

## Kevin V. Donohue

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### EDUCATION

**Bachelor of Science**, Resource Management, **State University of New York**, College of Environmental Science and Forestry, Syracuse, New York. August 1992 - May 1996.

**Master of Science**, Entomology, **North Carolina State University**, Raleigh, North Carolina. August 2003- August 2005. Thesis: Analysis of the effects of a dielectric barrier discharge on arthropod pests. Advisor: Dr. R. Michael Roe.

<http://www.lib.ncsu.edu/theses/available/etd-06012005-215408/unrestricted/etd.pdf>

**Ph.D. Entomology**, Entomology, **North Carolina State University**, Raleigh, North Carolina. August 2005- December 2008 (expected graduation date). Dissertation: Part I: Molecular characterization of the major hemelipoglycoprotein in ixodid ticks. Part II: Molecular characterization of male tick pheromones that trigger female tick engorgement. Part III: Role of the female tick synganglion in reproduction and development. Advisor: Dr. R. Michael Roe. GPA:3.95

### PUBLICATIONS (asterisk indicates peer-reviewed paper)

1. Donohue, K.D, S.M.S. Khalil, R.D. Mitchell, D.E. Sonensine and R.M. Roe. 2008. Molecular characterization of the major hemelipoglycoprotein in ixodid ticks. *Insect Mol. Biol. in press\**
2. Donohue, K.D., B.L. Bures, M.A. Bourham and R.M. Roe. 2008. Effects of temperature and molecular oxygen on the use of atmospheric pressure plasma as a novel method of insect control. *J. Econ. Entomol. in press.\**
3. Witting, B.E., C.F. Stumpf, K.V. Donohue, C.S. Apperson and R.M. Roe. 2008. Novel plant-based insect repellent as a DEET alternative. *J. Med. Entomol. in review\**
4. Mitchell, R.D., E. Ross, C. Osgood, D.E. Sonenshine, K.V. Donohue, S.M.S. Khalil, D.M. Thompson and R.M. Roe. 2007. Molecular characterization, tissue-specific expression and RNAi knockdown of the first vitellogenin receptor from a tick. *Insect Biochem. Mol. Biol.* 37: 375-388.\*
5. Stumpf, C.F., R.M. Roe, B. Witting, K.V. Donohue, A. Jones and C.S. Apperson. 2007. Development and efficacy testing of a novel all natural tick and insect

repellent, BioUD. Eighty-first Annual Meeting of the Southeastern Branch of the Entomological Society of America, 4-7 March 2007, Knoxville, Tennessee.

6. Wafa, D. M., F. Breidt, S. M. Gawish, S. R. Matthews, K. V. Donohue, R. M. Roe, and M. A. Bourham. 2007. Atmospheric plasma-aided biocidal finishes for non-woven polypropylene fabrics. Part 2: functionality of synthesized fabrics. *J. Appl. Poly. Sci.* 103: 1911-1917.\*
7. Stumpf, C. F., D. L. Comins, T. C. Sparks, K. V. Donohue, and R. M. Roe. 2006. Mortality studies and mode of action for novel neonicotinoid insecticides based on novel nicotine chemistry. *Pest. Biochem. Physiol.* 87: 211-219.\*
8. Roe, R.M., K.V. Donohue, A. Jones and B.E. Witting. 2006. Development of a novel all natural tick and insect repellent, BioUD, as a DEET replacement and for use on cotton fabric. 2006 Entomological Society of America Annual Meeting. 10-13 December, 2006, Indianapolis, Indiana.
9. Corum, D.G., K.V. Donohue and R.M. Roe. 2006. Identification of novel neuropeptides from the tick synganglion. Second Annual State of North Carolina Undergraduate Research and Creativity Symposium. 18 November 2006, Raleigh, North Carolina.
10. Donohue, K.V., S.M.S. Khalil, D.E. Sonenshine, and R.M. Roe. 2006. Cloning and sequencing of the major hemelipoglycoprotein in the American Dog Tick, *Dermacentor variabilis* (Say). 2006. 12th International Congress of Acarology, 21-26 August 2006, Amsterdam, The Netherlands.
11. Roe, R.M., K.V. Donohue, A. Jones, M. Vanderherchen, C.S. Apperson, M. Isherwood and R. Linderman. 2006. Development of a novel all natural tick and insect repellent, BioUD, as a DEET replacement and for use on cotton fabric. Fifth International Symposium on Molecular Insect Science, May 20-24, 2006, Tucson, Arizona.
12. Roe, R. M, K. V. Donohue, A. Jones, M. Vanderherchen, C. S. Apperson, M. Isherwood, and R. Linderman. 2006. Development of a novel all natural tick and insect repellent, BioUD, as a DEET replacement and for use on cotton fabric. Beltwide Cotton Conference, January 3-6, 2006, San Antonio, Texas.
13. Bures, B.L., K.V. Donohue, R.M. Roe and M. A. Bourham. 2006. Non-chemical dielectric barrier discharge treatment as a method of insect control. *IEEE Trans. Plasma Sci.* 34: 55-62.\*
14. Donohue, K.V., B.L. Bures, M.A. Bourham and R.M. Roe. 2006. Mode of action of a novel non-chemical method of insect control: atmospheric pressure plasma discharge. *J. Econ. Entomol.* 99: 38-47.\*

15. Bures, B.L., K.V. Donohue, R. M. Roe, and M. A. Bourham. 2005. Visualization of helium dielectric barrier discharge treatment of green peach aphids on tobacco leaves. *IEEE Trans. Plasma Sci.* 33: 290-291.\*
16. Donohue, K. V., B. L. Bures, M. A. Bourham, and R. M. Roe. 2005. Investigation of the Mode of Action of a Non-equilibrium Discharge on Arthropod Pests. Beltwide Cotton Conference, January 4-7, 2005, New Orleans, Louisiana.
17. Roe, R. M., J. v Kretschmar, D. M. Thompson, K. V. Donohue, C. E. Sorenson, F. Gould, C. Stumpf, J. W. v Duyn, G. D. Thompson, N. P. Storer, C. Blanco, J. D. Lopez Jr., B. R. Leonard, A. Kilpatrick, A. Hagerty, and D. Brickle. 2005. Larval Feeding Disruption Tests (FDT) for Monitoring Insect Resistance to Cry1Ac, Cry1F, and Cry1AB. Beltwide Cotton Conference, January 4-7, 2005, New Orleans, Louisiana.
18. Bures, B., K. V. Donohue, S. Long, M. A. Bourham, and R. M. Roe. 2004. Mortality of Insects on the Surface of Plants Using an Atmospheric Pressure Plasma Discharge. Beltwide Cotton Conference, January 5-9, 2004, San Antonio, TX.
19. Roe, R. M., D. M. Thompson, J. L. Rhein, K. V. Donohue, S. Long, J. S. Bachelor, C. Sorenson, and C. L. Sutula. 2004. Feeding Disruption Bioassay for Field Monitoring of Insect Susceptibility to Bt-Transgenic Crops and Traditional Pesticides. Beltwide Cotton Conference, January 5-9, 2004, San Antonio, TX.
20. Bures, B.L., K. V. Donohue, M. A. Bourham, and R. M. Roe. 2004. Non-chemical dielectric barrier discharge treatment as a method of insect control. The 31st IEEE International Conference on Plasma Science, June 28 – July 1, 2004, Baltimore, Maryland.
21. Bures, B., T. Gray, M. Bourham, R. M. Roe, S. Long, and K. V. Donohue. 2003. Reaction of Small Insects to an Ambient Pressure Dielectric Barrier Discharge. American Physical Society, Forty-fifth Annual Meeting of Plasma Physics, October 27-31, 2003, Albuquerque, NM.

## **EMPLOYMENT**

**Research Assistant.** Research Foundation of New York, Syracuse, NY. Fall 1994.

- Assisted in the calculation of cull deductions of surveyed timber stands

**Laboratory Technician.** NCSU Department of Entomology, Insectary Facility, Raleigh, NC. June 2002 – July 2003.

- Maintenance of 3 lepidopteran, 2 cockroach and 3 walking stick colonies
- Assist in outreach events with colonized insects
- Supervision of part-time student technicians

**Research Assistant.** NCSU Department of Entomology, Laboratory of Dr. Lewis L. Deitz, Raleigh, NC. January – July 2003.

- Assisted in the creation of a database of zoogeographical information on over 450 treehopper genera
- Contributed to the “Bibliography of the Membracidae”, a database of all known publications pertaining to treehoppers.

**Research Specialist.** NCSU Department of Entomology, Laboratory of Dr. R. Michael Roe, Raleigh, NC. June 2004 – present.

- Management of NCSU Department of Entomology Mass Spectrometry Facility
- Support multiple ongoing projects in insect and tick genomics, proteomics, toxicology and biochemistry
- Supervise and/or train undergraduate and graduate students
- Laboratory and radiation safety training of staff and students

## **NON-DEGREE RELATED RESEARCH**

**RNA interference as a novel method of insect control:** The endogenous role of RNA interference is the regulation or silencing of gene expression. This conserved pathway can be used for a wide array of genomic studies but has not yet been applied to the control of arthropods. The use of RNAi for insect and tick control has the advantage of species-level specificity previously unattainable by classical chemical insecticides and acaricides. We have found that long dsRNA can be introduced *per os* to the American dog tick and development can be halted by blocking the uptake of vitellogenin to the vitellogenin receptor in the ovary. Future studies will be directed at developing a novel delivery system to ensure an increased delivery of the dsRNA molecule to its intended target tissue.

**Production of Insect and Tick Repellent Textiles:** The research was carried out in conjunction with the NCSU Departments of Textiles, Nuclear Engineering and Entomology to discover novel methods of binding chemical compounds to fabric substrates and determining their repellency against ticks and insects.

**Insecticide Resistance Monitoring:** Participated in the development of “Feeding Disruption Technology (FDT), a bioassay that determines the levels of resistance to *Bacillus thuringiensis* (Bt) in lepidopteran pests.

## **TEACHING EXPERIENCE**

**Instructor.** ENT 591M: Molecular Entomology: Lab to the Field. Fall 2007.

Taught computer assisted analysis in genomics and proteomics; RNA interference and its applications in entomology.

**Teaching Assistant.** BIT 595 N/O: RNA interference in model organisms. Fall 2006.

Instructor: Dr. Joanna A. Miller. Department of Biotechnology, NCSU, Raleigh, NC.

**Instructor.** GN 493: Supervised/designed undergraduate research project “Subtractive cDNA library of the synganglion of the American dog tick, *Dermacentor variabilis*”. Fall 2006. Department of Entomology, NCSU, Raleigh, NC. Mentor to Daniel G. Corum.

**Guest Lecturer.** ENT 503: Insect Morphology and Physiology. Molecular biology and chromatography labs. Spring 2005. Instructor: Dr. R. Michael Roe. Department of Entomology, NCSU, Raleigh, NC.

## **RESEARCH SUPPORT/GRANTS**

- North Carolina Entomological Society Travel Grant. August 2006. Award: \$430.00.
- North Carolina State University Graduate Student Association Travel Grant. August 2006. Award: \$250.00.
- National Science Foundation. 2007. Endocrinology of tick reproduction: A new perspective. Provided preliminary data on the presence of a male pheromone in *Dermacentor variabilis* previously only determined in one other species. Completed the first sequence of the major heme-binding storage protein in ticks (4.9 kb). Produced a female *D. variabilis* subtractive cDNA library which yielded 7 novel peptides. These contributions were critical to the awarding of the grant. Award: \$540,000.

## **PRESENTATIONS AT PROFESSIONAL MEETINGS**

1. Advancing the Science of Toxicology and Entomology: Symposium Honoring the Distinguished Career of Dr. Ernest Hodgson. 18-19 September 2003, Research Triangle Park, North Carolina. Poster.
2. American Physical Society, Forty-fifth Annual Meeting of Plasma Physics, 27-31 October 2003, Albuquerque, New Mexico. Poster.
3. Fifty-fifth Annual Meeting of the Crop Protection School, 9 December 2003, North Carolina State University, Raleigh, North Carolina. Poster.
4. Annual Meeting of the Crop Protection Association of North Carolina. 9 December 2003. North Carolina State University, Raleigh, North Carolina. Poster.
5. Beltwide Cotton Conference, 5-9 January 2004, San Antonio, Texas. Poster.
6. The 31st IEEE International Conference on Plasma Science, 28 June - 1 July 2004. Baltimore, Maryland. 15-minute paper presented by B.L. Bures.
7. Beltwide Cotton Conference, 4-7 January 2005, New Orleans, Louisiana. Poster.
8. Beltwide Cotton Conference, 4-6 January 2006, San Antonio, Texas. Poster.

9. Southeastern Branch Entomological Society of America, 5-8 March 2006, Wilmington, North Carolina. Presentation “Analysis of the effects of an atmospheric pressure plasma discharge on arthropod pests”. 12-minute paper.
10. Fifth International Symposium on Molecular Insect Science, 20-24 May 2006, Tucson, Arizona. Poster.
11. **12th International Congress of Acarology**, 21-26 August 2006, Amsterdam, The Netherlands. Poster.
12. Second Annual State of North Carolina Undergraduate Research and Creativity Symposium. 18 November 2006, Raleigh, North Carolina.
13. 2006 Annual Meeting of the Entomological Society of America, 13 December 2006, Indianapolis, Indiana.
14. Eighty-first Annual Meeting of the Southeastern Branch of the Entomological Society of America, 4-7 March 2007, Knoxville, Tennessee.

#### **PROFESSIONAL MEMBERSHIPS**

- Entomological Society of America
- North Carolina Entomological Society
- Acarological Society of America

#### **PROFESSIONAL ACTIVITIES**

##### **Outreach**

- Bugfest Volunteer 2002, 2003, 2005, 2006, 2007.
- Volunteered at the NCSU Insectary Facility, 3-4 hours/day, 4-5 days/week, June – August 2002.
- Lead tours in English and Spanish at the NCSU Insectary Facility and NCSU Insect Collection, 2002.
- Old Dominion University, Department of Biological Sciences, Norfolk, Virginia. “*In vitro* dsRNA synthesis and probe design for gene silencing in arthropods.” Four classes taught between June – October 2006.
- Biltmore Estate, Asheville, NC. Identification and collection of wood roaches, *Cryptocercus punctulatus*, and their potential value in biodiesel production. 20 June 2007.

##### **Patents Pending**

- Invention Technology Disclosure Agreement: “Use of atmospheric plasma for insect control”, 2005.
- Invention Technology Disclosure Agreement: “Use of RNAi as a novel method of insect control”, 2007.

##### **Invited Talks**

- “RNA Interference in Ticks”, 9 November 2006, Department of Biotechnology, NCSU, Raleigh, NC.

### **COMMITTEE PARTICIPATION**

- Faculty search committee, IPM on Ornamentals, NCSU Department of Entomology, 2007/2008.
- NCSU Entomology Graduate Student Association; library committee
- NCSU Entomology Graduate Student Association; editor and website designer of the “Antenna” online newsletter - 2004-2005

### **AWARDS**

- Outstanding Graduate Student Award (M.S.), NC Entomological Society, 2005
- Nominee – John Henry Comstock Award, 2007