

Byron N. Van Nest

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Education:

PhD, Neuroscience, 2016

Neuroscience Graduate Program, Wake Forest School of Medicine, Winston-Salem, NC
Dissertation: “The adaptive benefits of adult structural plasticity in the mushroom bodies of freely behaving forager honey bees”

Advisory committee: Susan E. Fahrbach (mentor), Carol Milligan (committee chair), Wayne Silver, Glen S. Marris, Sarah Farris

Neural Systems and Behavior summer course, 2015

Marine Biological Laboratory, Woods Hole, MA

MS, Biology, 2010

Department of Biological Sciences, East Tennessee State University, Johnson City, TN
Thesis: “Time-memory behavior yields energetically optimal foraging strategy in honey bees”
Advisory committee: Darrell Moore (mentor and committee chair), Thomas C. Jones, Edith Seier

BS, *cum laude*, Information and Computer Sciences (Artificial Intelligence), 1999

University of California, Irvine.

Mentor: Richard Granger

Refereed Articles:

Van Nest BN. 2018. The olfactory proboscis extension response in the honey bee: a laboratory exercise in classical conditioning. *J Undergrad Neurosci Educ* 16: A168–76.

Van Nest BN, Wagner AE, Marris GS, Fahrbach SE. 2017. Volume and density of microglomeruli in the honey bee mushroom bodies do not predict performance on a foraging task. *Dev Neurobiol* 77: 1057–71.

Fahrbach SE, **Van Nest BN.** 2016. Synapsin-based approaches to brain plasticity in adult social insects. *Curr Opin Insect Sci* 18: 27–34.

Van Nest BN, Wagner AE, Hobbs CN*, Moore D. 2016. Dance floor clustering: food-anticipatory behavior in persistent and reticent honey bee foragers. *Behav Ecol Sociobiol* 70: 1962–73.

Wagner AE, **Van Nest BN, Hobbs CN*, Moore D.** 2013. Persistence, reticence, and the management of multiple time memories by forager honey bees. *J Exp Biol* 216: 1131–41.

Edge AA, **Van Nest BN, Johnson JN, Miller SN, Naeger N, Boyd SD, Moore D.** 2012. Diel nectar secretion rhythms in squash (*Cucurbita pepo*): influences on honey bee (*Apis mellifera*) foraging behavior. *Apidologie* 43: 1–16.

Van Nest BN, Moore D. 2012. Energetically optimal foraging strategy is emergent property of time-keeping behavior in honey bees. *Behav Ecol* 23: 649–58.

Moore D, **Van Nest BN, Seier E.** 2011. Diminishing returns: the influence of experience and environment on time-memory extinction in honey bee foragers. *J Comp Physiol A* 197: 641–51.

Naeger N, **Van Nest BN, Johnson JN, Boyd SD, Southey BR, Rodriguez-Zas SL, Moore D, Robinson GE.** 2011. Neurogenomic signatures of spatiotemporal memories in time-trained forager honey bees. *J Exp Biol* 214: 979–87.

(*Mentored undergraduate student.)

Articles in Preparation:

- Moore D, **Van Nest BN**. Honey bee foraging: fighting the dogma (a review).
- Van Nest BN**, Edge AA, Feathers M, Moore D. Assessment of a classical bird-pollination syndrome: evidence for bees as pollinators to *Campsis radicans* (Bignoniaceae).
- Van Nest BN**, Otto MW, Moore D. High experience levels delay recruitment but promote simultaneous time-memories in honey bee foragers. [IN REVIEW]
- Wagner AE, **Van Nest BN**, Corrigan C, Seier E, Joyner ML, Moore D. Comparing location and clustering patterns of persistent and reticent foragers at the dance floor in the honey bee.

Other Publications:

- Johnson D, **Van Nest BN**, Jones TC. 2009. Population genetics II. In: Van Nest BN (ed). Biology for Science Majors Laboratory III. Reno: Bent Tree Press. pp. 41–8.
- Van Nest BN** (ed). 2009. Biology for Science Majors Laboratory III. East Tennessee State University. Reno: Bent Tree Press.
- Van Nest BN**, Jones TC. 2009. Island biodiversity. In: Van Nest BN (ed). Biology for Science Majors Laboratory III. Reno: Bent Tree Press. pp. 93–104.
- Van Nest BN**, Jones TC, Laughlin T. 2009. Review of data analysis. In: Van Nest BN (ed). Biology for Science Majors Laboratory III. Reno: Bent Tree Press. pp. 11–30.
- Komsuoğlu H, **Van Nest BN**. 2000. MS-0 hardware reference manual (revision 0). Ann Arbor: University of Michigan. Technical Report.

Talks:

- Van Nest BN** (presenter), Wagner AE, Marrs GS, Fahrbach SE. 2017. Microglomerular density in the honey bee mushroom bodies does not predict performance on a visual learning task. *Invited talk*. Sandoz Lab, Laboratoire Evolution, Génomes Comportement, Ecologie, CNRS, Université Paris Sud, France.
- Fahrbach SE (presenter), **Van Nest BN**. 2016. Does brain plasticity enhance foraging performance in honey bees? Neural and Behavioral Plasticity in Insects satellite meeting, International Congress of Neuroethology, Montevideo, Uruguay.
- Fraser A* (presenter), **Van Nest BN**, Fahrbach SE. 2015. Who's your daddy? Does patriline determination reveal a genetic correlation in honey bee field behavior? Southern Appalachian Honeybee Research Consortium, Annual Symposium, Virginia Polytechnic Institute and State University, Blacksburg, VA.
- Golub I* (presenter), **Van Nest BN**, Fahrbach SE. 2014. Effects of age and foraging experience on *Apis mellifera* wings. Southern Appalachian Honeybee Research Consortium, Annual Symposium, North Carolina State University, Raleigh, NC.
- Van Nest BN** (presenter), Fahrbach SE. 2014. Using a fluorescent marker to correlate synaptic organization in honey bee brains with performance on a field 'IQ test'. Center for Molecular Communication and Signaling, Fall Retreat, Wake Forest University, Winston-Salem, NC.
- Van Nest BN** (presenter), Marrs, GS, Fahrbach SE. 2014. Synaptic correlates of performance on an ecologically relevant visual discrimination task in the adult honey bee mushroom body. *Invited talk*, International Congress of Neuroethology, Sapporo, Hokkaido, Japan.
- Van Nest BN** (presenter), Fahrbach SE. 2013. A synaptic view of neural plasticity in the adult honey bee brain. North Carolina Honey Bee Research Consortium, Annual Symposium, Wake Forest University, Winston-Salem, NC.

- Van Nest BN** (presenter), Velarde RA, Fahrbach SE. 2012. Quantitative studies of *E75* mRNA abundance in whole adult honey bee brains using qRT-PCR. North Carolina Honey Bee Research Consortium, Annual Symposium, University of North Carolina, Charlotte, NC.
- Van Nest BN** (presenter), Wagner AE, Hobbs CN*, Moore D. 2011. Persistent and reticent foragers: dance floor clustering. North Carolina Honey Bee Research Consortium, Annual Symposium, East Tennessee State University, Gray Fossil Site and Natural History Museum, Gray, TN.
- Naeger NL (presenter), **Van Nest BN**, Johnson JN, Boyd SD, Rodriguez-Zas SL, Moore D, Robinson GE. 2010. When only an -omic will do: analyzing the complex composite phenotype of “appointment keeping” in honey bees. Entomological Society of America, North Central Branch, Annual Meeting, Louisville, KY.
- Van Nest BN** (presenter), Seier E, Moore D. 2010. Time-memory behavior yields energetically optimal foraging strategy in honey bees. North Carolina Honey Bee Research Consortium, Annual Symposium, University of North Carolina, Greensboro, NC.
- Edge AA (presenter), **Van Nest BN**, Johnson JN, Moore D. 2009. Pollination biology of *Campsis radicans* (Bignoniaceae). The Joint Annual Meeting of Botany and Mycology, Snowbird, UT.
- Van Nest BN** (presenter), Moore D. 2008. Persistent and reticent foraging strategies: Energy optimization in honey bee (*Apis mellifera*) nectar foraging. Entomological Society of America Annual Meeting, Reno, NV.
- (*Mentored undergraduate student.)

Posters:

- Van Nest BN**, Otto MW, Moore D. 2018. Effects of circadian time-memory on foraging recruitment in honey bees. Society for Integrative and Comparative Biology Annual Meeting, San Francisco, CA.
- Van Nest BN**, Nelson KJ, Fahrbach SE. 2017. Is insulin the allatotropin in adult honey bee workers? Gordon Research Conference on Neuroethology: Neural, Behavioral, and Evolutionary Strategies for Animal Survival, Les Diablerets, Switzerland.
- Van Nest BN**, Marrs GS, Fahrbach SE. 2016. Synaptic organization in the honey bee mushroom body calyces does not predict performance on a challenging, ecologically relevant, visual learning task. International Congress of Neuroethology, Montevideo, Uruguay.
- Van Nest BN**, Marrs GS, Fahrbach SE. 2014. Synaptic correlates of performance on an ecologically relevant visual discrimination task in the adult honey bee mushroom body. Society for Neuroscience Annual Meeting, Washington, DC.
- Wagner AE, **Van Nest BN**, White A, Yost R, Corrigan C, Seier E, Joyner ML, Moore D. 2012. Comparing location and clustering patterns of persistent and reticent foragers at the dance floor in the honey bee, *Apis mellifera*. Entomological Society of America, Annual Meeting, Knoxville, TN.
- Wagner AE, **Van Nest BN**, Hobbs CN*, Harper C, Moore D. 2011. Time-keeping dynamics: Experience determines persistent and reticent foraging behavior in honey bees. Society for Neuroscience Annual Meeting, Washington, DC.
- Van Nest BN**, Wagner AE, Hobbs CN*, Moore D. 2010. Time-memory expression in honey bees: Influence of foraging experience. Society for Neuroscience Annual Meeting, San Diego, CA.
- Wagner AE, **Van Nest BN**, Hobbs CN*, Moore D. 2010. Time-memory expression in honey bees: Dance Floor Correlates. Society for Neuroscience Annual Meeting, San Diego, CA.
- Naeger NL, **Van Nest BN**, Johnson JN, Boyd SD, Rodriguez-Zas SL, Moore D, Robinson GE. 2009. Appointment keeping: Microarray analysis of time-trained honey bees. Society for Neuroscience Annual Meeting, Chicago, IL.

- Naeger N, **Van Nest BN**, Johnson JN, Boyd SD, Rodriguez-Zas S, Moore D, Robinson GE. 2009. Microarray analysis of time-trained honey bees: insights into forager time-keeping mechanisms. Entomological Society of America, Annual Meeting, Indianapolis, IN.
- Van Nest BN**, Moore D. 2009. Energetically optimal foraging strategy is emergent property of time-keeping behavior in honey bee foragers. Society for Neuroscience Annual Meeting, Chicago, IL.
- Boyd S, Edge A, Johnson JN, **Van Nest BN**, Moore D. 2008. Investigating nectar rhythms in squash (*Cucurbita pepo*): Effects on honey bee (*Apis mellifera*) foraging behavior. Entomological Society of America, Annual Meeting, Reno, NV.

(*Mentored undergraduate student.)

Courses Taught:

- BIO 114L: Comparative Physiology Laboratory. Department of Biology, Wake Forest University, Winston-Salem, NC, Spring 2013, Summer 2016*.
- BIO 352: Developmental Neuroscience (*with SE Fahrback*). Department of Biology, Wake Forest University, Winston-Salem, NC, Spring 2014, Spring 2016.
- NEU 200: Introduction to Neuroscience (*neuroanatomy lecture*). Undergraduate Neuroscience Program, Wake Forest University, Winston-Salem, NC, Fall 2014, Fall 2015.
- NEU 201: Neuroscience Laboratory. Undergraduate Neuroscience Program, Wake Forest University, Winston-Salem, NC, Fall 2014, Fall 2015.
- BIO 364: Sensory Biology (*with W Silver*). Department of Biology, Wake Forest University, Winston-Salem, NC, Spring 2015.
- BIO 213L: Genetics and Molecular Biology Laboratory. Department of Biology, Wake Forest University, Winston-Salem, NC, Fall 2012.
- BIOL 3141: Genetics Laboratory. Department of Biological Sciences, East Tennessee State University, Johnson City, Spring 2009*, Fall 2009*, Spring 2010*.
- BIOL 1311: Biology for Science Majors Laboratory III (population biology). Department of Biological Sciences, East Tennessee State University, Johnson City, Fall 2007.
- EECS 492: Introduction to Artificial Intelligence, Discussion. Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Fall 2001.
- EECS 281: Data Structures and Algorithms, Discussion. Electrical Engineering and Computer Science, University of Michigan, Ann Arbor, Fall 2000.

(*Terms in which I was instructor on record, designing the course syllabus and all activities.)

Mentored Undergraduate Students:

- Christina F. Tingle (2015–17) Wake Forest University: age progression of honey bee mushroom bodies.
- Caroline Stanek (2015) Wake Forest University: scanning electron microscopy of honey bee wings.
- Amy Fraser (2014–15) Wake Forest University: honey bee DNA extractions and patriline determination.
- Rachel Hale (2014) Wake Forest University: honey bee DNA extractions.
- JT Muller (2014) Wake Forest University: immunolabeling honey bee wing sensory neurons.
- Ivan Golub (2013–14) Wake Forest University: scanning electron microscopy of honey bee wings.
- David Hale (2012) Wake Forest University: visual proboscis extension reflex in honey bees.
- Caddy N. Hobbs (2009–10) East Tennessee State University: determining honey bee foraging strategy
- Ashley E. Wagner (2009) East Tennessee State University: examining honey bee dance floor dynamics

Funding Awards:

- Center for Molecular Communication and Signaling, Wake Forest University, Mini-Grant for travel to the International Congress of Neuroethology, Montevideo, Uruguay, 2016.
- Heiligenberg Travel Award, International Congress of Neuroethology, Sapporo, Hokkaido, Japan, 2014.
- Center for Molecular Communication and Signaling, Wake Forest University, Research Project Internal Grant (*with SE Fahrbach*). Title: “A synaptic view of experience-dependent plasticity in the adult honey bee brain”. 2013.
- NIH Predoctoral Training Grant in the Neurosciences (*under R Oppenheim*), Neuroscience Graduate Program, Wake Forest School of Medicine. 2010–12.
- The Dr. Denise Pav Graduate Research Scholarship, East Tennessee State University. 2009.
- The Edna Harrison Scholarship, East Tennessee State University. 2009.
- Graduate Assistance in Areas of National Need Fellowship, College of Engineering, University of Michigan, Ann Arbor. 2000–02.

Honors:

- The Honor Society of Phi Kappa Phi, East Tennessee State University, initiated 2009.
- Sigma Xi – Scientific Research Society, East Tennessee State University, inducted 2008.
- Tau Beta Pi – National Engineering Honor Society, University of California, Irvine, inducted 1997.

Service:

- Ad hoc reviewer, *Journal of Experimental Biology*, 2017.

Outreach:

- Discussion group facilitator, Neuroscience Minor Book Club, Wake Forest University, Fall 2014, Spring 2015, Fall 2015, Spring 2017.
- LGBTQ Safe Zone certified, Wake Forest University, 2016.
- North Carolina DNA Day Ambassador: taught genetics and genomics to North Carolina high school biology and forensics classes for DNA Day (April 25th), 2012, 2013, 2014, 2015.
- Taught comparative neuroanatomy and behavior to 3rd, 4th, and 5th graders at Meadowlark Elementary School, Winston-Salem, NC, 2015.
- Fahrbach SE, Velarde RA, **Van Nest BN**. Presentation: “Tricks and special equipment used by honey bee researchers,” Davie County Beekeepers Association, Mocksville, NC, 2013.
- Judge, Forsyth County Science Fair, grades 3–5, Winston-Salem, NC, 2013.
- Judge, North Carolina Regional Science Fair, grades 10–12, Winston-Salem, NC, 2013.
- Judge, University School Science Fair, Johnson City, TN. 2008.

Appointments:

- Postdoctoral Scholar, Case Western Reserve University, 2017–present.
- Postdoctoral Research Scientist, Wake Forest University, 2016–2017.
- Adjunct Lecturer, Wake Forest University, 2016.

Graduate Student Instructor, Wake Forest University, 2012–16.
Research Assistant, Wake Forest University, 2010–16.
Graduate Student Instructor, East Tennessee State University, 2007–10.
Research Assistant, East Tennessee State University, 2006–10.
EH&S Technician, Dynavax Technologies Corporation, Berkeley, CA, 2002–05.
Graduate Student Instructor, University of Michigan, 2000–01.
Research Assistant, Artificial Intelligence Laboratory, University of Michigan, 2000.
Embedded Systems Engineer, Xerox Special Information Systems, Pasadena, CA, 1999–00.
Research Assistant, University of California, Irvine, 1997–98.

Affiliations:

Association for Biology Laboratory Education
Center for Molecular Signaling and Communication, Wake Forest University
Entomological Society of America
Faculty for Undergraduate Neuroscience
The Honor Society of Phi Kappa Phi
The International Society for Neuroethology
Sigma Xi - Scientific Research Society
Society for Integrative and Comparative Biology
Society for Neuroscience
Tau Beta Pi - National Engineering Honor Society