

STRATEGIC PLAN

Rutgers Department of Entomology

Vision

We propose to develop **Excellence in Entomology** in our department centered on the dual emerging challenges of **urbanization** and **invasive species**. We will bank on our ideal location in New Jersey, a diverse coastal state and crossroads of the World, and on our faculty's superlative connections with local, national and international stakeholders. We are already pioneers in these areas of study. For example, Rutgers Entomology faculty detected the most recent US mosquito invasive (Peyton *et al.* 1999) and used high-resolution (genetic) analysis of its expansion to model invasiveness (Fonseca *et al.* 2009, Egizi *et al.* 2016) and the potential for rapid evolution to offset effects of climate change on vector-borne diseases (Egizi *et al.* 2015). We have modeled the primary drivers of the expansion of the brown marmorated stink bug, currently the most destructive agricultural pest in the US (Wallner *et al.* 2014), identified the origin of US populations in China (Xu *et al.* 2013) and developed IPM strategies for its control (Blaauw *et al.* 2014; <http://www.stopbmsb.org>; <http://eorganic.info/>). We have assessed area-wide strategies to manage invasive urban disease-vectors based on extensive surveillance, experimentation, and sound economic analyses (Fonseca *et al.* 2013; <http://asiantigermosquito.rutgers.edu>). We have also developed new methodologies to survey and control bedbugs (Singh *et al.* 2015; Cooper *et al.* 2015) and spotted wing drosophila (Cowles *et al.*; Lee *et al.* 2015), an urban and an agricultural invasive species with significant impacts in NJ, the US at large and worldwide.

Background

Insects (the focus of Entomology, or "Insect Science") infect people, pets, livestock and wildlife with parasites, eat our crops and our stored food and destroy our homes. However, they are also critical crop pollinators, are overwhelmingly the primary predators of insect pests, and have provided us with fundamental model systems (e.g., *Drosophila* genetics). Like plants, insects are so important to the US economy and health that special, focused and specialized training is required to efficiently identify, study and manage them. Because of broad requirements in systematics, ecology, physiology, toxicology, epidemiology, genetics and molecular biology, entomology is, also by necessity, a highly interdisciplinary discipline. Of note, **students demonstrably versed in Entomology either at the undergraduate or graduate level have excellent prospects for future employment**, as this is an increasingly sought after expertise (see Appendix 1 for the current employment of recent Rutgers Entomology MS and PhD graduates).

The strong connections between human and ecosystem health have been codified in the "One Health" concept that states simply that good food, good environment and protection from diseases lead to good health (<http://onehealthinitiative.com/>). The expectation is that awareness and collaborations among disciplines will help protect and save untold millions of lives in our present and future generations and increase their quality of life, productivity and happiness. **We propose to develop our program under the aegis of the One Health concept by focusing on basic**

entomological research aimed at resolving real world problems in our increasingly urbanized and interconnected planet.

An entomology program with strong research lines in basic and applied science supports-commodity specific areas that can also provide bridge funding for federal grants. Our faculty has obtained over \$10 million in competitive grants from USDA, NIH, EPA, USFS, DOD, NOAA and NSF, among other external sources in the past 10 years.

Critically, our 9 faculty members are specifically sought after by the general public, land users, farmers, turf and landscape professionals and professional control operators (PCO) seeking expert advice and answers to problems that often necessitate new research. Powerful stakeholders have exerted important influence on the direction of research programs as they provide renewable funding support in amounts often over \$200,000/year. These relationships also provide opportunities to rapidly test and demonstrate research findings and increase adoption of tactics. Importantly, most Entomology faculty have mandated responsibilities for extension programs, e.g., for pesticide safety, fruit production, blueberry-cranberry production, turfgrass, urban health, medical and veterinary entomology and mosquito control. Much of our extension activities are integral parts of a greater outreach/extension effort such as through the Rutgers Center for Turfgrass Science, the Marucci Center for Cranberry and Blueberry Research, the Rutgers Agricultural Research and Extension Center, Center for Vector Biology, as well as the Rutgers NJAES Office of Continuing Professional Education. These extension relationships provide research-based solutions that can be specific to New Jersey's diverse geography and clientele but are often relevant at the national (<https://sites.google.com/site/mosquitocontrolup/>) and international level (e.g. <https://win-network.ird.fr/>).

Entomology Strategic Issues and Goals

One clear outcome of this self-evaluation has been recognition of the overarching need to define our current identity and desired future direction. Our department has multiple strengths but at its core, our faculty members are experts in **urban pests** and **invasion ecology and evolution**, which often impact directly **Public Health** and **Integrated Pest Management (IPM)**, in turn requiring understanding of **Toxicology** or the development of **Biological Control**. Our faculty members have been the leaders of successful contract and grant-funded research projects and Multi State Regional Projects on (1) Asian Tiger Mosquito Biology and Management, (2) Bed Bug Management, (3) IPM and Organic Management of Brown Marmorated Stink Bug, (4) Chemical Ecology of Spotted Wing Drosophila, (5) Cranberry Weevil, (6) Plum Curculio, (7) Integrated Management of Annual Bluegrass weevil, (8) Spatially-based Management of Blueberry Maggot, and (9) Mating Disruption Technology for Oriental Beetle.

Strategic Goals

A. **Create an exceptionally unique and attractive Entomology research program.** Specifically, we seek to study problems in the emerging fields of **urban-agriculture interface** and **invasive species**, two fields rife with entomological questions that need urgent solutions. Urban farming is an emerging phenomenon in the developed world and there is a clear need for trained

entomologists capable of providing expertise in pollination ecology, pest control, and biological control. The majority of invasive species transition through developed areas surrounding ports and airports where a well-developed surveillance program might allow interception and eradication before establishment. Additionally, many of the invasive species are urban or rapidly adapt to human disturbed environments, therefore maximizing interactions with us and our own. We argue that New Jersey with its unique geography, large international ports, strong agricultural economy but extensive urban development is the perfect location for the proposed **Center of Excellence** focused on **Urban Health** (in the context of “One Health”) and **Invasive species**. In 2016, we applied to CDC to develop a Center of Excellence in Vector Borne Diseases in collaboration with the Schools of Public Health at Rutgers and University of Puerto Rico. Irrespective of the outcome of that application we will continue to seek funding to obtain Center of Excellence status also in Invasive Species research.

- B. **Promote excellence and growth in our academic educational programs.** Continue to attract excellent undergraduate and graduate students but improve and strengthen the curriculum so they are better trained and supported. Also increase their competitiveness in the workplace by providing them with post-graduate training such as grant proposal writing experience, travel to scientific meetings, and opportunities for internships in additional laboratories at Rutgers and elsewhere. In particular we are developing a Field Entomology course at the Pinelands Field Station allowing new graduate students in the MS and PhD programs to bond and develop collaborations.
- C. **Promote excellence in extension.** By focusing our research communication on the key areas of **Urban Health, Invasive Species, and Integrated Pest Management** (including **Toxicology and Biological Control**) we are confident we will address the primary requirements of the NJ community. We will maintain and build on the strong levels of communication with current stakeholders such as NJ residents (e.g., Rutgers Environmental Stewards, NJAES), State Mosquito Control Commission, county Mosquito, Tick and Pest Control programs, small and large scale farmers, particularly those intent on developing urban farming (e.g., <http://www.gardenstateurbanfarms.com>), and the powerful NJ turf and landscape industry. Furthermore, **we will streamline our communication of research results with the Dean’s office so they can be shared with the State Board of Agriculture and the Rutgers’ Board.**

Implementation

- A. **Create an exceptionally unique and attractive Entomology emphasis.** As described above, we will develop a novel emphasis that will increase the participation in classes and research projects of faculty from other departments at Rutgers to complement our existing strengths. Staying focused on **Urban Health** and **Invasive species** we need to strengthen our program by recruiting faculty members whose expertise will support the development of exceptionally strong research proposals to seek **external funds for the growth and consolidation of our department**. Specifically we will foster increased collaborations with faculty in the School of Public Health, Landscape Architecture, Human Ecology, Microbiology, Plant Science, Ecology, Evolution and Natural Resources. Because of current weaknesses in these areas and the need to reach a workable quorum, we propose the creation of Entomology faculty positions in:

Position	Description	Anticipated Announcement
Vector Biology/Microbiology	Parasite-insect interaction	will start July 2017
Evolutionary entomology ¹	invertebrate systematist, deep evolution	Spring 2017
Landscape entomology ²	GIS based spatial modeling, species distribution and expansion	Spring 2017
Vegetable entomology ³	Study and management of invertebrates attacking vegetable crops	Spring 2018
Insect physiology	Genetic basis of physiological processes, toxicology	Spring 2018
Beneficial insect biology ³	Apiculture, biological control	Spring 2019

¹ Supported by the Department of Ecology, Evolution and Natural Resources

² Supported by the Department of Landscape Architecture

³ Supported by the Department of Plant Biology

B. Promote excellence and growth in our academic educational programs

1. Attract excellent students to the Entomology major and to our graduate program

- Highlight faculty and student awards and important papers in the department webpage (<http://entomology.rutgers.edu/>) and Facebook page (<https://www.facebook.com/RutgersEntomology>) in order to increase the visibility of the department. Updates will be provided monthly.
- A primary aim is also to increase the number of Teaching Assistantships (TAs). A major limitation to the growth of our program is that the department has a single TA, which compromises teaching efforts (several of our classes have enrollments of over 25 students) as well as our ability to attract and train excellent students. A few needed TAs would generate predictable and significant support for graduate students providing a bridge for possible lapses in grant funding. The proposed new hires would teach undergraduate courses that would increase available funds to the department to support graduate training and at least one additional TA position. Our goal is to increase graduate enrollment to 20 by 2021.
- Increase enrollment in courses such as **Medical and Veterinary Entomology (MedVetEnt)** and **Integrated Pest Management** by networking with other Department's Chairs and faculty. MedVetEnt, a course taught at capacity both semesters, supports overwhelmingly Animal Sciences and other pre-Vet majors and there has been no participation of Public Health students. If addressed, this obvious omission should increase enrollment. Of note, the capacity of 25-30 students/semester is imposed by the lack of TA support and teaching space.

- Develop general courses in **Animal Behavior, Ecology and/or Evolution** team-taught by Entomology faculty with a focus on insects but taught in collaboration with faculty in other departments (such as EENR), to attract large numbers of students and increase enrollment in Entomology.
- Apply for **training grants** such as the USDA National Needs Fellows (<http://nifa.usda.gov/program/national-needs-graduate-and-postgraduate-fellowship-grants-program-funding-opportunity-nnf>) to provide additional student support. Additionally, a stronger program in Public Health would allow application to NIH Training grants in Medical Entomology (<https://researchtraining.nih.gov/programs/training-grants/T15>).
- Develop **research opportunities** for Entomology majors in different laboratories within the Department and in other relevant departments at Rutgers as part of the curriculum.

2. Strengthen the curriculum

- Add new **critical courses** in Medical Microbiology [G], Landscape Entomology [G], Urban Forestry (UG), and Evolutionary Biology [G]. Strengthen existing courses in Insect Physiology and Beneficial Insects. Of note, in the Fall 2015, Entomology started an undergraduate **major** that will increase the reach of our teaching and expertise but requires the development of a complete program in all aspects of entomological knowledge [UG indicates undergraduate course, G indicates graduate-level course]. Increase enrollment in the undergraduate major to 40 by 2021.
- Continue to hold **yearly colloquia** for graduate and undergraduate students that give awards to the best student presentations.

3. Increase competitiveness and post-graduate skills

- Steer funds from the Graduate Entomology Student Association, the Entomology Department, and Rutgers to provide **travel awards** to students based on research excellence and participation in outreach events. Of note, a recent endowment by Herb Streu will provide ~\$10,000 per year in competitive travel awards to our graduate students.
- Identify **fellowships and scholarships** that Entomology graduate students can apply for and encourage application to further increase the visibility of the department and the competitiveness of our students.
- Develop a **grant writing course** preferably to be co-taught with other departments (e.g., EENR or Plant Science)
- Carefully and frequently update the newly created department **webpage** to increase student visibility to prospective post-graduate employers.

C. Promote excellence in extension

The associations of insects with humans and their food systems provide a natural relationship with extension. Many of our faculty are Extension Specialists or have some extension responsibilities. To highlight our extension efforts we will continue to work closely with NJAES, eXtension/eOrganic, Northeast IPM Center, NJ Food Corps, NOFA-NJ, Rutgers Environmental Stewards, State and local

accredited Pest Control programs, etc. to develop collaborative relationships or develop curricula to disseminate research-based materials for the general public.

Stakeholder Analysis

1. EDUCATION

Academic: GP, K-12, Undergraduate, Graduate, Post-Docs, K-12 Teachers

Extension: Growers and Managers (Production Agriculture, Turfgrass, Landscape/Ornamentals, Urban/Forest Trees), Extension Agents, Media

2. RESEARCH COMMUNITY

Other R.U. Colleagues and Programs, Scientific Societies, Research Community at large

3. GOVERNMENT:

Local, State, National, International; includes Legislative Bodies and Regulatory Agencies

4. INDUSTRY

Chemical

5. AGRICULTURAL COMMUNITY

Urban, Ornamental/Field/Vegetable/Fruit Crops, Livestock,

6. ENVIRONMENTAL GROUPS

Water Quality, Biodiversity, Pesticides, GreenSpaces, Landscapers

7. PUBLIC HEALTH

Human Health: Mosquito Control, PCO's, Public Health Agencies, Food Industry, Physicians

Animal Health: Mosquito Control, Veterinarians

8. RECREATION

Tourism, Outdoor Sports, Camping, General Outdoor Activities

9. GENERAL PUBLIC

Appendix 1 - Placement of MS and PhD students from the Rutgers University Graduate Program in Entomology in the past 12 years

Deepak Matadha PhD (2003) - Middlesex County Mosquito Commission
Jamesina Scott, PhD (2003) – Sacramento Mosquito Abatement District
Elizabeth Cosgrove, MS (2004) - unknown
Peter Gregory, MS, MPh (2004) – Hygienist, Aecom-Industrial
John LaPolla, PhD (2004) - Associate Professor of Biology at Towson University
Priscilla Collins, MS (2004) – Bristol County Mosquito Control Commission
Shaoming Huang, PhD (2006) – Entomologist, San Joaquin County Mosquito and Vector Control District
Xin Zhou, PhD (2006) - Executive Director, China National GeneBank
Jesse Litman, MS (2006) - (PhD at Cornell) Insect Conservation (Adjunct), Musée d'Histoire Naturelle de Neuchâtel
Anne Nielsen, PhD (2008) - Assistant Professor, Dept of Entomology, Rutgers New Brunswick
Jessica Ware, PhD (2008) - Assistant Professor, Dept of Biological Sciences, Rutgers Newark
Jianxing Zhang, PhD (2008) - USDA APHIS
Ben McGraw, PhD (2009) - Associate Professor, Dept of Plant Sciences, Penn State University
Daniel Elmowitz, MS (2009) – Morris County Mosquito Commission
Debin Sun, PhD (2009) - Essex County Mosquito Commission
Kristen Bartlett-Healy, PhD (2009); Postdoc at CVB 2009-2012 - Assistant Professor, Dept. of Entomology, Louisiana State University
Matthew Bickerton, MS (2011) – Middlesex County Mosquito Commission
Ary Farajollahi, MS, PhD (2005, 2014) – Superintendent Salt Lake City Mosquito Abatement District & Adjunct Professor Biology Department, University of Utah.
Eric Williges, MS (2014) - Superintendent Essex County Mosquito Control
Jennifer Gruener, MS (2014) – Warren County Mosquito Control Commission
Joe Ingerson-Mahar, PhD (2014) – Senior Program Coordinator, Rutgers Vegetable IPM Program
Andrea Egizi, PhD (2014) – Director of the Tick-Diseases Laboratory at Monmouth County Mosquito Control Division & Adjunct Professor at Rutgers Entomology.
Brian Johnson, PhD (2014) – Senior Research Officer, College of Public Health, Medical and Veterinary Sciences, James Cook University, Australia; Research Professor Rutgers CVB starting April 2017.
Alexandra Villard, PhD (2015) – Researcher at NJ Beneficial Insects Lab.
Dana C Price, PhD (2015) – Associate Research Professor, Dept of Plant Biology, Rutgers New Brunswick
Diana Carle, PhD (2015) - unknown
Paul Frandsen, PhD (2016) – Officer in Bioinformatics and Genomics, Office of Research Information Systems, Smithsonian Institution
John Cambridge., Ph.D. (2016) – Director, Insectarium, Philadelphia, PA
Scott Crans, MS. (2016) - Administrator of NJDEP Office of Mosquito Control Coordination
Richard Cooper, Ph.D. (2016) – Technical Director and Senior Entomologist, Cooper Pest Solutions
David Moskowitz, Ph.D. (2016) – Senior Vice President, EcolSciences, Inc.

Lauren Weidner, Ph.D. (2016) – Continuing Lecturer, Department of Entomology, Purdue University
Amanda Whispell, Ph.D. (2016) - Unknown

Appendix 2 – Literature Cited

(Entomology *faculty; **graduate student; ***post-doc)

- Blaauw BR***, Polk D, Nielsen AL*. 2014. IPM-CPR for peaches: Incorporating behaviorally-based methods to manage *Halyomorpha halys* and key pests in peach. **Pest Management Science**. DOI: 10.1002/ps.3955
- Cooper R**, Wang*, and N. Singh***. 2015. Evaluation of a model community-wide bed bug management program in affordable housing. **Pest Management Science** 71. DOI 10.1002/ps.3982
- Cowles RS, Rodriguez-Saona C*, Holdcraft R**, Loeb GM, Elsensohn JE, Hesler SP. 2015. Sucrose improves insecticide activity against *Drosophila suzukii* (Diptera: Drosophilidae). **Journal of Economic Entomology** 108: 640-653.
- Fonseca DM*, Unlu I***, Crepeau T, Farajollahi A**, Healy SP, Bartlett-Healy K***, Strickman D, Gaugler R*, Hamilton G*, Kline D, Clark GG. 2013. Area-wide management of *Aedes albopictus*: II. Gauging the efficacy of traditional integrated pest control measures against urban container mosquitoes. **Pest Management Science**. 69(12): 1351-1361.
- Lee JC, Barrantes LD, Beers EH, Burrack HJ, Dalton DT, Dreves, AJ, Gut LJ, Hamby KA, Haviland DR, Isaacs R, Nielsen AL*, Richardson T, Rodriguez-Saona CR*, Shearer PW, Stanley CA, Walsh DB, Walton WM, Yee WL, Zalom FG, Bruck DJ. 2013. Improving trap design for monitoring *Drosophila suzukii* (Diptera: Drosophilidae). **Environmental Entomology**. 42: 1348-1355.
- Egizi A**, Fefferman NH, Fonseca DM* 2015 Evidence that implicit assumptions of “no evolution” of disease vectors in changing environments can be violated on a rapid timescale. **Philosophical Transactions of the Royal Society Series B** 370(1665) DOI: 10.1098/rstb.2014.0136.
- Egizi A**, Kiser J, Abadam C, Fonseca DM*. 2016 [The hitchhiker's guide to becoming invasive: exotic mosquitoes spread across a US state by human transport not autonomous flight](#). **Molecular Ecology** (13): 3033-47
- Fonseca DM*, Widdel A, Spichiger S-E, Hutchinson M, Kramer LD. 2010. Fine-scale spatial and temporal population genetics of a new US mosquito reveal multiple introductions. **Molecular Ecology**. 19(8): 1559-72.
- Peyton EL, Campbell SR, Candeletti TM, Romanowski M, Crans WJ*. 1999. *Aedes (Finlaya) japonicus japonicus* (Theobald), a new introduction into the United States. **Journal of the American Mosquito Control Association** 15(2): 238-41.
- Singh N**, Wang C*, and Cooper R**. 2015. Effectiveness of a sugar-yeast monitor and a chemical lure for detecting bed bugs (299k PDF). **Journal of Economic Entomology** 108. DOI: 10.1093/jee/tov061.
- Wallner AM***, Hamilton GC*, Nielsen AL*, Hahn N**, Green EJ, Rodriguez-Saona CR*. 2014. Landscape factors facilitating the invasive dynamics and distribution of the brown marmorated stink bug, *Halyomorpha halys* (Hemiptera: Pentatomidae), after arrival in the United States. **PLoS One**. 9(5):e95691. doi: 10.1371/journal.pone.0095691. eCollection 2014.
- Xu J***, Fonseca DM*, Hamilton GC*, Hoelmer KA, Nielsen AL*. 2014. Tracing the origin of US brown marmorated stink bugs, *Halyomorpha halys*. **Biological Invasions**. 16(1): 153-166.

Appendix 3 - Position announcements for proposed entomology faculty positions

POSITION: Assistant/Associate Professor – Evolutionary Entomology

LOCATION: Department of Entomology, School of Environmental and Biological Sciences, Rutgers University, New Brunswick, NJ 08901

AVAILABILITY:

Applications for a tenure-track assistant professor (60% research, 40% teaching) in the Department of Entomology at Rutgers University are invited. The successful applicant will develop a nationally and internationally recognized program that delivers basic research and teaching with emphasis on evolutionary entomology and insect systematic. It is anticipated that the applicant will be a broadly trained invertebrate systematist and evolutionary entomologist whose research addresses emerging issues related to insect evolution broadly defined. Research focus areas on deep evolution using morphological and genetic or genomic datasets to study areas of insect evolution which include are not limited to insect diversification, insect divergence, ecology, and behavior. Competition for external funding including NSF and USDA-NIFA to support his or her program is expected. Postdoctoral experience with demonstrated productivity is strongly preferred.

We seek an innovative scientist whose interests complement research areas of current Department of Entomology members as well as multidisciplinary working groups in other centers and departments at Rutgers University; such interdisciplinary collaboration would be facilitated if the candidate's research program could include interests in ecology, behavior, physiology, physics or chemistry.

The successful applicant will teach and contribute to teaching graduate and undergraduate courses, particularly *Insect Classification* (UG), *Principles of Systematics* (G), *Insect Taxonomy* (G), *Insect Collection* (G) *Insect Ecology*, *Molecular Entomology Tech* (G) and relevant portions of *Insect Structure and Function* ? (UG, G) and related topics. Participation in departmental and university committees and in curriculum development is expected. Send resume, cover letter summarizing research interests and goals, and contact information for four references to lyon@aesop.rutgers.edu. Review of applications will begin {Insert Date} and recruitment will continue until the position is filled. For additional information contact George Hamilton at hamilton@aesop.rutgers.edu or 732-932-9774.

POSITION: Assistant Professor – Landscape Entomology

LOCATION: Department of Entomology, School of Environmental and Biological Sciences,
Rutgers University, New Brunswick, NJ 08901

AVAILABILITY:

Applications for a tenure-track assistant professor (50% research, 30% extension, 20% teaching) in the Department of Entomology at Rutgers University are invited. The successful applicant will develop a nationally and internationally recognized program that delivers basic and applied research, teaching and extension programming with emphasis on landscape ecology and insect ecology and management in forest and/or ornamental plant systems. It is anticipated that the applicant will be a broadly trained insect ecologist whose research addresses emerging issues in invasive forest pests and the interaction of landscape features that influence pest dynamics across heterogeneous landscapes. Research focus areas on the management of current and future pest problems (i.e., southern pine beetle, emerald ash borer), insect chemical ecology, insect behavior, biological control, trophic interactions or GIS are of particular interest. Competition for external funding including USDA Forest Service, to support his or her program is expected. Postdoctoral experience with demonstrated productivity is strongly preferred.

We seek an innovative scientist whose interests complement research areas of current Department of Entomology members as well as multidisciplinary working groups in other centers and departments at Rutgers University with interest in forest health, climate change impacts, invasive species management, and risk modeling. The successful candidate will also be expected to take a leadership role in interactions with the New Jersey Department of Environmental Protection, as well as communicate with key stakeholder groups as needed.

The successful applicant will teach and contribute to teaching graduate and undergraduate courses, particularly forest and landscape insect related topics which enhance cooperation with the Department of Ecology, Evolution and Natural Resources (e.g., forest entomology, ecology of invasive insects, insect behavior) and Landscape Architecture (urban forestry). Participation in departmental and university committees and in curriculum development is expected.

Send resume, cover letter summarizing research interests and goals, and contact information for four references to lyon@aesop.rutgers.edu. Review of applications will begin {Insert Date} and recruitment will continue until the position is filled. For additional information contact George Hamilton at hamilton@aesop.rutgers.edu or 732-932-9774.

POSITION: Assistant Professor – Vegetable Entomology

LOCATION: Department of Entomology, School of Environmental and Biological Sciences, Rutgers University, New Brunswick, NJ 08901 (Physical Location: Rutgers Agricultural Research and Extension Center, Bridgeton, NJ)

AVAILABILITY:

Applications for a tenure-track assistant professor and extension specialist (60% extension, 30% research, 10% teaching) in the Department of Entomology at Rutgers University are invited. The successful applicant will develop a nationally and internationally recognized program that delivers basic and applied research, teaching and extension programming with emphasis on the biology, ecology, and management of invertebrates of importance in vegetable production in New Jersey and the Northeast. It is anticipated that the applicant will be a broadly trained entomologist whose research addresses emerging issues related to the production of vegetable crops and that leads to the development of economically and environmentally sustainable management programs for vegetable crops in New Jersey and the surrounding region. Research focus areas may include, but are not limited to, plant-arthropod interactions, integrated pest management, emerging or newly introduced insect pests, and potential influences of climatic factors on insect growth and development. Competition for external funding including USDA-NIFA and other federal as well as state and industry funding sources to support his or her research and extension program is expected. Postdoctoral experience with demonstrated productivity is strongly preferred.

We seek an innovative scientist whose interests complement research areas of current Department of Entomology members as well as multidisciplinary working groups in other centers and departments at Rutgers University with interest in vegetable production, invasive species management, and sustainable crop production. The successful candidate will also be expected to take a leadership role in interactions with the New Jersey Department of Agriculture, as well as communicate with key stakeholder groups as needed. He or she will work closely with research and extension personnel, local farmers, agricultural organizations, and governmental and non-governmental organizations to plan and develop programs that support sustainable vegetable production in the area of entomology.

The successful applicant will teach and contribute to teaching graduate and undergraduate courses, particularly contribute guest lectures to the undergraduate courses *Insect Biology* and *Agricultural Entomology and Pest Management* and the graduate courses *Integrated Pest Management* and *Biological Control* and co-teach or teach insect related topics that enhance courses taught by the Department Plant Biology. Participation in departmental and university committees and in curriculum development is expected.

Send resume, cover letter summarizing research interests and goals, and contact information for four references to lyon@aesop.rutgers.edu. Review of applications will begin {Insert Date} and recruitment will continue until the position is filled. For additional information contact George Hamilton at hamilton@aesop.rutgers.edu or 732-932-9774.

POSITION: Assistant Professor – Insect Physiology

LOCATION: Department of Entomology, School of Environmental and Biological Sciences, Rutgers University, New Brunswick, NJ 08901

AVAILABILITY:

Applications for a tenure-track assistant professor (60% research, 40% teaching) in insect physiology in the Department of Entomology at Rutgers University are invited. The successful applicant will develop a nationally and internationally recognized program that delivers basic research and teaching with emphasis on insect physiology, and experience and interest in using molecular and genomic approaches to address fundamental questions in model insects, disease vectors, agriculture or urban pests. It is anticipated that the applicant will be a broadly trained in integrative approaches (from molecules to behavior/from genes to functional genomics) in insect physiology. Applications should also have a record of scholarly activities in their field demonstrated by peer-reviewed publications and gaining funding for their research. Postdoctoral experience and experience in teaching in a classroom setting are preferred.

The successful candidate is expected to develop a nationally and internationally recognized research program that will strengthen and complement the current programs in the department. Areas of interest include, but are not limited to, insect/microbe interactions, sensory neurophysiology and behavior, plant/insect/parasite tritrophic interactions, feeding and reproductive behaviors, and evolution of physiological processes, ideally synthesizing approaches across molecular, cellular and/or whole organismal levels.

The Department of Entomology at Rutgers University includes faculty, graduate students, and undergraduate majors and minors, with diverse interests spanning the spectrum from applied to fundamental studies. The successful applicant will teach and contribute to teaching graduate and undergraduate courses, particularly in Insect-Plant Biochemical Interactions, Toxicology of Insecticides, and relevant portions of Insect Structure and Function, and other related topics which enhance cooperation with the Department of Ecology, Evolution and Natural Resources or Plant Biology. Participation in departmental and university committees and in curriculum development is expected.

Send resume, cover letter summarizing research interests and goals, and contact information for four references to lyon@aesop.rutgers.edu. Review of applications will begin {Insert Date} and recruitment will continue until the position is filled. For additional information contact George Hamilton at hamilton@aesop.rutgers.edu or 732-932-9774.

POSITION: Assistant Professor – Beneficial Insect Biology

LOCATION: Department of Entomology, School of Environmental and Biological Sciences, Rutgers University, New Brunswick, NJ 08901

AVAILABILITY:

Applications for a tenure-track assistant professor (50% research, 30% extension, 20% teaching) in the Department of Entomology at Rutgers University are invited. The successful applicant will develop a nationally and internationally recognized program that delivers basic and applied research, teaching and extension programming with emphasis on beneficial insect biology, apiculture, and biological control. It is anticipated that the applicant will be a broadly trained biologist whose research addresses emerging issues related to beneficial insects.

We seek an innovative scientist whose interests complement research areas of current Department of Entomology members as well as multidisciplinary working groups in other centers and departments at Rutgers University with interest in pollinator health, biology and ecology of beneficial insects, and classical, conservation or augmentative biological control. The successful candidate will also be expected to take a leadership role in interactions with the New Jersey Department of Environmental Protection, as well as communicate with key stakeholder groups as needed. Competition for external funding including USDA-NIFA, EPA and other private and state agencies to support his or her program is expected. Postdoctoral experience with demonstrated productivity is strongly preferred.

The successful applicant will teach and contribute to teaching graduate and undergraduate courses, such as *Agricultural Entomology and Pest Management* (UG, guest lectures), *Apiculture* (UG), *Pollination Ecology* (UG, G), *Integrated Pest Management* (G, guest lectures), *Biological Control of Insect Pests* (G, guest lectures), *Insect Behavior* (G, guest lecture or co-teach), *Insect Ecology* (G, guest lectures) and related topics which enhance cooperation with the Department of Ecology, Evolution and Natural Resources or Plant Biology. Participation in departmental and university committees and in curriculum development is expected.

Send resume, cover letter summarizing research interests and goals, and contact information for four references to lyon@aesop.rutgers.edu. Review of applications will begin {Insert Date} and recruitment will continue until the position is filled. For additional information contact George Hamilton at hamilton@aesop.rutgers.edu or 732-932-9774.