

## Derrick K. Mathias

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University of Florida, Institute of Food & Agricultural Sciences  
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### Education

- Jul 2009 - May 2010 **Master of Public Health**, Concentration in Infectious Diseases  
Johns Hopkins Bloomberg School of Public Health, Baltimore, MD  
Advisor: D. E. Norris  
Capstone Project: Emergence of Insecticide Resistance in *Anopheles gambiae*  
and Implications for Malaria Control in Western Kenya
- Sep 1999 - Dec 2006 **Doctor of Philosophy (PhD)**, Evolutionary Biology  
University of Oregon, Department of Biology, Center for Ecology & Evolutionary  
Biology, Eugene, OR  
Advisors: W. E. Bradshaw and C. M. Holzapfel  
Dissertation: Evolution of a Seasonal Adaptation in the Pitcher-Plant Mosquito,  
*Wyeomyia smithii*
- Aug 1992 - May 1996 **Bachelor of Science** in Biology, *magna cum laude*  
University of Memphis, Department of Biology, Memphis, TN

### Professional Experience

- Jan 2017 – Present **Assistant Professor**  
Florida Medical Entomology Laboratory, Department of Entomology &  
Nematology, Institute of Food and Agricultural Sciences, University of Florida,  
Vero Beach, FL
- Aug 2014 – Dec 2016 **Assistant Professor**  
Department of Entomology & Plant Pathology, College of Agriculture, Auburn  
University, Auburn, AL
- Jan 2014 - Jul 2014 **Research Associate**  
Department of Molecular Microbiology & Immunology, Johns Hopkins  
Bloomberg School of Public Health, Baltimore, MD
- Jul 2010 - Dec 2013 **Postdoctoral Fellow**  
Department of Molecular Microbiology & Immunology, Johns Hopkins  
Bloomberg School of Public Health, Baltimore, MD  
Postdoctoral Advisor: Rhoel R. Dinglasan
- Jan 2007 - Jun 2009 **American Society for Microbiology/Coordinating Center for Infectious Diseases  
Postdoctoral Fellow**  
Centers for Disease Control & Prevention, Center for Global Health Research,  
Kisumu, Kenya  
Postdoctoral Advisors: John E. Gimnig (CDC), Edward D. Walker (Michigan State  
University)
- Jun 1996 - Jul 1997 **Research Technician**  
St. Jude Children's Research Hospital, Department of Immunology, Memphis, TN  
Principal Investigator: Mary E. Conley

## Additional Training

- Jul 2012 **Molecular Evolution Workshop**, Marine Biological Laboratory, Woods Hole, MA; short course that combined lectures with practical instruction on phylogenetic analysis, bioinformatics, gene duplication, organization of gene families, and comparative genomics.
- Nov 2011 **Training in MALDI-TOF Mass Spectrometry & Recombinant Protein Expression**, Laboratory of Iain Wilson, Universität für Bodenkultur Wien, Vienna, Austria. As a visiting scientist, received training in the expression of full-length, functional proteins using the yeast *Pichia pastoris* and in MALDI-TOF mass spectrometry to assess enzymatic activity of recombinant proteins.
- Jun 2002 **Summer Institute for Statistical Genetics**, North Carolina State University, Raleigh, NC; short course focused on quantitative-genetic theory and analytical methods for the mapping of quantitative trait loci (QTL).

## Awards/Fellowships

- May 2011 - May 2013 **The Calvin A. & Helen L. Lang Scholars Postdoctoral Fellowship**, Johns Hopkins Bloomberg School of Public Health
- Jan 2007 - June 2009 **American Society for Microbiology/Coordinating Center for Infectious Diseases Postdoctoral Fellowship**, CDC/KEMRI - Center for Global Health, Kisumu, Kenya
- Sep 2004 - Dec 2006 **Graduate Research Fellowship** - University of Oregon, Center for Ecology and Evolutionary Biology
- Sep 2003 - Aug 2004 **National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT) in Genomics, Evolution, and Development**, University of Oregon, Department of Biology
- Sep 2000 - Aug 2003 **National Institutes of Health Genetics Training Fellowship**, University of Oregon, Department of Biology
- Sep 1999 - Aug 2000 **Graduate Teaching Fellowship**, University of Oregon, Department of Biology
- Aug 1992 - May 1996 **Academic Excellence Scholarship**, University of Memphis

## Grants (Extramural)

- Jul 2011 - Jun 2013 **PATH-Malaria Vaccine Initiative**, \$224,687 (direct costs), Co-PI: R. R. Dinglasan, Vector-fitness study of a mosquito-based, pan-malaria transmission-blocking vaccine.
- Jun 2004 - Jun 2005 **National Science Foundation Doctoral Dissertation Improvement Grant**, \$12,000, Co-PI: W. E. Bradshaw, Circadian-clock genes and variation in photoperiodic time measurement: A role for *timeless*?

## Grants (Intramural)

- Oct 2015 - Sep 2017 **Hatch/Multistate Program, Alabama Agricultural Experiment Station**, \$50,000, Examining environmental determinants of tick and tick-borne pathogen distributions in Alabama: Can tick ecology predict risk of tick-borne diseases?
- May 2015 - April 2017 **Auburn University Intramural Grants Program - Seed Grant**, \$10,000, Improving RNAi in disease vectors: Exploring nanoparticle delivery of dsRNA

## Professional Activities

- 2000 - 2006 Society for the Study of Evolution, Member
- 2007 - Present American Society of Tropical Medicine & Hygiene, Member

2010 - Present Entomological Society of America, Member, Judge for travel awards (2016, student transition and early professionals category)

2010 - Present *PLOS Neglected Tropical Diseases*, Reviewer

2011 - 2013 PATH-MVI Working Group on Transmission-Blocking Assays, Consultant

2013 - Present *Journal of Medical Entomology*, Reviewer

2013 - Present *PLOS One*, Reviewer

2014 - 2016 Alabama Vector Management Society, Member

2015 - Present American Mosquito Control Association, Member

2015-Present *Infection, Genetics and Evolution*, Reviewer

### Teaching

Spring 2015 - 2017 Guest Lecturer, *Economic Entomology* (ENTM 4020), lecture/lab titled *Introduction to Medical-Veterinary Entomology*, Department of Entomology & Plant Pathology, Auburn University

Fall 2015 Instructor, *Insects Affecting Humans, Domestic Animals, & Wildlife* (ENTM 4040), Department of Entomology & Plant Pathology, Auburn University

3<sup>rd</sup> Term 2013/14 Co-instructor, *Vector Biology and Vector-Borne Diseases* (PH 260.650), Department of Molecular Microbiology & Immunology, Johns Hopkins Bloomberg School of Public Health

4<sup>th</sup> Term 2013/14 Co-instructor, *Vector Biology and Disease Ecology Literature* (PH 260.657), Department of Molecular Microbiology & Immunology, Johns Hopkins Bloomberg School of Public Health

Jul 2013 Guest Lecturer, *Topics in Infectious Disease Epidemiology*, lecture titled *Arboviruses*, Graduate Summer Institute of Epidemiology & Biostatistics, Johns Hopkins Bloomberg School of Public Health

Nov 2012 Guest Lecturer, *Public Health Ecology*, two lectures titled *Vector-Borne Disease Systems* and *Applying Population Genetics to the Ecology of Vector-Borne Diseases*, Department of Molecular Microbiology & Immunology, Johns Hopkins Bloomberg School of Public Health

### Extension

Mar 2017 *Mosquito-Borne Disease in the United States* (webinar), All Bugs Good and Bad Webinar Series, eXtension.org, organized by the Alabama Cooperative Extension System

Oct 2016 *Mosquitoes & Zika Virus: Assessing the Threat to Public Health in Alabama* (presentation), Auburn Rotary Club, Auburn, AL

Jun - Sep 2016 Consultant for mosquito and arboviral surveillance for Jefferson County Department of Health, Birmingham, AL

Oct 2016 *Mosquitoes and Public Health* (seminar), Second Annual Pesticide Applicators University, Alabama Cooperative Extension System, Auburn Marriott Opelika Hotel & Conference Center at Grand National, Opelika, AL

Jun 2016 *Mosquito Biology and Identification* and *Mosquitoes and Public Health* (seminars) Alabama Cooperative Extension System, Alabama Green Industry Training Center, Birmingham, AL.

Nov 2015 *Ehrlichiosis in Alabama* (presentation), Alabama Study Commission on Tick-Borne Illnesses, Alabama Legislature, Montgomery, AL

Oct 2015 *Mosquitoes and Public Health* (seminar), First Annual Pesticide Applicators University, Alabama Cooperative Extension System, Auburn Marriott Opelika Hotel & Conference Center at Grand National, Opelika, AL

Oct 2015 *Mosquito Biology and Identification* (seminar/workshop), First Annual Pesticide Applicators University, Alabama Cooperative Extension System, Auburn Marriott Opelika Hotel & Conference Center at Grand National, Opelika, AL

### Media

May 2016 Media outlet: WKRG Mobile, AL; interview on mosquitoes and Zika virus with a television news reporter; aired on evening news 5/24/2016.

Nov 2015 Media outlets: WHNT Huntsville, AL; WXTX Columbus, GA; interviews on kissing bugs and Chagas disease with local television news reporters; aired on evening news 11/24/2015.

July 2015 Media outlet: Alabama Media Group; interview with a reporter for a story titled *Mosquitoes of Alabama: What makes them tick, makes you itch and what you can do about it*; appeared on [www.al.com](http://www.al.com).

Dec 2013 Media outlet: This Week in Parasitism; Mathias et al 2013 (PLoS Pathogens 9(11): e1003757) featured in a podcast titled *Three New Ways to Prevent Malaria*; aired online on 12/19/13 and can be found in archives (TWiP 64) at [www.microbeworld.org](http://www.microbeworld.org).

### Presentations

Mar 2017 *Investigating the Vectors of Epizootic Hemorrhagic Disease Virus in Alabama* (poster, with X. Zhang), Entomological Society of America – Southeastern Branch Annual Meetings, Memphis, TN

Oct 2016 *Investigation of Pathogen Prevalence and Ecological Determinants of Questing Density Among Lone Star Ticks in East-Central Alabama* (poster, with X. Wang), XXV International Congress of Entomology/Entomological Society of America Annual Meetings, Orlando, FL

May 2016 *Biosafety Challenges of Research on Vector-Borne Diseases*, Southeastern Biological Safety Association Symposium, Center for Advanced Science, Innovation, & Commerce, Auburn University, Auburn, AL

Mar 2016 *Arboviral Emergence & Assessing Threats to Public Health*, Alabama Vector Management Society 27<sup>th</sup> Annual Meeting, Orange Beach, AL

Feb 2016 *Mosquitoes & Emerging Threats to Public Health in Alabama*, Alabama Pest Control Association, Winter Meetings 2016, Dixon Conference Center, Auburn, AL

Apr 2014 *A Glycan-Mimetic Small Molecule Blocks Plasmodium Invasion of the Mosquito Midgut*, Infectious and Global Diseases Seminar Series, Department of Microbiology and Medical Zoology, University of Puerto Rico-School of Medicine, San Juan, PR

Mar 2014 *Translating the Molecular Biology of Vector-Parasite Interactions into Tools for Malaria Eradication*, Natural Science and Mathematics Colloquium, St. Mary's College of Maryland, St. Marys City, MD.

Nov 2013 *Targeting Sexual-Stage Malaria Parasites with Transmission-Blocking Compounds in the Mosquito Midgut*, American Society for Tropical Medicine and Hygiene Annual Meetings, Washington, D.C.

Jun 2013 *Strategies for Translating Research on Vector-Parasite Interactions into Transmission-Blocking Interventions*, Vector Encounter Annual Meeting, Johns Hopkins Bloomberg School of Public Health/Goucher College, Baltimore, MD

Apr 2013 *Mechanisms of a Mosquito-Based Malaria Transmission-Blocking Vaccine* (poster), Research Advances in Malaria: Transmission from the Mosquito Midgut to the Mammalian Liver, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD

- Oct 2012 *A Glycan-Mimetic Small Molecule Blocks Plasmodium Invasion of the Mosquito Midgut*, Malaria Research Institute Seminar Series, Johns Hopkins Bloomberg School of Public Health, Baltimore, MD
- Nov 2010 *Progress Towards the Development of a Mosquito-Based, Pan-Malaria Transmission-Blocking Vaccine* (poster), National Institutes of Health/Johns Hopkins Bloomberg School of Public Health Joint Symposium on Malaria, Bethesda, MD
- Mar 2007 *Insecticide Resistance in Malaria Vectors of Western Kenya: Current Situation and Future Outlook*, CDC/KEMRI - Center for Global Health, Kisumu, Kenya
- Apr 2004 *Genetic Basis of Photoperiodic Adaptation* (poster), Indiana University/University of Oregon joint IGERT Symposium on the Evolution of Gene Regulation, Eugene, OR
- Jun 2003 *Geographic Variation in the Expression of timeless, a Critical Component of the Circadian Clock*, Society for the Study of Evolution Annual Meetings, California State University - Chico, Chico, CA
- Jun 2002 *Circadian Rhythmicity and Epistatic Modification of Photoperiodic Response*, Society for the Study of Evolution Annual Meetings, University of Illinois, Urbana-Champaign, IL

## Publications

- Oforika LC, Adeleke MA, Anikwe JC, Hardy NB, **Mathias DK**, Makanjuola WA, Fadamiro HY. Poor genetic differentiation but clear cytoform divergence among cryptic species in *Simulium damnosum* complex (Diptera: Simuliidae). *Systematic Entomology* (in press)
- Pastrana-Mena R\*, **Mathias DK\***, Delves MJ, King JG, Yee R, Rajaram K, Verotta L, Dinglasan RR. 2016. A malaria transmission-blocking natural product derivative prevents *Plasmodium* zygote-to-ookinete maturation in the mosquito midgut. *ACS Chemical Biology* 11(12):3461-3472.
- Balaich JN, **Mathias DK**, Torto B, Jackson BT, Tao D, Ebrahimi B, Tarimo BB, Cheseto X, Foster WA, Dinglasan RR. 2016. The non-artemisinin sesquiterpene lactones parthenin and parthenolide block *Plasmodium falciparum* sexual stage transmission. *Antimicrobial Agents and Chemotherapy* 60(4):2108-2117.
- Atkinson SC, Armistead JS, **Mathias DK**, Sandeu MM, Tao D, Borhani-Dizaji N, Tarimo BB, Morlais I, Dinglasan RR, Borg NA. 2015. The Anopheles-midgut APN1 structure reveals a new malaria transmission-blocking vaccine epitope. *Nature Structural and Molecular Biology* 22(7):532-539.
- Ruecker A, **Mathias DK**, Straschil U, Churcher TS, Dinglasan RR, Leroy D, Sinden RE, Delves MJ. 2014. A male and female gametocyte functional viability assay to identify biologically relevant malaria transmission-blocking drugs. *Antimicrobial Agents and Chemotherapy* 58(12):7292-7302.
- Mathias DK.**, Jardim JG, Parish LA, Armistead JS, Trinh HV, Chalermpon K, Sattabongkot J, Dinglasan RR. 2014. Differential roles of an anopheline midgut GPI-anchored protein in mediating *Plasmodium falciparum* and *Plasmodium vivax* ookinete invasion. *Infection, Genetics and Evolution* 28:635-647.
- Tao D, Ubaida-Mohien C, **Mathias DK**, King JG, Pastrana-Mena R, Tripathi A, Goldowitz I, Graham DR, Moss E, Marti M, Dinglasan RR. 2014. Sex-partitioning of the *Plasmodium falciparum* stage V gametocyte proteome provides insight into *falciparum*-specific cell biology. *Molecular and Cellular Proteomics* 13:2705-2724.
- Armistead JA, Morlais I, **Mathias DK**, Jardim J, Joy J, Fridman A, Finnefrock A, Bagchi A, Plebanski M, Scorpio D, Churcher T, Borg NA, Sattabongkot J, Dinglasan RR. 2014. Antibodies to a single, conserved epitope in Anopheles APN1 inhibit universal transmission of *Plasmodium falciparum* and *Plasmodium vivax* malaria. *Infection and Immunity* 82(2):818-829.
- Mathias DK\***, Pastrana-Mena R\*, Ranucci E, Tao D, Ferruti P, Ortega C, Staples GO, Zaia J, Takashima E, Tsuboi T, Borg NA, Verotta L, Dinglasan RR. 2013. A small molecule glycosaminoglycan mimetic blocks *Plasmodium* invasion of the mosquito midgut. *PLoS Pathogens* 9(11): e1003757.

- Ubaida Mohien C, Colquhoun DR, **Mathias DK**, Gibbons JG, Armistead JS, del Carmen-Rodriguez M, Rodriguez MH, Edwards NJ, Hartler J, Thallinger GG, Graham DR, Martinez-Barnette J, Rokas A, Dinglasan RR. 2013. A bioinformatics approach for integrated transcriptomic and proteomic comparative analyses of model and non-sequenced anopheline vectors of human malaria parasites. *Molecular and Cellular Proteomics* 12:120-131.
- Mathias DK**, Plieskatt JL, Armistead JS, Bethony JM, Abdul-Majid KB, McMillan A, Agnov E, Aryee MJ, Zhan B, Gillespie P, Keegan B, Jariwala AR, Rezende W, Bottazzi ME, Scorpio DG, Hotez PJ, Dinglasan RR. 2012. Expression, immunogenicity, histopathology, and potency of a mosquito-based malaria transmission-blocking recombinant vaccine. *Infection and Immunity* 80(4):1606-1614.
- Mathias DK**, Ochomo E, Atieli F, Ombok M, Bayoh N, Olang G, Muhia D, Kamau L, Vulule JM, Hamel MJ, Hawley WA, Walker ED, Gimnig JE. 2011. Spatial and temporal variation in the *kdr* allele L1014S in *Anopheles gambiae* s.s. and phenotypic variability in susceptibility to insecticides in western Kenya. *Malaria Journal* 10:10.
- Bayoh MN, **Mathias DK**, Odiere MR, Mutuku FM, Kamau L, Gimnig JE, Vulule JM, Hawley WA, Hamel MJ, Walker ED. 2010. *Anopheles gambiae* s.s.: Historical population decline associated with regional distribution of insecticide-treated bed nets in western Nyanza Province, Kenya. *Malaria Journal* 9:62.
- Mathias D**, Jacky L, Bradshaw WE, Holzapfel CM. 2007. Quantitative trait loci associated with photoperiodic response and stage of diapause in the pitcher-plant mosquito, *Wyeomyia smithii*. *Genetics* 176:391-402.
- Mathias D**, Reed L, Bradshaw WE, Holzapfel CM. 2006. Evolutionary divergence of circadian and photoperiodic phenotypes in the pitcher-plant mosquito, *Wyeomyia smithii*. *Journal of Biological Rhythms* 21:132-139.
- Bradshaw WE, Holzapfel CM, **Mathias D**. 2006. Circadian rhythmicity and photoperiodism in the pitcher-plant mosquito: Can the seasonal timer evolve independently of the circadian clock? *The American Naturalist* 167:601-605.
- Bergland AO, Agotsch M, **Mathias D**, Bradshaw WE, Holzapfel CM. 2005. Factors influencing the seasonal life history of the pitcher-plant mosquito, *Wyeomyia smithii*. *Ecological Entomology* 30:129-137.
- Mathias D**, Jacky L, Bradshaw WE, Holzapfel CM. 2005. Geographic and developmental variation in expression of the circadian rhythm gene, *timeless*, in the pitcher-plant mosquito, *Wyeomyia smithii*. *Journal of Insect Physiology* 51:661-667.
- Conley ME, **Mathias D**, Treadaway J, Minegishi Y, Rohrer J. 1998. Mutations in *Btk* in patients with presumed X-linked Agammaglobulinemia. *American Journal of Human Genetics* 62:1034-1043.

\*Denotes equal contribution by authors.