

Award Category: Graduate Student Award
Zachary C DeVries

Nominator Name: Coby Schal
Nominator Company/Affiliation: North Carolina State University
Nominator Title: Blanton J Whitmire Distinguished Professor
Nominator Phone: 919-515-1821
Nominator Email: coby@ncsu.edu

Proposed Category (choose 1) Doctoral Student

Nominee Name of Individual: Zachary C DeVries
Nominee Affiliation (if applicable): Blanton J Whitmire Distinguished Professor
Nominee Title (if applicable): PhD candidate
Nominee Email: zcdevrie@ncsu.edu
Nominee Phone: 919-515-1820

Provide a Letter of Nomination from the candidate's department head/chair, faculty advisor, or a faculty member familiar with the student's performance. This letter is no more than two (2) pages in length and should be pasted into this box.

Academic performance in graduate school. Zach completed a BS in Zoology (2011) at Auburn University with major honors and was on the Dean's List throughout his BS studies (3.97/4.00 GPA). He maintained a 4.0/4.0 GPA as a MS student at Auburn, published several extension publications, presented 7 oral presentations, published 6 refereed papers, and was active in various governance and graduate student organizations. Zach joined the PhD program at NCSU in September 2013 and his productivity has been exemplary while maintaining a 4.0/4.0 GPA. IPM fieldwork experience. Zach's research requires extensive field-work in low-income homes. He led several studies that examined the efficacy of various interventions, including bait placements, sanitation, and the thoroughness of heat treatments for bed bugs. These studies are integral to Zach's PhD research and involve IRB and informed consent that he manages, interacting with residents in English and Spanish, and educating residents about urban pests and sanitation. Research, relevance to IPM, and realized or potential impacts to the field of IPM. For his PhD Zach has three major projects, all related to IPM in indoor settings. The first looks at the relationship between cockroach infestations, allergens in the environment, and it aims to develop better integrated procedures for eliminating cockroaches and reducing cockroach-produced allergens. Zach is also examining the effects of cockroach interventions on the bacterial communities in infested homes using high-throughput DNA sequencing. His second project examines the obstacles that do-it-yourself total release foggers (TRFs) present to indoor IPM, their environmental impacts, and the potential health-related implications of using TRFs, especially in disadvantaged communities. He conducted extensive field and lab work on this project and completed a massive dataset on insecticide residue analysis. This research is in final draft form and will be submitted for publication in June 2017. The third part of Zach's project looks at host differentiation and host attraction in bed bugs

and the effects of physiological state (hunger, age, mating status) on chemotactic and thermotactic orientation. This work is especially important because contact between bed bug lineages that feed on bats and lineages that feed on humans could facilitate zoonotic pathogen transmission to humans. Involvement in IPM delivery to stakeholders. Zach has presented several professional papers, 8 of which explicitly delivered IPM information to stakeholders. He routinely helps with our Extension efforts, with activities that include outreach talks and presentations at K-12 and hand-on consultation with residents and management in affordable housing, including local housing authorities. Zach took a leading role in our 2013, 2014, 2015 and 2016 BugFest exhibits at the NC Museum of Natural Sciences, the largest STEM event in the world that draws 35,000 visitors annually! What sets him apart from others are major IPM presentations that are normally reserved for faculty: two P-phase (general pest management) 50 min sessions on bed bugs at our annual NC Pest Management conference, each with an audience of >1,000! He also assisted with several ant and termite workshops in our Urban Entomology Training Facility. Extension publication record. In 2013 Zach published an 8 page summary "Battling bed bugs-knowing the enemy" for the Alabama Cooperative Extension System. He has assisted our Extension Urban Entomologist (Dr. Waldvogel) with several fact sheets to consumers and the pest management industry. Research publication record. Zach published 7 papers before joining my lab. In the last year Zach published one manuscript on host orientation in bed bugs (Journal of Experimental Biology) and two other manuscripts are in draft form. One of these looks at the interaction of bat-associated and human-associated *C. lectularius* at shelters. Zach is following up on our recent paper, looking at reproductive compatibility and shelter fidelity of these two bed bug lineages, and already published one paper on this topic (Parasitology Research). His research on TRFs vs. IPM approaches is ready for submission to Environmental Health Perspectives. Several other collaborative projects are in draft form. Zach also reviewed an impressive 27 papers for various journals. Teaching assistantship record. Zach has been exceptionally determined at seeking extraordinary opportunities to teach. In 2015 and 2016 Zach was "Instructor of Record" for General Entomology (ENT 110), for which he developed lectures, administered weekly quizzes and exams, mentored the lab instructor and graded ~40 students. He currently mentors 2 undergraduates in our lab. Presentation record. Zach has presented 15 oral and poster research papers at the North Carolina Entomological Society, International Congress of Entomology, National Conference on Urban Entomology and several conferences of the Entomological Society of America (ESA). Awards and grants. At NCSU Zach received a University-Wide Graduate Recruitment Fellowship and the David R. Nimocks, Jr. Fellowship in Urban Entomology. He also was awarded the 2013 Monsanto travel award from ESA and the 2013 MUVE Student Research Award. In 2014 alone he repeated the MUVE Student Research Award and won ESA's Larry Larson Graduate Student Award for Leadership in Applied Entomology, Monsanto Student Research Grant Award, the Kirby L. Hays Memorial Award of the Southeastern Branch of the ESA, President's Prize (2nd Place) for Oral Presentation at ESA, an NCSU UGSA Travel Award, 3rd Place Oral Presentation at NCSU's Entomology Graduate Student Symposium, a Keck Vandenberg Travel Fellowship, a Pi Chi Omega John V. Osmun Memorial Scholarship, an NCSU Foundation for Toxicology and Agromedicine Scholarship, and 1st place in the Southeastern Branch ESA student competition. Most recently he won First Place in the Student Paper Competition at both the International Congress of Entomology (2016) and

the Southeastern Branch of the Entomological Society of America Meeting (2016) and won the Outstanding PhD Student Award from the North Carolina Entomological Society (2016). In his very young career, Zach has received >\$25,000 in competitive grant travel awards, including a grant from the Pest Management Foundation, and >\$63,000 in scholarship and fellowship awards. In summary, Zachary DeVries has excelled in research, teaching, extension and engagement. He has an amazing track record of accomplishments in his BS, MS and PhD studies. Zach is a hard and conscientious worker and has the intellectual maturity, self-motivation, work ethic and collaborative spirit to succeed as an independent researcher and educator in developing IPM programs in Urban Pest Management. I rank Zach among the top 2 graduate students of 40+ that I have directly supervised and mentored. Zach is unique in operating in my lab well above the level of a PhD student. He definitely has the scientific and personal maturity of a seasoned postdoc, and he clearly has demonstrated excellence in his graduate program in all aspects detailed in the IPM Symposium Awards “scholarship, research, teaching, presentations, awards, extracurricular activities, and a strong commitment to IPM research and implementation, and teaching, extension and outreach in support of IPM.

1. How has this nominee demonstrated strong potential of providing leadership in IPM? Please expound on their work through fieldwork, data collection, experimental design, teaching, outreach, or other support for research, extension, and/or education IPM projects. (500 words or less).

Zach has demonstrated outstanding IPM leadership qualities and continues to show potential for significant leadership through his research, teaching, and extension activities. Zach’s research is focused on alleviating pest pressure, reducing pesticide use, and mitigating associated health effects in the indoor environment. One project that exemplifies Zach’s commitment to challenging standard pest management practices in favor of IPM is his work characterizing the efficacy and exposure risks associated with total release foggers (TRFs). Zach showed that TRFs were ineffective at controlling cockroach infestations, while IPM strategies involving baits were highly effective. Baits are a pivotal component of cockroach IPM programs because limited amounts of active ingredient are placed into hidden areas of the home, minimizing human and environmental exposure risks. Zach also showed that TRFs deposit large amounts of pesticides throughout the home, representing a major exposure risk to tenants, especially children. Zach also lead a large-scale field study assessing the efficacy of IPM strategies for managing cockroach populations and reducing associated allergens in the home. He is assessing the effects of whole-home baiting versus the traditional strategy of baiting only in the kitchen and bathroom. This study underscores the importance of proper bait placement, sanitation and education in efforts to reduce cockroach populations and mitigate their associated health risks. Zach has also contributed significantly to IPM education. He is routinely

invited to give presentations regarding the biology and management of urban pests. Recent events include the Global Bed Bug Summit (50 min, Indianapolis) and the North Carolina Pest Management Association (50 min, Morrisville). Zach has also incorporated IPM into the General Entomology course he teaches. This course is housed in the Agriculture Institute at NCSU, and is designed to provide a general overview of entomology to 2-year students, many of whom do not fit the traditional student model. For most of these students, this is their first exposure to IPM, which is critical given the high percentage who seek employment in the agriculture industry. Zach's research, teaching and involvement in extension and outreach activities demonstrate a commitment to providing leadership in IPM. He has led extension events for both extension and housing-authority personnel. He educates trainees on the biology of urban pests and safe and effective management strategies. Zach also regularly coordinates with the media to ensure that they are aware of the latest information regarding urban pests. Finally, Zach has been closely involved in a variety of outreach events, including BugFest, the largest entomological event in the world (35000 visitors annually). Through these events, Zach engages all members of society, providing basic information and recommendations for safe pest management practices centered on IPM principles.

2. How has this nominee shown his or her ability to work with others and/or team build for a project using IPM? (500 words or less).

Zach has collaborated with diverse groups spanning various backgrounds. This is evident in his recent projects, including his work in affordable housing, publications, and extension and outreach activities. His research evaluating the efficacy and health impacts of various cockroach and bed bug management approaches involves extraordinary commitment to planning and coordination. Working well with a team is required to work in multiple homes in a uniform fashion. Zach has excelled at this, taking a lead role in several studies, including writing and presenting the results. Large-scale projects like these also require constant coordination with funders, apartment tenants, and managers, to ensure IPM protocols are being followed and permission is granted to work in homes under IRB protocols. Zach has shown tremendous ability to work well with these groups, ensuring that staff are aware of his work and on-board with all ongoing actions. He also takes every step to work with tenants and ensure intervention efforts are successful and result in minimal intrusion. Furthermore, Zach always takes the time to explain in detail the rationale for the actions he is taking and make sure tenants understand the importance of IPM in establishing and maintaining a pest free environment. Zach's publication record also reflects his commitment to teamwork and collaboration. Of his nine peer-reviewed publications to date, over 50% include at least 3 authors, and over 50% include authors from at least two academic institutions. This record shows he is not simply a "cofan" of collaboration, but

actually puts it into practice. In addition, he has worked with a diverse group of individuals on many of his projects, a key reason he has been so productive during his academic career. Zach often works on extension and outreach events that require teamwork and coordination. He conducted several training sessions with housing authorities and extension agents. These Extension activities are important because they improve knowledge and acceptance of IPM techniques, and implement them in areas where tenants are not always amenable to new and different procedures. Zach has also coordinated several outreach events, including BugFest and Brain and Behavior Awareness Night. At these events, Zach works with other Entomology students and Post-docs to plan, prepare, organize and deliver exhibits designed to educate and engage the public on entomology and IPM. Typically, these events provide opportunities for children and adults to learn about the biology of insects, but the exhibits that Zach coordinates allow for opportunities to discuss and promote IPM practices for cockroaches and bed bugs. Zach's efforts in research, teaching, and extension emphasize teamwork and collaboration. From his work, it is clear that he thrives in environments where he can work with others, and ultimately utilizes these interactions to improve IPM efforts for indoor pests.