a research article formatted for submission to the journal *Conservation Biology*. 14-18 students per year, 2004, 2005, 2008, 2009.

Graduate Foundations in Evolution, Ecology and Behavior (Biology 501). The course is a graduate-level reading seminar required of all first year students in the Georgetown Department of Biology graduate program. Topics include classical concepts and empirical findings in ecology, evolution and organismal biology. Major emphases also include critical analyses of scientific literature and developing proficiency in scientific writing and oral presentation. 4-7 students per year, 2011, 2013-2015.

Graduate Survival Skills (Biology 505). This is a seminar-style graduate course that covers foundational professional skills necessary for success in graduate school and beyond. A major focus of the course is on communication in both written and oral form, with a special emphasis on grant proposal preparation. Additional topics include time management skills, strategies for effectively managing mentor-advisee relationships and research ethics. 6-8 students per year, 2016,2017.

Graduate Seminar in Ecology and Evolution (Biology 507). This seminar brought together and graduate students to read and critically discuss a pre-publication draft of *Evolution in Health and Disease*, 2nd ed. (eds. Stephan Stearns and Jacob Koella). The

course included weekly writing assignments and student presentations of primary literature. One of the students followed up by writing a book review, which was published in the *Transactions of the Royal Society of Tropical Heath and Medicine*. 5 students, 2007.

Topics in Ecological Genetics (Biology 512). This course focused on critical analysis and discussion of contemporary literature in the field of ecological genetics, with a particular emphasis on considering how advances in DNA sequencing technology ("NextGen sequencing") are opening up exciting new opportunities in this field. Students were responsible for presenting primary literature, participating in classroom discussion and writing a "mini-review" paper on a topic related to their research interests. 4 students, 2012.

Research Mentorship

Junior Faculty Mentorship

Faculty mentor for two junior (pre-tenure) faculty members in the Department of Biology at Georgetown, Dr. Shaun Brinsmade and Dr. Leslie Ries.

Ph.D. Students

Deborah O'Donnell, "Ecology and life-history evolution of the invasive mosquito, *Aedes albopictus*." PhD in Biology completed December, 2009.

Jennifer Urbanski, "Evolution and molecular physiology of photoperiodic diapause in the Asian tiger mosquito, *Aedes albopictus*." PhD in Biology with Distinction completed, 2011.

Xin Huang, "The molecular physiology of ecological adaptation." PhD in Biology with Distinction completed, 2016.

Zachary Batz, "Ecology and genetics of diapause in *Aedes albopictus*." Entered PhD program in Biology August 2014.

Mara Heilig, "Functional genetics of diapause in *Aedes albopictus*." Entered PhD program in Biology August 2018.

Doctoral Committees

Christopher Drummond (Major Professor: Matthew Hamilton) "Evolution of floral color change in *Lupinus* (Fabaceae)." PhD 2006.

Doug Blackiston (Major Professor: Martha Weiss) "Learning and memory in larval and adult Lepidoptera." PhD 2007.

David Soria (Major Professor: Matthew Hamilton) "Patterns and causes of substitution rate heterogeneity in angiosperm plants." PhD 2007.

Quincy Gibson (Major Professor: Janet Mann) "The development of social patterns in wild bottlenose dolphin calves (*Tursiops* sp.)" PhD 2007.

Margaret Stanton (Major Professor: Janet Mann) "Social network development and the influence of early sociality on future fitness in bottlenose dolphins (*Tursiops* sp.)" PhD 2011.

Ewa Krzyszczyk (Major Professor: Janet Mann) "Ontogeny of behavior and social interactions in the wild bottlenose dolphin, *Tursiops* sp." PhD in 2013.

Jean Tsai (Major Professor: Martha Weiss) "Behavioral ecology of male mating success in Nasonia." PhD in 2014.

Aimee Kopolow (Major Professor: David Hartley, GUMC) : "Mathematical modeling of risk factors for the introduction of Rift Valley fever to Florida." PhD in 2014.

Dana Price (Major Professor: Dina Fonseca, Rutgers University). "Comparative analysis of the molecular evolution of Culicid genomes." PhD in 2015.

Megan Saunders (Major Professor: Paul Leisnham, University of Maryland). "Overwintering ecology of urban vector mosquitoes." PhD in 2019.

Caitlyn Karninski (Major Professor: Janet Mann). In progress.

Nicole Wagner (Major Professor: Sarah Johnson). In progress.

Aylssa King (Major Professor: Shaun Brinsmade). In progress.

Claire Li (Major Professor: Heidi Elmendorf). In progress.

Masters Committees

Zara Dowling (Major Professor Paul Leisnham, University of Maryland). "Linking socioeconomic factors to mosquito control in Washington, D.C." MS in 2011.

Lilian Powers (Major Professor: Martha Weiss) "Exploring variation in learning ability in *Pieris rapae*, the cabbage white butterfly." MS in 2013.

Brendan Riske (Major Professor David Carlini, American University). "Temperature effects on *Wolbachia* infection of *Ae. albopictus* eggs". MS in 2019.

Undergraduate Research

Laboratory Senior Theses

John Dzundza (2005), Ryan Shay (2006), Timothy Nywening (2006), Keith Summa (2007), Philip Fujimoto (2008), Amalia Aruda (2009), Zahra Zahman (2009), Shaelyn Sleater (2010), Jeffrey Bien* (2010), Niaem Issa* (2010), Mark DeCottis (2011), Jihana Motley (2011), Waseem Khaleel (2012), Jonathan Miller (2012), Jackie Kalan (2014), Steven Lim* (2014), Jad Tabbara (2015), Max Malec (2015). (* Indicates co-mentored with GU Medical Center faculty)

Critical Analysis of the Literature Senior Theses

Joseph McLain (2004), Brigit McLaughlin* (2010)

(* Indicates co-mentored with scientist from Smithsonian National Zoological Park)

Teaching Biology Senior Theses

Renee Wlodarczyk (2005), Colleen Bennett (2010), Laura Mercurio (2010), Ginny Dines (2011), Matthew Mullarkey (2011), Nilesh Seshadri (2015), Megan Flaviano (2015).

Student Awards and Recognition

Deborah O'Donnell:

- Research grant from Cosmos Club of Washington DC (2006, $1,000);
- National Science Foundation Doctoral Dissertation Improvement Award (2007);
- Invited speaker at Entomological Society of America annual meeting, Section Symposium: Ecology of Invasive Mosquitoes: Factors Controlling Their Spread and Ecological and Public Health Impacts (2007);
- Invited speaker, annual meeting Virginia Mosquito Control Association (2007).

Jennifer Urbanski:

- Research grant from Cosmos Club of Washington DC (2006, $1,000).
- President's Prize for best student presentation, Entomological Society of America 2007 annual meeting, Section B2, Physiology, Biochemistry and Toxicology.
- Invited symposium speaker, The Genetics and Genomics of Environmental Change, American Genetics Association annual meeting (2009).
- Outstanding Graduate Student Award, Department of Biology, Georgetown University (2009).
- Ph.D. awarded with Distinction (2011)

Xin Huang:

- Sigma-Xi Grant in Aid of Research (2012, $400)
- Arthropod Genomics Symposium Travel Grant (2013, $705)
- Outstanding Graduate Student Award, Department of Biology, Georgetown University (2015).
- Ph.D. awarded with Distinction (2016)

Zachary Batz:

- Research grant from Cosmos Club of Washington DC (2017, $3,000)
- Outstanding Graduate Student Award, Department of Biology, Georgetown University (2019)

SERVICE

Departmental Service

Member, Biology Committee for Undergraduate Students and Studies, 2003-2005

Chair, Seminar Committee, 2003-2007

Faculty Coordinator, Graduate Student Distinguished Speaker Program, 2004-2007

Co-Chair, Laboratory Assistant Professor Search, 2005-2006

Member, Biology Committee for Graduate Students and Studies, 2005-present

Member, Biology Curriculum and Assessment Committee, 2006-2010

Co-Director, Environmental Biology Major, 2011

Member, Laboratory Assistant Professor Search Committee, 2009

Member, Department of Biology Faculty Search Committee, 2012 & 2014

Member, Department of Biology Merit Review Committee, 2014-2015.

Interim Chair, Biology Committee for Graduate Students and Studies, 2013

College/University Service

2018. Member, Georgetown Environment Director and Endowed Chair Search Committee

2015-2016. Member, Graduate School Executive Committee.

2015. Member, University Science Planning Group.

October, 2008. Presentation to Parents' Leadership Council, "Interactive teaching in introductory biology at Georgetown University." Georgetown University, Washington, DC.

August, 2008. Training session for GU Medical Center faculty, "Using iClickers to stimulate interactive teaching and learning." Georgetown University, Washington, DC.

May, 2008. Presentation at TLISI workshop, "Pushing the boundaries of classroom practice." Sponsored by the Center for New Designs in Learning and Scholarship. Georgetown University, Washington, DC.

April, 2008. Presentation to the Unified Classroom Services Working Group "Using iClickers in large introductory classrooms." Georgetown University, Washington, DC.

March, 2008. Presentation to the Georgetown College Board of Advisors "Innovative approaches to interactive teaching in large introductory classrooms." Georgetown University, Washington, DC.

February, 2008. Presentation to the Board of Regents working group, "Innovative approaches to interactive teaching in large introductory classrooms." Georgetown University, Washington, DC.

September, 2007. Presentation to the Department of Psychology, "Innovative approaches to interactive teaching in large introductory classrooms." Georgetown University, Washington, DC.

November, 2006. Symposium organizer, "Teaching for Understanding", a symposium on interactive teaching and learning. Georgetown University, Washington, DC. See http://cndls.georgetown.edu/events/symposia/TFU/

Professional Service

NSF Panel Service

Ecology and Evolution of Infectious Diseases, February 11-13, 2015.
Evolutionary Processes Cluster, October 19-21, 2010.

NIH Panel Service

NIAID R13 Panel, November 18-21, 2013.
NIAID ZRG1 IDM S (81), November 9, 2015.
NIAID PAR-16-106, May18, 2016.
NIAID ZRG1 IDM S (81), July 18, 2016.
Fogarty Center ZRG1 IDM-Z (55) training plan review panel, October 17, 2018
NIAID, ZRG1 IDM S (83), March 5, 2018

Ad Hoc Reviews

Animal Conservation, Biological Bulletin, Biological Conservation, BMC Genomics, CBE-Life, Sciences Education, Evolution, Ecology, Ecology Letters, Evolutionary Ecology, Genetics, Global Change Biology, Heredity, Journal of Animal Ecology, Journal of Experimental Biology, Journal of Insect Physiology, Journal of Medical Entomology, Insect Molecular Biology, Molecular Biology and Evolution, Proc. Nat. Acad. Sci. USA, Proc. Roy. Soc. Lond. B, Nature, Oecologia, Oikos, PLoS One, PLoS Neglected Tropical Diseases, Molecular Ecology, South African Journal of Wildlife Research, Tropical Biomedicine, Vectors and Parasites, Israeli Science Foundation, National Science Foundation, National Geographic Society, The Wellcome Trust.

Textbook Reviews

Prospectus for Introductory Biology textbook, Sinauer Associates (2008); Two chapters of *Biological Sciences*, 3rd ed., Prentice Hall (2008); Conservation Science, Roberts and Company Publishers (2011), One chapter of *Evolution*, Norton (2011)

INVITED SEMINARS AND SYMPOSIA

July, 2020. Invited oral presentation in symposium on "Diapause, Dormancy, and Seasonal Adaptation", International Congress of Entomology, Helsinki, Finland.

April, 2019. Invited oral presentation at Fourth International Workshop on Dengue/Zika and Vector Mosquitoes, Guangzhou, P.R. China.

February, 2019. Invited departmental seminar, Department of Entomology, Ohio State University, Columbus, OH

November, 2018. Invited departmental seminar, Department of Environmental Science and Technology, University of Maryland, College Park, MD

April, 2017. Invited oral presentation at Third International Workshop on *Aedes albopictus*, the Asian tiger mosquito, Pavia, Italy.

September, 2016. Invited oral presentation in symposium on "New Insights into the Metabolism of Mosquitoes That Are Vectors of Human Diseases**"**, International Congress of Entomology, Orlando, FL.

November, 2015. Invited oral presentation in symposium on "30 Years of Hunting the Tiger. *Aedes albopictus* in America: Current Perspectives and Future Challenges", Entomological Society of America, Minneapolis, MN.

October, 2015. Invited departmental seminar, Department of Biological Science, University of Cincinnati, Cincinnati, OH.

March, 2015. Invited oral presentation at Second International Workshop on *Aedes albopictus*, the Dengue vector, Guangzhou, P.R. China.

November, 2014. Invited departmental seminar, Department of Ecology and Evolutionary Biology, Yale University, New Haven, CT.

October, 2014. Invited departmental seminar, Department of Biology, Baylor University, Waco, TX.

March, 2014. Invited departmental seminar, Department of Entomology, Rutgers University, New Brunswick, NJ.

November, 2013. Invited oral presentation and panelist, Foundation for National Institutes of Health and National Institutes of Allergy and Infectious Diseases Workshop on Population Replacement Strategies for Malaria Vectors. Washington, DC.

October, 2013. Invited departmental seminar, Department of Entomology, Virginia Tech. University, Blacksburg, VA.

March, 2013. Invited oral presentation at International Workshop on *Aedes albopictus*, the Asian tiger mosquito, Pavia, Italy.

November, 2012. Invited departmental seminar, Department of Biology, Elmira College, Elmira, NY.

August, 2012. Invited oral presentation at symposium on "Bioinformatics and the next gen-revolution", International Congress of Entomology, Daegu, South Korea.

August, 2012. Invited oral presentation at symposium on "New complexities in the regulation of insect diapause and cold hardiness", International Congress of Entomology, Daegu, South Korea.

February, 2012. Invited departmental seminar, Department of Entomology, University of Maryland, College Park, MD.

December, 2011. Invited departmental seminar, Department of Microbiology and Immunology, Georgetown University Medical Center, Washington, DC.

November, 2009. Invited departmental seminar. Genetics Program, Smithsonian Institution, Washington, DC.

February, 2009. Invited oral presentation to the International Symposium on the Asian Tiger Mosquito- Ecology, Evolution, Epidemiology and Control. Rutgers University, New Brunswick, NJ.

May, 2008. Invited departmental seminar. Department of Entomology, Ohio State University. Columbus, OH.
December, 2007. Invited oral presentation to Entomological Society of America symposium "Frontiers in Vector Molecular Physiology". San Diego, CA.

January, 2007. Invited presentation to Howard Hughes Medical Institutes and National Academies Summer Institutes on Undergraduate Education in Biology. Chevy Chase, MD.

June, 2006. Invited departmental seminar. Department of Entomology, University of Wisconsin, Madison, WI.

November, 2004. Invited oral presentation to Entomological Society of America symposium "Using principles of ecology to understand populations and communities of container mosquitoes". Salt Lake City, UT.

June, 2004. Invited departmental seminar, Smithsonian Institution Molecular Genetics Laboratory, National Zoo, Washington, DC.

January, 2004. Invited departmental seminar, Coriell Institute for Medical Research, Camden, NJ.

November, 2003. Invited departmental seminar. Department of Biology, Howard University, Washington, DC.

November, 2003. Invited departmental seminar. Department of Biology, George Washington University, Washington, DC.

November, 2002. Invited oral presentation to Entomological Society of America symposium "The comparative ecology and evolution of *Aedes aegypti* and *Aedes albopictus*. Ft. Lauderdale, FL.

September, 2002. Invited oral presentation to the Society of Vector Ecology, Albuquerque, NM.

January, 2001. Invited oral presentation to workshop "A synthetic approach to phytotelmata communities", Wakulla Springs, FL.

October, 2000. Invited departmental seminar. Department of Biology, University of Vermont, Burlington, VT.

October, 2000. Invited departmental seminar, Florida Medical Entomology Lab, Vero Beach, FL.

February, 2000. Invited departmental seminar. Institute for Cell, Animal, and Population Biology. University of Edinburgh, Edinburgh, Scotland.

January, 2000. Invited departmental seminar. Department of Biology. University of California at Santa Cruz, Santa Cruz, CA.

November, 1998. Invited oral presentation to Center for Ecology and Evolution workshop "The Origins and Maintenance of Biodiversity", London, UK.

WORKSHOPS AND PANEL PARTICIPATION:

November, 2013. Invited workshop participant, Biology Directors Consortium Workshop, Atlanta, GA.

March, 2012. Invited panelist, "Careers in Teaching Panel Discussion", National Institutes of Health "Advocates for Community and Training Seminar Series", Twinbrook labs, Rockville, MD.

October, 2011. Invited participant at W.H. Freeman Assessment Writing Workshop for upcoming introductory biology textbook "How Life Works". Boston, MA.

July, 2009. Invited participant and poster presentation to NSF-, HHMI- and AAAS- sponsored meeting: Vision and Change in Undergraduate Biology Education. Washington, DC.

August, 2008. Invited participant in NSF-sponsored workshop on Diagnostic Question Clusters to Improve Undergraduate Education in Introductory Biology. Milwaukee, WI.

June, 2008. Invited group facilitator, National Academies Summer Institutes on Undergraduate Education in Biology. University of Wisconsin, Madison, WI.

July, 2007. Invited participant, National Science Foundation Working Group on Undergraduate Biology Education in the 21st Century. Arlington, VA.

June, 2006. Participant, National Academies Summer Institutes on Undergraduate Education in Biology. University of Wisconsin, Madison, WI.

April, 2005. Participant, PKAL Leadership Conference: Leadership in Building a Research-Rich Learning Environment. Hope College, Holland, MI.

June, 2004. Panelist, Preparing Future Faculty. Howard University, Washington, DC.