

Michelle R. Sanford, Ph.D., M-ABFE

Harris County Institute of Forensic Sciences

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EDUCATION

Ph.D., Entomology, Texas A&M University. Dissertation: *Observations on the associative learning capabilities of adult Culex quinquefasciatus Say and other mosquitoes*. May, 2010.

M.S., Entomology, University of California, Riverside. Thesis: *Effects of Enrichment on Mosquitoes and Associated Invertebrates in a Constructed Treatment Wetland*. March, 2003.

B.S. Biology, Minor: Entomology, University of California, Riverside. June, 2000.

CERTIFICATION

Member, American Board of Forensic Entomology. August 2013.

FORENSIC ENTOMOLOGY CASEWORK EXPERIENCE

- Assistance on 10 cases directed by Jeffery K Tomberlin, PhD, D-ABFE, F-AAFS (2005-2010)
- Forensic entomology cases for the Harris County Institute of Forensic Sciences:
 - 363 cases as of 9/28/2018 including scene and/or autopsy response
- Medicolegal death investigator scene response including photography, decedent examination and reporting
 - 36 scene deaths as of 9/28/2018
- Courtroom testimony
 - 3 trials as of 9/28/2018

ADJUNCT FACULTY AFFILIATIONS

University of Texas, Health and Science Center at Houston. September 2013 – Present.

WORK EXPERIENCE

Forensic Entomologist, Harris County Institute of Forensic Sciences, Houston, TX. (01/13-Present).

Forensic entomology casework and program development of forensic entomology in Harris County as the first fulltime forensic entomologist to be employed in a medical examiner's office. Typical duties include death scene and autopsy attendance, specimen collections, insect identification and staging, insect rearing, calculation of time of colonization, report writing and expert witness testimony as needed. This position includes cross training in medicolegal death investigations as well as training medical examiner's office staff in forensic entomology.

Postdoctoral Fellow, NIH-NRSA Institutional Training Grant through the Center for Vectorborne Diseases, University of California, Davis. (04/10–01/13.).

PI: G. Lanzaro

Research on the population genetics and behavior associated with mating and incipient speciation within the molecular forms of *Anopheles gambiae* s.s. using next generation sequencing, morphology and behavior; with field work in Mali and Cameroon.

Graduate Student Researcher, Department of Entomology, Texas A&M University. (09/05-03/10).

PI: J. Tomberlin

Dissertation research examining the specifics of associative learning of odors with food resources in *Culex quinquefasciatus* including temporal dynamics of memory, unconditioned stimulus strength, differences between males and females, and odor discrimination and learning. Also training and experience in forensic entomology including teaching and casework.

Fulbright Fellow, Department of Parasitology, Chiang Mai University, Thailand. (01/08-11/08).

PI: P. Somboon

Explored the learning abilities of *Anopheles cracens* and *An. minimus*, major malaria vectors in Thailand and surrounding Southeast Asia, to odors associated with a sugar-meal.

Graduate Student Researcher, Coastal Plains Experiment Station, Tifton, GA. (05/06-07/06).

PI: W. J. Lewis

Examined the learning response of *Culex quinquefasciatus* to different sugar concentrations (unconditioned stimulus strength) and odors with Dr. Glen Rains.

Laboratory Assistant (Full-time Staff), Department of Entomology, UC Riverside. (12/03-08/05).

Dual appointment:

1. Worked on developing an improved bioassay system for the evaluation of novel oviposition attractants and for the observation of the specific behaviors associated with *Culex* oviposition (PI: R. Cardé).
2. Studied the production of mosquitoes and nuisance midges within a constructed treatment wetland receiving partially treated wastewater and a sewage treatment plant works (PI: W. Walton).

Laboratory Assistant (Temporary), Department of Entomology, UC Riverside. (04/03-11/03).

PI: W. Walton

Provided technical support for field studies in mosquito ecology in relation to vegetation management and pond substrate modification in a constructed treatment wetland. Including sample collection, processing, and data entry/consolidation.

Mosquito Consultant, Santa Lucia Preserve. (05/03-10/03).

Utilized mosquito collection techniques to evaluate population trends and efficacy of controls (bacterial insecticides, vegetation management) in a privately owned community/wildlife preserve.

Graduate Student Researcher, Department of Entomology, UC Riverside. (09/00–03/03).

PI: W. Walton

Conducted research for the completion of a Master's thesis on mosquito ecology in constructed treatment wetlands. Utilizing a variety of entomological and limnological techniques including wet chemistry and water analysis techniques for bacteria and phytoplankton.

Student Assistant, Department of Entomology, UC Riverside. (07/98-09/00).

PI: W. Walton

Participated in field studies on mosquitoes in constructed wetlands, describing the immature stages and ecology of higher wetland Diptera, and conducted independent field research to learn more about mosquito ecology for the purposes of control.

TEACHING EXPERIENCE

Internship in Forensic Entomology (2015-Present).

Implementation of the first professional internship in forensic entomology in a medical examiner's office. The forensic entomology intern gains exposure to forensic investigations in the medical examiner's office as well as scene based forensic entomology experiences to allow them to understand how these parts fit together into the larger overall medicolegal death investigation. Interns gain an appreciation of applied forensic entomology casework and how it need not be limited to homicides and crime scenes. They also gain an appreciation of current limitations in the field, gaps to fill and areas for new research.

Forensic Entomology for Investigators. (2013-present).

Creation and implementation of a basic in-house training program for the Harris County Institute of Forensic Sciences to familiarize forensic investigators with insects, forensic entomology, specimen collections and the limitations of using insects in estimating time of colonization and post-mortem interval. The training was implemented for a 24-hour staff with limited time by dividing the training into six short videos of less than fifteen minutes accompanied by short quizzes and an in-house field guide.

Resident Rotation (2013-present).

Provide a basic overview of forensic entomology and its application to the mission of the medical examiner's office to medical students, residents and fellows that rotate through the Harris County Institute of Forensic Sciences on a monthly basis as part of their training.

Pathology Fellow Training (2013-present).

Creation of a one-day in-house workshop conducted on a yearly basis for pathology fellows training at the Harris County Institute of Forensic Sciences in forensic entomology, insects, specimen collections, methods of estimating time of colonization, limitations to estimating time of colonization and post-mortem interval. This includes working with insect specimens and analysis as in report analysis. The goal of this workshop is to provide fellows with knowledge to appreciate the value and limitations of insect evidence in forensic casework.

Graduate Teaching Assistant, Department of Entomology, Texas A&M University. (01/10-04/10).

Assisted in teaching Entomology 432 – Applied Forensic Entomology, an introductory laboratory in forensic entomology. Prepared laboratory and field activities and practical exams. Provided lectures on forensically important insect identification, lecture support and grading.

Graduate Teaching Assistant, Department of Entomology, Texas A&M University. (08/09-12/09).

Assisted in teaching Entomology 208 – Veterinary Entomology, a laboratory course in veterinary entomology. Taught identification of insects of veterinary importance to non-entomology majors in a laboratory setting, prepared practical exams, grading, and lab management.

Graduate Teaching Assistant, Department of Entomology, Texas A&M University. (08/09-12/09).

Assisted in teaching Forensic and Investigative Sciences 205 – Introduction to Forensic and Investigative Sciences, an introductory course required of majors in Forensic and Investigative Sciences. Managed grades for a large class, provided lecture support, and demonstration setup.

Graduate Teaching Assistant, Department of Entomology, Texas A&M University. (01/07-05/07).

Assisted in teaching Entomology 432 – Applied Forensic Entomology, an introductory laboratory in forensic entomology. Prepared laboratory and field activities and practical exams. Provided lectures on forensically important insect identification, lecture support and grading.

Graduate Teaching Assistant, Department of Entomology, Texas A&M University. (08/06-12/06).

Assisted in the teaching of Entomology 322 – Insects in Human Society, an introductory entomology course for non-majors. Record keeping related to grades and attendance for a large class, wrote and administered exams, gave review lectures, organized insect collecting field trips, and grading.

Graduate Teaching Assistant, Department of Entomology, UC Riverside. (04/02-06/02).

Assisted in the teaching Entomology – 114 Aquatic Insects, a course in aquatic insect ecology and identification. Provided support in the lab and field to entomology students in the process of completing aquatic insect collections and conducted a field project on Rapid Bio-assessment in streams.

Workshop Presentations:

Mass Fatality Incident Exercise with the HCIFS and Houston FBI-ERT on field collection and handling of forensic entomology evidence. 10/2016.

Harris County Institute of Forensic Sciences, Topics in Forensic Science Conference 2015: Anatomy of the Forensic Investigation. Presentation: To know a fly: Interpreting the forensic entomology report.

Harris County Institute of Forensic Sciences, Topics in Forensic Science Conference 2014: Investigating the Post-Mortem Interval. Presentation: Insects Used to Approximate Time Since Death.

Forensic Entomology Workshop for the Dallas, TX Police Dept., FLIES Facility, Texas A&M University, College Station, TX. Presentation: Rehydrating dried blow fly larvae to reclaim their usefulness in forensic investigations. M. R. Sanford, J. L. Pechal, and J. K. Tomberlin. (12/09).

Advanced Body Search and Recovery Workshop, San Marcos, TX, Presentation: Introduction to Insects of Forensic Importance. (03/06).

Guest Lectures:

Texas A&M University,

- *The Science of Forensic Entomology*, ENTO/FIVS 431. Forensic Entomology at the Medical Examiner's Office. **M. R. Sanford.** (03/04/2014, 02/27/2015, 03/11/2016, 3/31/2017, 02/16/2018).
- *Occupational and Professional Development*, FIVS 482, Professional Forensic Entomology. **M. R. Sanford** (12/1/2015, 11/29/2016, 11/21/2017)

University of Tennessee, Knoxville. Medical and Veterinary Entomology, EPP 525. Forensic Entomology at the Medical Examiner's Office. **M. R. Sanford** (04/22/2014, 04/11/2016, 01/23/2018).

Mount Marty College, Forensic Entomology at the Medical Examiner's Office, Zoology and Forensic Science Students. **M. R. Sanford.** (04/21/2017).

University of Tennessee, Knoxville. Entomology and Plant Pathology Department Seminar, Forensic Entomology in the Medical Examiner's Office: More than meets the eye. **M. Sanford.** (07/16/2015).

Graduate Student Committees:

- Joshua Thomas, MS student, Texas A&M University, December 2015

PUBLICATIONS (<https://orcid.org/0000-0001-6212-4023>)

Sanford, MR, M Torres and J Ross. 2018. Unexpected human fatality associated with bed bug (Hemiptera: Cimicidae) heat treatment. *Journal of Forensic Sciences*. <https://doi.org/10.1111/1556-4029.13883>

Tarone, AM and **MR Sanford**. 2017. Is PMI the Hypothesis or the Null Hypothesis? *Journal of Medical Entomology*. tjx119. doi: 10.1093/jme/tjx119.

Sanford, M. R. 2017. Insects and associated arthropods analyzed during medicolegal death investigations in Harris County, Texas, USA: January 2013 – April 2015. *PLoS One*. 12: e0179404. <https://doi.org/10.1371/journal.pone.0179404>.

- (Preprint on the biorXiv: <http://biorxiv.org/content/early/2016/09/08/071027>).

Sanford, M. R. 2017. Comparing Species Composition of Passive Trapping of Adult Flies with Larval Collections from the Body during Scene-Based Medicolegal Death Investigations. *Insects*. 8(2): 36. doi:10.3390/insects8020036.

Thomas, J. K., **M. R. Sanford**, M. Longnecker, and J. K. Tomberlin. 2016. Effects of temperature and tissue type on the development of *Megaselia scalaris* (Diptera: Phoridae). *Journal of Medical Entomology*. 53(3): 519-525. doi:10.1093/jme/tjw019.

M.L. Pimsler, C.G. Owings, **M. Sanford**, B.M. OConnor, P.D. Teel, R.M. Mohr and J.K. Tomberlin. 2016. Association of *Myianoetus muscarum* (Acari: Histiostomatidae) with *Synthesiomyia nudiseta* (Wulp) (Diptera: Muscidae) on Human Remains. *Journal of Medical Entomology*. 53(2):290-295.

Sanford, M. R., 2015. Forensic Entomology in the Medical Examiner's Office. *Academic Forensic Pathology*. 5(2): 306-317.

Sanford, M.R. 2015. Forensic entomology of decomposing humans and their decomposing pets. *Forensic Science International*. 247: e11-e17. doi:10.1016/j.forsciint.2014.11.029.

Pimsler, M. L., T. Pape, J. S. Johnston, R. A. Wharton, J. J. Parrott, D. Restuccia, **M. R. Sanford**, J. K. Tomberlin, and A. M. Tarone. 2014. Structural and genetic investigation of the egg and first-instar larva of an egg-laying population of *Blaesoxipha plinthopyga* (Diptera: Sarcophagidae), a species of forensic importance. *Journal of Medical Entomology*. <http://dx.doi.org/10.1603/ME14029>.

Sanford M. R., Cornel AJ, Nieman CC et al. 2014. *Plasmodium falciparum* infection rates for some *Anopheles* spp. from Guinea-Bissau, West Africa [v2; ref status: indexed, <http://f1000r.es/4n3>] *F1000Research*, 3:243 (doi: 10.12688/f1000research.5485.2). <http://f1000research.com/articles/3-243/v2#sthash.aYwIYEVg.dpuf>.

Sanford, M. R., T. L. Whitworth, D. R. Phatak. 2014. Human Wound Colonization by *Lucilia eximia* and *Chrysomya rufifacies* (Diptera: Calliphoridae). Myiasis, Perimortem or Postmortem Colonization? *Journal of Medical Entomology*. 51(3): 716-719.

Chaiwong, T., T. Srivoramas, P. Sueabsamran, K. Sukontason, **M. R. Sanford**, and K. L. Sukontason. 2014. The blow fly, *Chrysomya megacephala*, and the house fly, *Musca domestica*, as mechanical vectors of pathogenic bacteria in Northeast Thailand. *Tropical Biomedicine*. 31(2): 336-346.

Sanford, M. R., S. Ramsay, A. J. Cornel, C. D Marsden, L. C Norris, S. Patchoke, E. Fondjo, G. C. Lanzaro, Y. Lee. 2013. A preliminary investigation of the relationship between water quality and *Anopheles gambiae* larval habitats in western Cameroon. *Malaria Journal*. 12: 225. doi:10.1186/1475-2875-12-225.

Marsden, C. D., A. Cornel, Y. Lee, **M. R. Sanford**, , L. C. Norris, P. B. Goodell, C. C. Nieman, S. Han, A. Rodrigues, J. Denis, A. Ouledi, and G. C. Lanzaro. 2013. An analysis of two island groups as potential sites for trials of transgenic mosquitoes for malaria control. *Evolutionary Applications*. doi: 10.1111/eva.12056.

- Lee, Y., T C. Collier, **M. R. Sanford**, C. D. Marsden, A. Fofana, A. J. Cornel and G. C. Lanzaro. 2013. Chromosome inversions, genomic differentiation and speciation in the African malaria mosquito *Anopheles gambiae*. *PLOS One* 8(3): e57887. doi: 10.1371/journal.pone.0057887.
- Sanford, M. R.**, W. J. Lewis, and J. K. Tomberlin. 2012. The effects of sucrose concentration on appetitive olfactory-based associative learning in *Culex quinquefasciatus* Say. *Journal of Insect Behavior*. doi: 10.1007/s10905-012-9368-y.
- Chaiwong, T., T. Srivoramas, K. Sukontason, **M. R. Sanford**, K. Moophayak, and K. L. Sukontason. 2012. Survey of the synanthropic flies associated with human habitations in Ubon Ratchathani Province of Northeast Thailand. *Journal of Parasitology Research*. doi: 10.1155/2012/613132.
- Sanford, M. R.**, B. Demirci, C. D. Marsden, Y. Lee, A. J. Cornel, and G. C. Lanzaro. 2011. Morphological differentiation may mediate mate-choice between incipient species of *Anopheles gambiae* s.s.. *PLoS ONE*. 6(11): e27920. doi: 10.1371/journal.pone.0027920.
- Marsden, C. Lee, Y., Neimen, C., **Sanford, M.**, Dinis, J., Martins, C., Rodrigues, A., Cornel, A. Lanzaro, G. 2011. Asymmetric introgression between incipient species of the malaria vector, *Anopheles gambiae*, maintains divergence despite extensive hybridization. *Molecular Ecology*. 20(23):4983-94. doi: 10.1111/j.1365-294X.2011.05339.x.
- Sanford, M. R.** and J. K. Tomberlin. 2011. Conditioning Individual Mosquitoes to an Odor: Sex, Source, and Time. *PLoS ONE* 6(8): e24218. doi:10.1371/journal.pone.0024218.
- Sukontason, K. L., T. Chaiwong, U. Chaisri, H. Kurahashi, **M. Sanford** and K. Sukontason. 2011. Reproductive organ of the blow fly, *Chrysomya megacephala* (Diptera: Calliphoridae): Ultrastructural of testis. *Journal of Parasitology Research*. doi:10.1155/2011/690863.
- Chaiwong, T., K. L. Sukontason, U. Chaisri, H. Kurahashi, **M. Sanford** and K. Sukontason. 2011. Effects of human contraceptive on reproduction and offspring in *Chrysomya megacephala*. *Asian Pacific Journal of Tropical Medicine*. 4(4): 259-265.
- Sanford, M. R.**, J. L. Pechal, and J. K. Tomberlin. 2011. Rehydration of forensically important larval Diptera specimens. *Journal of Medical Entomology*. 48(1): 118-125.
- Sanford, M.**, M. Flores, L. Holmes, L. Zheng, C. Fellows, and J. Tomberlin. 2010. Observations on the Oriental Latrine Fly, *Chrysomya megacephala*, in the McFaddin National Wildlife Refuge, Sabine Pass, Texas, USA. *Southwestern Entomologist*. 35(1): 109-111.
- Liu, Q., J.K. Tomberlin, J. Brady, **M.R. Sanford**, and Z. Yu. 2008. Black soldier fly (Diptera: Stratiomyidae) larvae reduce *Escherichia coli* in dairy manure. *Environmental Entomology*. 37(6): 1525-1530.
- Tomberlin, J. K., G. C. Rains, and **M. R. Sanford**. 2008. Development of *Microplitis croceipes* as a biological sensor. *Entomologia Experimentalis et Applicata*. 128: 249-257.
- Tomberlin, J. K., G.C. Rains, S. A. Allan, **M. R. Sanford**, and W. J. Lewis. 2006. Associative learning of odor with food or blood-meal by *Culex quinquefasciatus* Say (Diptera: Culicidae). *Naturwissenschaften*. 93: 551-556.
- Sanford, M. R.**, K. Chan, and W. E. Walton. 2005. Effects of inorganic nitrogen enrichment on mosquitoes (Diptera: Culicidae) and the associated aquatic community in constructed treatment wetlands. *Journal of Medical Entomology*. 42(5): 766-776.
- Sanford, M. R.** and W. E. Walton. 2004. New collection record for *Uranotaenia anhydor* Dyar in southern California. *Journal of the American Mosquito Control Association*. 20(1): 85-86.
- Sanford, M. R.**, J. B. Keiper, and W. E. Walton. 2003. The impact of wetland vegetation drying time on abundance of mosquitoes and other invertebrates. *Journal of the American Mosquito Control Association*. 19(4):361-366.
- Keiper, J. B., D. L. Deonier, J. Jiannino, **M. Sanford**, and W. E. Walton. 2002. Biology, immature stages, and redescription of *Hydrellia personata* Deonier (Diptera: Ephydriidae), a *Lemna* miner. *Proceedings of the Entomological Society of Washington*. 104: 458-467.
- Keiper, J. B., J. Jiannino, **M. Sanford**, and W. E. Walton. 2001. Biology and immature stages of *Typopsilopa nigra* (Williston) (Diptera: Ephydriidae), a secondary consumer of damaged stems of wetland monocots. *Proceedings of the Entomological Society of Washington*. 103: 89-97.

Keiper, J. B., **M. Sanford**, J. Jiannino, and W. E. Walton. 2000. Invertebrates inhabiting wetland monocots damaged by Lepidoptera. *Entomological News*. 111: 348-354.

PROCEEDINGS

Popko, D. A., **M. R. Sanford** and W. E. Walton. 2009. The influence of water quality and vegetation on mosquitofish in mosquito control programs in wastewater wetlands. *Proceedings of the Mosquito and Vector Control Association of California*. 77: 230-237.

Sanford, M.R., J.L. Pechal, and J.K. Tomberlin. 2009. Rehydrating dried blow fly larvae to reclaim their usefulness in forensic investigations. *Proceedings of the American Academy of Forensic Sciences*. 15: 269.

Sanford, M. R. and W. E. Walton. 2002. The effect of ammonium nitrogen addition on *Culex tarsalis* in constructed treatment wetlands. Mosquito Control Research Annual Report 2002. *University of California Division of Agriculture and Natural Resources*. (<http://www.ucmrp.ucdavis.edu/publications/ucmrpannualreport2002.pdf>)

Keiper, J. B., J. A. Jiannino, **M. R. Sanford** and W. E. Walton. 2002. Effect of vegetation management on the abundance of mosquitoes at a constructed treatment wetland in southern California. *Proceedings of the Mosquito and Vector Control Association of California*. 70:35-43.

Walton, W. E., J. B. Keiper, J. A. Jiannino, and **M. R. Sanford**. 2000. Effects of nitrogen composition on mosquito populations in constructed treatment wetlands. Mosquito Control Research Annual Report 2000. *University of California Division of Agriculture and Natural Resources*. pp. 54-56.

EXTENSION PUBLICATIONS

Sanford, M. R. and J. K. Tomberlin. Preventing West Nile infection in horses. EEE-00033. 2006. Texas Cooperative Extension. Texas A&M University.

BOOK CHAPTERS

Wiersema J, M Pierce, A Woody and **M Sanford**. Evidence Management Best Practices in Medicolegal Death Investigation. In Mozayani, A and Parish-Fisher, C. (eds.), *Forensic Evidence Management: From Crime Scene to the Courtroom*. CRC Press, Boca Raton, FL.

Sanford, M. R., J. K. Tomberlin, and S. L. VanLaerhoven. 2015. Behavioral Ecology and Forensic Entomology. In Tomberlin, J.K., Benbow, M.E. (eds.), *Forensic Entomology: International Dimensions and Frontiers*. CRC Press, Boca Raton, FL.

Tomberlin, J. K., **M. R. Sanford**, M. L. Pimsler, and S. L. VanLaerhoven. 2015. Vertebrate Carrion as a Model for Conducting Behavior Research. In: Benbow, M. E., Tomberlin, J. K. and Tarone, A. M. (eds.), *Carrion Ecology, Evolution, and Their Applications*. CRC Press, Boca Raton, FL.

Tomberlin, J. K., and **M. R. Sanford**. 2012. Forensic Entomology and Wildlife, pp. 81–107. In Huffman, J.E., Wallace, J.R. (eds.), *Wildlife Forensics: Methods and Applications*. Wiley-Blackwell, West Sussex, UK.

Pending:

Sanford, M. R. and A. M. Tarone. 2018. Chapter 11: Is PMI the Hypothesis or the Null Hypothesis? In: *Forensic Entomology: The Utility of Arthropods in Legal Investigations, 3rd Edition*. (eds.) J. H. Byrd and J. K. Tomberlin. In preparation. CRC Press, Boca Raton, FL.

Sanford, M. R., J. H. Byrd, J. K. Tomberlin and J. Wallace. 2018. Chapter 3: Collection of Entomological Evidence During Death Investigations. In: *Forensic Entomology: The Utility of Arthropods in Legal Investigations, 3rd Edition*. (eds.) J. H. Byrd and J. K. Tomberlin. In preparation. CRC Press, Boca Raton, FL.

Wiersema, J., A. Woody and **M. Sanford**. Forensic Taphonomy of Bayou Fatalities in Harris County, Texas. In: *Forensic Taphonomy: The Postmortem Fate of Human Remains, 2nd Edition*. (eds.) W. D. Hagland and M. H. Sorg. In preparation. CRC Press, Boca Raton, FL.

PRESENTATIONS

Invited:

North American Forensic Entomology Association, Orlando, Florida 2018: Keynote: The Certainty of Uncertainty. **M. R. Sanford**.

International Congress of Entomology, Orlando, Florida, September 2016. The problem of temperature in forensic entomology casework. **M. R. Sanford**.

Entomological Society of America Annual Meeting, Portland, Oregon, November 2014. Dealing with uncertainty in forensic entomology casework. **M. R. Sanford**.

Entomological Society of America Annual Meeting, Austin, Texas, November 2013. Forensic Entomology in the Medical Examiner's Office. **M. R. Sanford**.

Entomological Society of America Annual Meeting, Austin, Texas, November 2013. From training mosquitoes to decomposing bodies: An unexpected journey. **M. R. Sanford**.

Entomological Society of America Annual Meeting, Reno, Nevada, November 2011. Using next generation sequencing to examine genetic differentiation in *Anopheles gambiae* s.s. **M. R. Sanford**, Y. Lee, C. D. Marsden, A. J. Cornel and G. C. Lanzaro.

Entomological Society of America Annual Meeting, San Diego, California, December 2010. Factors important to mosquito memory of odors associated with a sugar-meal. **M. R. Sanford**, J. K. Olson, and J. K. Tomberlin.

Entomological Society of America Annual Meeting, San Diego, California, December 2010. Non-consumptive effects and experience with mosquito-fish on mosquito larval development and adult oviposition site selection. **M. R. Sanford**, M. M. Johnsen, J. K. Olson, and J. K. Tomberlin.

Society of Vector Ecology Annual Meeting, Antalya, Turkey, October 2009. Appetitive olfactory-based associative learning in *Culex quinquefasciatus*: How long does a mosquito remember? **M. R. Sanford**, J. K. Tomberlin, and J. K. Olson.

Huazhong Agricultural University, Wuhan, China, June 2009. Waste water treatment with constructed treatment wetlands, balancing environmental quality and public health. **M. R. Sanford**, J. K. Tomberlin, and W. E. Walton.

Seminar in Parasitology, Department of Parasitology, Chiang Mai University, Chiang Mai, Thailand, October 2008. Olfactory learning by malaria vectors in Thailand. **M. R. Sanford**, P. Somboon, J. K. Tomberlin, and J. K. Olson.

Entomology Science Conference, Department of Entomology, Texas A&M University, October 2006. The effect of unconditioned stimulus strength on associative learning in the southern house mosquito, *Culex quinquefasciatus* (Diptera: Culicidae). **M. R. Sanford**, J. K. Tomberlin, and J. K. Olson.

Submitted:

North American Forensic Entomology Association, July 2018. Extreme Weather and Forensic Entomology in Harris County, TX. **M. R. Sanford**

North America Forensic Entomology Association, July 2018. Some Adventures from the Scene. **M. R. Sanford**.

American Academy of Forensic Sciences, New Orleans, Louisiana, February 2017. Myiasis and Death: Factors and Complications Related to Estimating Time of Colonization after Antemortem Fly Colonization Followed by Death. **M. R. Sanford**, D. R. Phatak, A. John, and M. Condron.

North American Forensic Entomology Association: Forensic Entomology in Harris County, Texas. Annual Meeting, September 2016, Orlando, FL. **M. R. Sanford**.

American Academy of Forensic Sciences, Indoor vs. Outdoor Forensic Entomology: Exploring the Differences, Challenges, and Opportunities of Indoor Scenes. Annual Meeting. Las Vegas, NV. 2016. **M. R. Sanford**.

American Academy of Forensic Sciences, Factors related to temperature from scene to autopsy: Implications for Forensic Entomology. Annual Meeting, Orlando, FL, February 2015. **M. R. Sanford**.

American Academy of Forensic Sciences, Annual Meeting, Seattle, WA, February 2014. Forensic Entomology at the Harris County Institute of Forensic Sciences. **M. R. Sanford**.

North American Forensic Entomology Association Annual Meeting, Dayton, OH, July 2013. The importance of scene attendance by the forensic entomologist. **M.R. Sanford**.

Entomological Society of America Annual Meeting, Knoxville, TN, November 2012. Examining the population structure of *Anopheles gambiae* s.s. in west Africa using RAD-Seq. **M. R. Sanford**, Y. Lee, A. Fofana, C. D. Marsden, A. J. Cornel and G. C. Lanzaro.

North American Forensic Entomology Association Annual Meeting, Las Vegas, NV, July 2012. Assessing differential

attraction of blow fly sexes and mating status at single tissue baits versus whole carcasses. **M. R. Sanford**, G. C. Lanzaro, and J. K. Tomberlin.

American Society for Tropical Medicine and Hygiene Annual Meeting, Philadelphia, PA, December 2011. Wing size differentiation between the incipient species of *Anopheles gambiae* s.s. and its potential role in assortative mating. **M. R. Sanford**, B. Demirci, Y. Lee, C. D. Marsden, A. J. Cornel and G. C. Lanzaro.

North American Forensic Entomology Association Annual Meeting, College Station, TX, July 2011. Studying sympatric speciation in non-model organisms: Applying methods of study in *Anopheles gambiae* s.s. to flies of forensic importance. **M. R. Sanford**, Y. Lee, C. D. Marsden, A. J. Cornel and G. C. Lanzaro.

World Malaria Day, Davis, CA, April 2011. Using wing morphology to distinguish the M and S molecular forms of *Anopheles gambiae* s.s. in West Africa. **M. R. Sanford**, B. Demirci, Y. Lee, C. D. Marsden, A. J. Cornel and G. C. Lanzaro.

Entomological Society of America Annual Meeting, Indianapolis, IN, December 2009. The temporal dynamics of appetitive olfactory-based associative learning in *Culex quinquefasciatus* Say. **M. R. Sanford**, J. K. Tomberlin, and J. K. Olson.

North American Forensic Entomology Association Annual Meeting, Miami, FL, July 2009. Non-consumptive effects of *Chrysomya rufifacies* (Macquart) on *Chrysomya megacephala* (Fabricius) in native and expanding habitat distributions. **M. R. Sanford**, J. K. Tomberlin, T. Klongklaew, K. Moophayak and K. L. Sukontason.

American Academy of Forensic Sciences Annual Meeting, Denver CO, February 2009. Rehydrating dried blow fly larvae to reclaim their usefulness in forensic investigations. **M. R. Sanford**, J. L. Pechal, and J. K. Tomberlin.

Louisiana Mosquito Control Association and Texas Mosquito Control South Central Conference, Lake Charles, LA, December 2008. Olfactory conditioning of malaria vectors in Thailand: can *Anopheles* learn odors associated with a sugar-meal? **M. R. Sanford**, P. Somboon, J. K. Tomberlin, and J. K. Olson.

Entomological Society of America Annual Meeting, Reno, NV, November 2008. Olfactory conditioning of *Anopheles dirus* (Peyton & Harrison 1979) (Diptera: Culicidae) to a sugar-meal. **M. R. Sanford**, Pradya Somboon, J. K. Tomberlin, and J. K. Olson.

Royal Golden Jubilee Seminar Series XLVIII, *Medical Science: Assembling lines of researches*, The Royal Golden Jubilee Ph.D. Programme, Hosted by the Department of Parasitology, Chiang Mai University, Chiang Mai, Thailand, February 2008. Do female mosquitoes make oviposition decisions based on larval experience? **M. R. Sanford**, M. M. Johnsen, J. K. Olson, J. K. Tomberlin.

Texas Mosquito Control Association Annual Meeting, South Padre Island, TX, October, 2007. Do female mosquitoes make oviposition decisions based on larval experience with mosquitofish? **M. R. Sanford**, J. K. Olson, T.J. DeWitt, and J. K. Tomberlin.

Southwestern Branch of the Entomological Society of America, Corpus Christi, TX, February, 2007. Mosquito oviposition: Does larval experience with predators influence adult oviposition decisions? A preliminary study. **Michelle Sanford**, J. Olson, T. DeWitt, and J. Tomberlin.

Entomological Society of America Annual Meeting, Indianapolis, IN, December 2006. The effect of unconditioned stimulus strength on associative learning in the southern house mosquito, *Culex quinquefasciatus* (Diptera: Culicidae). **M. R. Sanford**, J. K. Tomberlin, and J. K. Olson.

Texas Mosquito Control Association Annual Meeting, Wichita Falls, TX, October 2006. The effect of unconditioned stimulus strength on associative learning in the southern house mosquito, *Culex quinquefasciatus* (Diptera: Culicidae). **M. R. Sanford**, J. K. Tomberlin, and J. K. Olson.

Entomological Society of America Annual Meeting, Salt Lake City, UT, November 2004. Mosquito production from highly eutrophic constructed treatment wetlands. **M. R. Sanford** and W. E. Walton.

Entomological Society of America Annual Meeting, Cincinnati, OH, October 2003. The effects of nitrogen enrichment on mosquitoes in a constructed treatment wetland. **M. R. Sanford**, J. Jiannino, K. Chan, and W. E. Walton.

Mosquito and Vector Control Association of California Annual Meeting, Palm Springs, CA, January 2003. The relationship of drying period for harvested wetland vegetation to mosquito abundance. **M. R. Sanford**, J. B. Keiper, J. Jiannino, and W. E. Walton.

Posters:

Southwestern Branch of the Entomological Society of America, Austin, TX, February 2006. Observations on the distribution and abundance of *Chironomus calligraphus* Goeldi (Diptera: Chironomidae) in an activated sludge sewage treatment plant. **M. R. Sanford** and W. E. Walton.

Pacific Branch of the Entomological Society of America, South Lake Tahoe, CA. June 2002. Constructed treatment wetlands vegetation management impacts on mosquito abundance. **M. R. Sanford**, J. B. Keiper, J. Jiannino, and W. E. Walton.

FUNDING

- Acorn grant from the Forensic Sciences Foundation of the American Academy of Forensic Sciences for \$471.89: Indoor forensic entomology: Does the nearest weather station accurately represent the scene?

HONORS & AWARDS

- Association of Former Students, Texas A&M University, Outstanding Achievement in Doctoral Research Award. (2010).
- Election to Sigma Xi as a student member. (2009).
- John Henry Comstock Award, Southwestern Branch of the Entomological Society of America. (2009).
- Outstanding PhD Student, Department of Entomology, Texas A&M University. (2008).
- Outstanding Presentation, Royal Golden Jubilee Seminar Series XLVIII, *Medical Science: Assembling lines of researches*, The Royal Golden Jubilee Ph.D. Programme, Chiang Mai, Thailand. (2008).
- U. S. Fulbright Fellowship (Thailand), *Associative Learning Behavior of Malaria Vectors in Northern Thailand*. Department of Parasitology, Faculty of Medicine, Chiang Mai University, Chiang Mai, Thailand. (2007-2008).
- Third Place, Ph. D. Oral presentation competition. Southwestern Branch of the Entomological Society of America Annual Meeting, Corpus Christi, TX. (2007).
- Gamma Sigma Delta Honor Society of Agriculture. (2006).
- The Honor Society of Phi Kappa Phi. (2006).
- Regents Fellowship, Texas A&M University. (2005-2006).
- James Gus Foyle Memorial Scholarship, Texas Mosquito Control Association. (2005).
- Chancellor's Distinguished Fellowship, UC Riverside. (2000-2002).
- University of California Statewide Mosquito Research Program Student Mini-grant for: *Nitrogen Loading and Mosquito Development in a Constructed Wetland*. \$1000. (2001).

PROFESSIONAL MEMBERSHIPS

- American Academy of Forensic Sciences (Trainee Affiliate 2013; Associate Member 2015, Member 2017)
- North American Forensic Entomology Association
- Entomological Society of America

PROFESSIONAL SERVICE

Interim Secretary North American Forensic Entomology Association (2017 –2018)

Co-Organizer for the Symposium “**Forensic Entomology Without Borders: Uniting the Worldwide Forensic Entomology Community**”. Organizers: Michelle Sanford, Adrienne Brundage, Meaghan Pimsler and Charity Owings. Accepted for the International Congress of Entomology in Orlando, FL, 2016.

Organizer for the symposium “World Malaria Day at UC Davis 2012”. UC Davis.

Co-organizer for the symposium “Cost-effective Alternatives to Traditional Sequencing: Applying Next Generation Molecular Technologies to Medical and Veterinary Entomology” at the Entomological Society of America Annual meeting in Reno, NV, 2011.

Co-organizer for the symposium: “World Malaria Day at UC Davis”. UC Davis, CA, 2011.

External Peer Reviewer for National Institutes of Justice Technical Report, 2014.

Subject Reviewer for the Annals of the Entomological Society of America, Journal of Medical Entomology, Journal of Insect Behavior, Journal of Vector Ecology, Journal of Molecular Epidemiology and Evolutionary Genetics of Infectious Diseases, Forensic Science International, Journal of Insect Behavior, Insects, Journal of Forensic Sciences and PLOS ONE. (publons.com/a/391208/)

Student Representative for the departmental search committee for the position of entomologist at the Texas AgriLife Research and Extension Center in Corpus Christi, TX, 2009

Secretary of the Entomology Graduate Student Organization, Texas A&M University. (2006-2007).

Secretary of the Entomology Graduate Student Association, UC Riverside. (2002-2003).

Instructional and Student Affairs Committee student representative for the Entomology Graduate Student Association at UC Riverside. (2001-2002).

SPECIALIZED TRAINING

Forensic Botany Workshop, North American Forensic Entomology Association Annual Meeting, 23 July 2018.

Accumulated Degree Days Workshop, North American Forensic Entomology Association Annual Meeting, 23 July 2018.

Courtroom Testimony Training, Harris County District Attorney’s Office, 16 July 2018

Mass Fatality Incident Exercise with the Houston FBI-Evidence Recovery Team, FBI-Conroe Firing Range, 3-4 October 2016.

“When the gavel falls...” one day symposium on forensic science and the law. Houston Forensic Science Center. 17 September 2015.

Death Investigation (online), Texas A&M University Engineering and Extension Service (TEEX), Forensic Science Academy. Completed: 31 July 2014.

Participation in the first HCIFS Mass Fatality Morgue Operations Exercise, 17 June 2014.

Hands-on Data Mining Training, Salford Systems. 20 June 2014. An introduction to predictive modeling.

Texas Department of Public Safety, Online TCIC Criminal Justice Practitioner Training, 30 July 2013.

FEMA Emergency Management Institute ICS-100 Introduction to Incident Command System, IS-00100.b. July 2013.

FEMA Emergency Management Institute IS-00200.b, IS-00700.a, and IS-00800.b. July 2013.

Insect Chemical Ecology short course 2010, Penn State University. 1 June – 15 June 2010. Course on the specialized techniques and experimental design required to identify behaviorally active chemical compounds in arthropods.

“The Craft of Grant Writing” 17 March 2007, Texas A&M University, Office of Proposal Development. A one day grant writing course.

COMMUNITY SERVICE/OUTREACH

- Prairie View A&M University, REAP (Research Extension Apprentice Program) 2018, Presentation: Forensic Entomology as a career. (06/2018)
- Missing in Harris County Day, (2016, 2018) – Event support and NamUs entry
- Carter Lomax Middle School, Career Day, Pasadena, TX. Presentation: Entomology as a career. (2013, 2014, 2015, 2016, 2017, 2018).
- Forensic Science Career Day at the Institute of Forensic Sciences, Harris County Institute of Forensic Sciences, Houston, TX, Presentation: Forensic Entomology. (8/2016, 12/2017).

- Houston Project GRAD, M. D. Anderson Cancer Center/UT Health Science Center, Graduate School of Biomedical Sciences, Houston, TX, Presentation: Forensic Entomology. (07/15).
- Rotary International Club of Winters, CA. Presentation: Insect Learning. (04/11).
- Youth Adventure Program 2009 in Forensic Entomology, Texas A&M University, College Station, TX. Presentation: Introduction to Forensic Entomology. (08/09).
- Volunteer Water Quality Monitor, Santa Ana River Citizens Water Monitoring Project.
Worked on a team of volunteers to monitor water quality parameters in areas of the Santa Ana River watershed in Riverside County, CA using probes and water samples as well as macroinvertebrate collection using state of California Rapid Bioassessment protocols. (04/03-11/04).