

## Dorit Eliyahu

### Contact Information

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### Education

**Ph.D. in Entomology** with concentration in Behavioral Biology, May, 2007  
North Carolina State University, Raleigh, NC  
Dissertation: Chemical Communication in the German Cockroach: Pheromones and Heterospecific Courtship Eliciting Compounds.  
Adviser: Dr. Coby Schal  
Department of Entomology, College of Agriculture and Life Sciences

**M.S. in Plant Protection** (*Magna cum laude*), 2002  
Hebrew University, Faculty of Agricultural, Food and Environmental Quality Sciences, Rehovot, Israel  
Thesis: Aspects of the Control of Pheromone Production in the Cotton Bollworm, *Helicoverpa armigera*.  
Advisers: Dr. Shalom W. Applebaum and Dr. Ada Rafaeli  
Department of Entomology

**B.S. in Animal Sciences** (*Magna cum laude*), 1998  
Hebrew University, Faculty of Agricultural, Food, and Environmental Quality Sciences, Rehovot, Israel

### Professional Experience

#### Post-doctoral Research:

**University of Arizona, NIH Postdoctoral Excellence in Research and Teaching (PERT) Fellow** with Dr. J. Becerra, July 2009-present.

Understanding to role of chemistry in the evolutionary success of true bugs (Hemiptera: Heteroptera).

- Identification of defense chemicals.
- Chemical synthesis.
- Behavioral and predator assays to study the effectiveness of chemicals.

**Arizona State University, School of Life Sciences** with Dr. J. Liebig, August 2007-June 2009.  
Identification of reproductive-specific cuticular hydrocarbons responsible for regulating reproduction in nestmates in ants and termites.

- Chemical identification of reproductive-specific alkenes in *Zootermopsis nevadensis*.
- Behavioral assays for attraction of workers to reproductives in *Z. nevadensis*.
- Reproductive-specific hydrocarbons in the ant *Camponotus festinatus*.
- Role of cuticular hydrocarbons and venom alkaloids in reproductive recognition in the fire ant *Solenopsis invicta*.

**Doctoral Research:** Chemical identification of pheromones and their effects on cockroach behavior.

- Effects of stereochemistry on behavioral activity of the contact sex pheromone of the German cockroach, *Blattella germanica*: I showed that the natural stereoisomer is the least active.

- Identification of the chemical structure of a nymphal contact pheromone that elicits courtship behavior in the adult male German cockroach, *B. germanica*: I found that some of the nymphal components in female nymphs are identical to the adult female contact sex pheromone components while at least one (both in male and female nymphs) is novel.
- Comparative study of heterospecific cuticular components that elicit courtship behavior in the adult male German cockroach, *B. germanica*: I found that the chemicals in the heterospecifics may be similar, but not identical, to the German cockroach contact sex pheromone. I synthesized the proposed active chemical and thus confirmed the structure.
- Identification of the chemical structure of the volatile sex pheromone of wood cockroach, *Parcoblatta lata*.
- Analysis of maternal cuticular hydrocarbons of the German cockroach, *B. germanica*: I found that they serve as provisions in embryos and nymphs.

**M.S. Research:** Aspects of regulation of pheromone biosynthesis in the cotton bollworm, *Helicoverpa armigera*.

- Mode of action of pheromone biosynthesis activating neuropeptide (PBAN) on pheromone biosynthesis: Using radiolabeled precursors, I provided evidence that PBAN may act on Acetyl Coenzyme A Carboxylase in the fatty acid synthesis pathway, leading to pheromone biosynthesis.
- Inhibition of pheromone biosynthesis by male accessory gland peptides: I found that pheromonostatic peptide (PSP) from *Helicoverpa zea* inhibits pheromone production in *H. armigera*. I also found that an herbicide has pheromonostatic qualities.

#### Teaching Experience:

- Pima Community College, Adjunct Professor, Introduction to Biology (for majors), Spring, 2011.
- Arizona State University, Tempe, AZ: Guest lecture for "Animal Behavior", Fall, 2008.
- North Carolina State University, Raleigh, NC: Teaching assistant for "Techniques in Molecular Ecology and Evolution", Spring 2007.
- Hebrew University, Faculty of Agricultural, Food and Environmental Quality Sciences, Rehovot, Israel: Teaching assistant for "Introduction to Entomology (for non majors)", Fall 2001. I taught basic entomology concepts to small groups of undergraduate students as part of the laboratory portion of the course, and designed quizzes to evaluate their understanding.

**Assistant librarian**, Hebrew University, Faculty of Agricultural, Food and Environmental Quality Sciences, Rehovot, Israel  
November 1998 – March 2002.

**Veterinary student**, Koret School of Veterinary Medicine, Hebrew University  
October 1998 – February 2000.

#### Refereed Publications

\* Undergraduate author; ▲Equal contribution

**Eliyahu, D.**, \*Ceballos, R.A., \*Saeidi, V., and Becerra, J.X. (Submitted) Synergism versus potency in the defense secretions of Pentatomomorpha (Heteroptera) nymphs.

▲ **Eliyahu, D.**, ▲Nojima, S., Santangelo, R.G., Kiemle, D.J., Carpenter, S., Webster, F.X., Leal, W.S., Gemeno, C., and Schal, C. (2011) An unusual macrocyclic lactone sex pheromone of *Parcoblatta lata*, a primary food source of the endangered red-cockaded woodpecker. *Proc. Natl. Acad. Sci. USA PLUS* [doi: 10.1073/pnas.1111748109]

**Eliyahu, D.**, Ross, K.G., Haight, K.L., Keller, L., and Liebig J. (2011) Venom alkaloids and cuticular hydrocarbons indicate differences in queen genotype, colony structure, and fertility status in the fire ant *Solenopsis invicta*. *J. Chem. Ecol.* 37:1242-1254.

**Eliyahu, D.**, Nojima, S., Mori, K., and Schal, C. (2009) Jail baits: How and why nymphs mimic adult females of the German cockroach, *Blattella germanica*. *Anim. Behav.* 78: 1097-1105.

Liebig, J., **Eliyahu, D.**, and Brent, C.S. (2009) Cuticular hydrocarbon profiles indicate reproductive status in the termite *Zootermopsis nevadensis*. *Behav. Ecol. Sociobiol.* 63: 1799-1807.

**Eliyahu, D.**, Nojima, S., Mori, K., and Schal, C. (2008) Identification of new contact sex pheromone components of the German cockroach, *Blattella germanica*, predicted from the proposed biosynthetic pathway. *J. Chem. Ecol.* 34: 229-237.

**Eliyahu, D.**, Nojima, S., Capracotta, S.S., Comins, D.L., and Schal, C. (2008) Identification of cuticular compounds responsible for eliciting interspecific courtship in the male German cockroach, *Blattella germanica*. *Naturwissenschaften* 95: 403-412.

Fan, Y., **Eliyahu, D.**, and Schal, C. (2008) Insect cuticular hydrocarbons as maternal provisions in embryos and nymphs. *J. Exp. Biol.* 211: 548-554.

**Eliyahu, D.**, Mori, K., Takikawa, H., Leal, W.S., and Schal, C. (2004) Behavioral activity of stereoisomers and a new component of the contact sex pheromone of the female German cockroach, *Blattella germanica*. *J. Chem. Ecol.* 30:1839-1848.

**Eliyahu, D.**, Applebaum, S.W., and Rafaeli, A. (2003). Moth sex-pheromone biosynthesis is inhibited by the herbicide Diclofop. *Pesticide Biochem. Physiol.* 77:75-81.

**Eliyahu, D.**, Nagalakshmi, V., Applebaum, S.W., Kubli, E., Choffat, Y., and Rafaeli, A. (2003). Inhibition of pheromone biosynthesis in *Helicoverpa armigera* by pheromonostatic peptides. *J. Insect Physiology* 49:569-574.

## Book Chapters

Smith, C.R., Dolezal, A., **Eliyahu, D.**, Holbrook, C.T., and Gadau, J. (2009) Ants (Formicidae): Models for social complexity. *Cold Spring Harb. Protoc.* DOI:10.1101/pdb.emo125

**Eliyahu, D.** (2009) GC-MS for characterization and identification of ant semiochemicals. *Cold Spring Harb. Protoc.* DOI:10.1101/pdb.prot5249.

## Non-Refereed Publications

Santangelo, R.G., **Eliyahu, D.**, Gore, J.C., Waldvogel, M.G., and Schal, C. (2007) Controlling cockroaches in insect-rich environments. *Pest Control Technology* October, 80, 83-84, 86, 88, 90.

## Invited Talks

**Eliyahu, D.** (2011) Remember to stop and smell the roaches (and the ants, termites, and true bugs): Exploring chemical communication in insects. Entomology Seminar Series, University of Arizona, Tucson, AZ.

Eliyahu, D. (2010) Beer and wine? Just give me vodka! Synergism vs. potency in defense chemicals of true bugs. Annual Meeting of the Entomological Society of America, San Diego, CA.

**Eliyahu, D.** (2009) Sex, deceit, and control: My experience with insect pheromones. Evolutionary Biology, University of Basel, Basel, Switzerland.

**Eliyahu, D.** (2007) Restless Suitors: Courtship in the German cockroach, *Blattella germanica*. Social Insect Research Group, Arizona State University, Tempe, AZ.

**Eliyahu, D.,** Fan, Y., Mori, K., Leal, W.S., and Schal, C. (2004) Contact pheromones in the German cockroach: Not just about sex. 2004 Animal Behavior Conference. Indiana University, Bloomington, IN.

## Professional Presentations

**Eliyahu, D.** (2011) Beer and wine? Just give me vodka! Synergism vs. potency in defense chemicals of true bugs. 27<sup>th</sup> Meeting of the International Society of Chemical Ecology, Burnaby, British Columbia. And: Sixth International Symposium on Molecular Insect Science, Amsterdam, The Netherlands. (Poster Presentations)

**Eliyahu, D.** (2011) From delivery to self-serve: Converting a general biology class from lectures to group discussions. National IRACDA Conference, Houston, TX.

**Eliyahu, D.** (2008) Royal chemistry: Cuticular hydrocarbons and their possible role as a primer pheromone in a dampwood termite. Breakout meeting of the North American Section of the International Union for the Study of Social Insects, Arecibo, PR.

**Eliyahu, D.** (2007) New pheromone components predicted from the biosynthetic pathway in *Blattella germanica* and basic for courtship of nymphs and other species. Annual Meeting of the Entomological Society of America, San Diego, CA. (Poster Presentation)

**Eliyahu, D.** (2007) Sensitive guys: German cockroach males exhibit courtship behavior upon contact with unsuitable mates, The Eighth Annual Student and Postdoctoral Symposium of the W.M. Keck Center for Behavioral Biology. Raleigh, NC.

**Eliyahu, D.** (2006) Scent of a woman? Contact with several cockroach species elicits courtship in male German cockroaches. Annual meeting of the Entomological Society of America, Indianapolis, IN.

**Eliyahu, D.,** and Schal, C. (2005) "Jail-bait": Nymph pheromone triggers courtship in adult male German cockroaches, *Blattella germanica*. Annual Meeting of the International Society of Chemical Ecology, Washington, DC. (Poster Presentation)

**Eliyahu, D.,** Fan, Y., and Schal, C. (2005) Maternal provisioning of cuticular hydrocarbons in the German cockroach. Southeastern Branch Meeting of the Entomological Society of America, Tunica, MS.

**Eliyahu, D.** (2005) Sexual mimicry in the German cockroach. The Sixth Annual Student and Postdoctoral Symposium of the W.M. Keck Center for Behavioral Biology. Raleigh, NC.

**Eliyahu, D.,** Fan, Y., and Schal, C. (2004) Sexual mimicry in the German cockroach. Annual meeting of the Entomological Society of America, Salt Lake City, UT.

Fan, Y., **Eliyahu, D.,** Youngsteadt, E., Brookhart, G.L., Stay, B., and Schal, C. (2004) Maternal provisioning of cuticular hydrocarbons to embryos in two cockroach species. Annual meeting of the Entomological Society of America, Salt Lake City, UT.

Gore, J.C., Santangelo, R.G., **Eliyahu, D.**, Waldvogel, M.G., Stringham, S.M., and Schal, C. (2004) Of pig sties and butterflies: Cockroach population management in sensitive structural environments. Annual meeting of the Entomological Society of America, Salt Lake City, UT.

**Eliyahu, D.**, Fan, Y., Mori, K., Takikawa, H., Leal, W.S., and Schal, C. (2004) Pheromone stereochemistry and sexual mimicry: A closer look at the sex life of cockroaches. The Joint Meeting of the International Society of Chemical Ecology and the Phytochemical Society of North America, Ottawa, ON.

**Eliyahu, D.**, Mori, K., Leal, W.S., and Schal, C. (2004) Behavioral activity of stereoisomers and a new component of the contact sex pheromone of female German cockroach. Entomological Society of America Southeastern Branch meeting, Charleston, SC.

**Eliyahu, D.**, Fan, Y., and Schal, C. (2003) Love thy neighbor: Nymphs of the German cockroach, *Blattella germanica* (L.) elicit courtship behavior in conspecific adult males. Entomological Society of America National meeting, Cincinnati, OH.

### Selected Awards, Grants and Fellowships

- National Geographic Society – Research and Exploration grant (pre-application approved) (requested \$15,600)
- University of Arizona Center for Insect Science Postdoctoral travel award, Sixth International Symposium on Molecular Insect Science, Amsterdam, The Netherlands, October 2011 (\$1,000)
- NIH-IRADA-PERT fellowship, 2009-2012 (\$180,000)
- Postdoctoral travel award, North American Section of the International Union for the Study of Social Insects, Arecibo, Puerto Rico, October 2008. (\$500)
- North Carolina Entomological Society Outstanding PhD Student award, November 2006.
- North Carolina Pest Control Association's Indoor Urban Entomology Scholarship, November 2004 (\$2,000)
- Student travel award, Joint Meeting of the International Society of Chemical Ecology and the Phytochemical Society of North America, Ottawa, Canada, July 2004. (\$500)

### Professional Affiliations & Professional Development

- Biodiversity of True Bugs OTS course, Costa Rica, 2010
- Graduate Student Professional Development Workshop, Chapel Hill, NC, 2005 (<http://harvest.cals.ncsu.edu/index.cfm?showpage=558>)
- Professional Development Workshop of the W.M. Keck Center for Behavioral Biology, Raleigh, NC, 2005
- Member of the International Society of Chemical Ecology
- Member of the Entomological Society of America
- Member of the American Association for the Advancement of Science
- Member of the International Union for the Study of Social Insects (2007-2009)

### Technical Skills

Chromatographic techniques, chemical analysis and synthesis, insect rearing, behavioral and physiological bioassays, Blackboard.

Languages: English (fluent), Hebrew (native), Spanish, French, Arabic.

## Institutional Service & Outreach Activities

- Reviewer: Naturwissenschaften, European Journal of Biology, National Science Foundation
- Postdoctoral representative, PERT Selection Committee, Fall 2011 Search
- Small group leader, Undergraduate Biology Research Program, Summer 2011
- Mentor, MCB181 Student project, Fall 2010
- Organizer, PERT Undergraduate Student Recruitment Event, Spring 2010
- Mike Duke Memorial Seminar committee, Entomology Graduate Student Association, 2005–2006
- President, Entomology Graduate Student Association, 2004–2005
- Outreach committee, Entomology Graduate Student Association, 2003–2005
- Organizer of cockroach display, Bugfest, NC Museum of Natural Sciences, 2004–2006 (<http://bugfest.org/>)
- Linnaean Games, team member, 2003–2005 (2003 National Champions)
- Entomology outreaches in schools (8 activities, 40-120 K-12 students each)

## References:

### **Coby Schal, PhD – PhD adviser**

Blanton J. Whitmire Professor

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### **Juergen Liebig, PhD – Postdoctoral adviser**

Assistant Professor

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### **Judith Becerra, PhD – Postdoctoral adviser**

Associate Research Professor

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### **Jennifer Katcher, MS – Teaching mentor**

Biology Instructor

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