

# Adrian A. Smith

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North Carolina Museum of Natural Sciences  
11 W. Jones Street  
Raleigh, NC 27601  
Email: [Adrian.Smith@naturalsciences.org](mailto:Adrian.Smith@naturalsciences.org)  
Website: [adrianalansmith.com](http://adrianalansmith.com)

## Appointments

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- 2016 - Current    **North Carolina Museum of Natural Sciences**  
Head, Evolutionary Biology & Behavior Research Lab. Raleigh, NC
- 2016 - Current    **North Carolina State University**  
Research Assistant Professor, Department of Biological Sciences. Raleigh, NC

## Education

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- 2006 - 2011    **Arizona State University**  
School of Life Sciences, Center of Social Dynamics and Complexity, Tempe, AZ  
Ph. D., Biology; December 2011  
Dissertation: “The Regulation of Worker Reproduction in the Ant *Aphaenogaster cockerelli*”  
Major Advisors: Dr. Bert Hölldobler and Dr. Jürgen Liebig
- 2002 - 2006    **Florida State University**  
Department of Biological Sciences, Tallahassee, FL  
B. S., Biological Sciences

## Research Experience & Training

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- 2011 - 2015    Postdoctoral Research Associate  
Supervisors: Dr. Andrew V. Suarez and Dr. Lawrence M. Hanks  
Dept. of Entomology, University of Illinois at Urbana-Champaign
- 2009            Ant Course, California Academy of Sciences  
Portal, Arizona
- 2009            Biomimicry and Design Workshop, The Biomimicry Guild (now Biomimicry 3.8)  
Playa Uvita, Costa Rica
- 2003 - 2006    Laboratory Assistant/ Independent Researcher  
Supervisor: Dr. Walter R. Tschinkel  
Dept. of Biological Sciences, Florida State University
- 2005            Field Research Assistant  
Supervisors: Dr. Blaine J. Cole and Dr. Diane C. Wiernasz  
Dept. of Biology and Biochemistry, University of Houston, Houston, TX

## Research Publications

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- In review Sorger, D. M., Zima jr., J., **Smith, A. A.**, Schal, C., Zettel, H., Pal, A., Dunn, R. R., Janda, M. The hidden diversity of trap-jaw ants (Hymenoptera: Formicidae: Ponerinae: *Odontomachus*) along elevational gradients in Borneo. *Zoological Journal of the Linnean Society*
- 19 **Smith, A. A.**, Liebig, J. 2017. The evolution of cuticular fertility signals in eusocial insects. *Current Opinion in Insect Science* 22: 79-84.
- 18 Fox, E. G. P., **Smith, A. A.**, Gibson, J. C., Solis, D. R. 2017. Larvae of trap-jaw ants, *Odontomachus* LATREILLE, 1804 (Hymenoptera: Formicidae): morphology and biological notes. *Mrymecological News* 25: 17-28.
- 17 **Smith, A. A.**, Millar, J. G., Suarez, A. V. 2016. Comparative analysis of fertility signals and sex-specific cuticular chemical profiles of *Odontomachus* trap-jaw ants. *Journal of Experimental Biology* 219: 419-430. [Featured article by Inside JEB]
- 16 O'Fallon, S.\*, Suarez, A. V., **Smith, A. A.** 2016. A comparative analysis of rapid antennation behavior in four species of *Odontomachus* trap-jaw ants. *Insectes Sociaux* 63: 265-270.  
\*[undergraduate mentee]
- 15 Penick, C. A. and **Smith, A. A.** 2015. The true odor of the odorous house ant. *American Entomologist*. 61: 127-128.
- 14 **Smith, A. A.**, Millar, J. G., Suarez, A. V. 2015. A social insect fertility signal is dependent on chemical context. *Biology Letters*, 11: 20140947. [Cover article]
- 13 Scholes, D. R., Suarez, A. V., **Smith, A. A.**, Johnston, J. S., Paige, K. N. 2014. Organ-specific patterns of endopolyploidy in the giant ant *Dinoponera australis*. *Journal of Hymenoptera Research*, 37: 113-126.
- 12 **Smith, A. A.**, Vanderpool, W.\*, Millar, J. G., Hanks, L. M., Suarez, A. V. 2014. Conserved male-specific cuticular hydrocarbon patterns in the trap-jaw ant *Odontomachus brunneus*. *Chemoecology*, 24: 29-34. [\*undergraduate mentee]
- 11 **Smith, A. A.**, Millar, J. G., Hanks, L. M., Suarez, A. V. 2013. A conserved fertility signal despite population variation in the cuticular chemical profile of the trap-jaw ant *Odontomachus brunneus*. *Journal of Experimental Biology*, 216: 3917-3924.
- 10 Penick, C. A., Copple, R. N.\*, Mendez, R. A., **Smith, A. A.** 2012. The role of anchor-tipped larval hairs in the organization of ant colonies. *PLoS ONE*, 7: e41595. [\*undergraduate mentee]
- 9 **Smith, A. A.**, Millar, J. G., Hanks, L. M., Suarez, A. V. 2012. Experimental evidence that workers recognize reproductives through cuticular hydrocarbons in the ant *Odontomachus brunneus*. *Behavioral Ecology and Sociobiology*, 66: 1267-1276.
- 8 **Smith, A. A.**, Overson, R. P., Hölldobler, B., Gadau, J., Liebig, J. 2012. The potential for worker reproduction in the ant *Aphaenogaster cockerelli* and its absence in the field. *Insectes Sociaux*, 59: 411-416.

- 7 **Smith, A. A., Hölldobler, B., and Liebig, J.** 2012. Queen specific signals and worker punishment in the ant *Aphaenogaster cockerelli*: the role of the Dufour's gland. *Animal Behaviour*, 83: 587-593. [Featured article]
- 6 **Smith, A. A., Hölldobler, B., and Liebig, J.** 2011. Reclaiming the crown: queen to worker conflict over reproduction in *Aphaenogaster cockerelli*. *Naturwissenschaften*, 98: 237–240. [Cover article]
- 5 Holbrook, C. T., Clark, R. M., Moore, D., Overson, R. P., Penick, C. A., **Smith, A. A.** 2010. Social insects inspire human design. *Biology Letters*, 6: 431-433.
- 4 Cole, B. J., **Smith, A. A.**, Huber, Z. J., and Wiernasz, D. C. 2010. The structure of foraging activity in colonies of the harvester ant, *Pogonomyrmex occidentalis*. *Behavioral Ecology*, 21: 337-342.
- 3 **Smith, A. A., Hölldobler, B., and Liebig, J.** 2009. Cuticular hydrocarbons reliably identify cheaters and allow enforcement of altruism in a social insect. *Current Biology*, 19, 79-81. [Highlighted in: *Nature and Current Biology*.]
- 2 **Smith, A. A., Hölldobler, B., and Liebig, J.** 2008. Hydrocarbon signals explain the pattern of worker and egg policing in the ant *Aphaenogaster cockerelli*. *Journal of Chemical Ecology*, 34: 1275-1282.
- 1 **Smith, A. A.** and Haight, K. L. 2008. Army ants as research and collection tools. *Journal of Insect Science*, 8: 71

## Teaching Experience

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### Course Instruction and design

- 2017 **BSC/ARC/IPGE 295 Biologically Inspired Design** (Lead Instructor and Curriculum Creator)  
Department of Biological Sciences & School of Architecture, North Carolina State University
- 2015 **Ant Course 2015**, California Academy of Sciences field course, Portal, AZ (Outreach instructor, digital multimedia). [Worked with 34 graduate and professional students to create and publish research and outreach videos.]
- 2011 - 2012 **Biology for Biomimics**, online (Lead Instructor and Curriculum Creator)  
The Biomimicry Professional Certification Program, The Biomimicry Institute (now Biomimicry 3.8). [Online live and pre-recorded lectures with 12 professional (masters-level) students, accompanied by discussions and coursework through the Moodle platform.]
- 2011 **BIO/IND 494/598 Biologically Inspired Design** (Lead Instructor and Curriculum Creator)  
School of Life Sciences & The Design School, Arizona State University  
[3 credit hour face-to-face course that I designed from scratch. 23 junior and senior undergraduate and 3 graduate students from design, biology, and engineering.]

### Assistantships and Laboratory Instruction

- 2009 - 2011 **IND/GRA/MGT 464, Collaborative Design and Development I & II** (Teaching Assistant)  
InnovationSpace, The Design School, Arizona State University

- 2008        **BIO 201, Human Anatomy and Physiology I** (Lab Instructor). School of Life Sciences, Arizona State University
- 2007        **BIO 187, General Biology I** (Lab Instructor). School of Life Sciences, Arizona State University
- 2006        **BIO 100, The Living World** (Lab Instructor). School of Life Sciences, Arizona State University

#### **Guest Lectures**

- 2016        **NCSU Library Workshop: Promote Your Research using Video.** North Carolina State University libraries.
- 2016        **BIO592 Science in the Public and Professional Sphere.** Biology, North Carolina State University
- 2015        **ART 335 & 445 Photography II & III.** Visual & Performing Arts Division, Earlham College
- 2014 & 2015    **ENV 394 Science Communication: The art and practice of science storytelling.** Biology, Northern Kentucky University
- 2014        **IB 535, Biology and Tech Innovation.** Integrative Biology, University of Illinois at Urbana-Champaign. Online course.
- 2013 & 2014    **ENG 333, Creativity, Innovation, and Vision.** Engineering, University of Illinois at Urbana-Champaign
- 2013        **IB/MATH 299, BioMath.** Integrative Biology, University of Illinois at Urbana-Champaign
- 2013        **IB 329, Animal Behavior.** Integrative Biology, University of Illinois at Urbana-Champaign
- 2013        **IB 109, Insects and People.** Integrative Biology, University of Illinois at Urbana-Champaign
- 2012        **IB 445, Chemical Ecology.** Integrative Biology, University of Illinois at Urbana-Champaign

#### **Teaching Conferences**

- 2011        Biology + Design. Biomimicry Education Summit. Cleveland, OH. (*invited panelist*)
- 2011        Presentation: *Biology into design module: self-organization and group behavior.* Biomimicry in Higher Education Webinar. The Biomimicry Institute.
- 2010        Presentation: *Biomimicry in a new product development classroom.* Biomimicry Education Summit. San Francisco, CA. (*invited speaker*)
- 2009        Biomimicry Education Summit. Jackson Hole, WY.

#### **Teaching-related Publications**

- 1            **Smith, A. A.** and Fischer, H. 2011. Innovating from life. In: *The Business of Sustainability: Trends, Policies, Practices, and Stories of Success*, ed. S. G. McNall, J. C. Hershauer, and G. Basile. Santa Barbara, CA: Praeger, pp. 313-328.

# Student Mentorship

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## Student Research Publications

- 2014 - 2015 Sean O’Fallon: Undergraduate, University of Illinois; **first-authored** publication 16 above.
- 2013 Anne Curé: Undergraduate, University of Illinois; **acknowledged contribution** to publication 14 above.
- 2012 – 2013 Whitney Vanderpool: Undergraduate, University of Illinois; **co-authorship** of publication 12 above.
- 2012 Francisca Casas: Undergraduate, University of Illinois; **acknowledged contribution** to publication 11 above.
- 2011 R. Neal Cople: Undergraduate, Arizona State University; **co-authorship** of publication 10 above.
- 2010 James Garcia: Undergraduate, Arizona State University; **acknowledged contribution** to publication 6 above.

## Facilitation of Student Research Grants

- 2016-2017 Undergraduate Research Grant Award, Office of Undergraduate Research, NCSU. Awarded to Omar Halawani - \$1,000
- 2016 Summer Office of Undergraduate Research (OUR), Office of Undergraduate Research, NCSU. Awarded in support of Bria Pearson & Omar Halawani - \$2,000
- 2016 Support for Undergraduate Research Experiences (SURE), Department of Biological Sciences, NCSU. Awarded in support of Omar Halawani - \$1,000

# Research Grants and Awards

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- 2017 Teaching grant - CUREs (Course-based Undergraduate Research Experiences) award, NCSU Office of Undergraduate Research, \$1,250
- 2016 Early Career Professional Outreach and Public Engagement Award, Entomological Society of America
- 2016 - 2018 PI - “Finding the next antibiotics: Putting evolutionary theory into practice”, TriCEM Seed Research Grant, \$20,000
- 2015 Stinger Award – 2015 YouTube Your Entomology Contest, Entomological Society of America
- 2014 Stinger Award – 2014 YouTube Your Entomology Contest, Entomological Society of America
- 2012 - 2014 Research Grant, Pest Management Foundation, National Pest Management Association, \$5,000
- 2012 George C. Eickwort Research Award - North American Section – International Union for the Study of Social Insects, \$1,000
- 2011 Profiled as an “outstanding graduate student” by Graduate College, ASU
- 2010 1st Place & Best of Show, Creative Crafts – Metal working (zinc cast of Harvester ant nest), Arizona State Fair, \$5

- 2010 NSF- Animal Behavior. Social Biomimicry: Conference on Insect Societies and Human Design. *One of six conference organizers* (PI – Jennifer Fewell), \$16,838
- 2009 Frontiers in Life Sciences Workshop Grant, School of Life Sciences, ASU, \$30,000
- 2008 Best Student Oral Presentation, North American Section – International Union for the Study of Social Insects, Puerto Rico Meeting

## Professional Service

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### Positions Held

- 2017 - Current SysEB Section Rep - Education and Outreach Committee; Entomological Society of America
- 2015 External examiner: Biology and Environmental Science Oral Comprehensive Exams, Earlham College
- 2013 - 2014 Conference symposium organizer. *Insect communication through cuticular chemicals*. International Society of Chemical Ecology & Chemical Signals in Vertebrates meeting
- 2009 - 2011 Biomimicry Fellow; Biomimicry 3.8. Missoula, Montana; <http://biomimicryinstitute.org>
- 2010 - 2011 Guest Instructor; Nature's Design Studio: A Biomimicry Workshop. Center for Teacher Success, Phoenix, AZ
- 2009 - 2010 Conference Organizing Committee Member, Frontiers in Life Sciences Conference, Arizona State University. *Social Biomimicry: Insect Societies and Human design*
- 2007 - 2009 Mentor; Graduate Partners in Science Education (GPSE) / Science Investigators Club. School of Life Sciences, Arizona State University & Phoenix Preparatory Academy, Phoenix, AZ
- 2007 - 2008 President, Animal Behavior Reading Group, Arizona State University

### Peer Reviewer

*Animal Behaviour* (2), *American Naturalist* (2), *Behavioral Ecology*, *Behavioral Ecology and Sociobiology*, *BioEssays*, *Biological Invasions*, *BMC Ecology*, *Chemoecology*, *Current Opinion in Insect Science*, *Insectes Sociaux*, *Journal of Chemical Ecology*, *Journal of Ethology*, *Journal of Experimental Biology* (3), *Journal of Insect Behavior* (2), *Journal of Insect Physiology* (3), *Journal of Insect Science*, *Molecular Ecology*, National Science Foundation, *Naturwissenschaften*, *Physiological Entomology*, *PloS One* (4), *Proceedings of the Royal Society B*

### Professional Society Membership

International Union for the Study of Social Insects, North American Section; Entomological Society of America

## Selected Presentations

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- 2017 Smith, A. A. *Science communication, chemical communication, and the study of ant societies*. Department of Biology, University of North Carolina, Pembroke. **Invited seminar.**

- 2016 **Smith, A. A.** *Chemical communication and the organization of ant societies*. Department of Evolution, Ecology, and Organismal Biology Seminar, The Ohio State University. **Invited seminar.**
- 2016 **Smith, A. A.** *Science communication via video*. MEAS-FER 2016, Research Symposium. Departments of Forestry & Environmental Resources, Marine Earth, & Atmospheric Sciences, NC State University. **Invited speaker.**
- 2015 **Smith, A. A.** *The importance of being a spokesperson for your science and communicating basic biology through digital multimedia*. **Entomology Society of America**, Minneapolis, MN. **Invited speaker.**
- 2015 **Smith, A. A.** *Chemical communication and the organization of ant societies*. Northern Kentucky University, Department of Biology. **Invited seminar.**
- 2015 **Smith, A. A.** *Chemical communication and the organization of ant societies*. Earlham College, Department of Biology. **Invited seminar.**
- 2014 **Smith, A. A.** *Contact pheromones and the maintenance of a reproductive division of labor in ant societies*. University of Cincinnati, Department of Biological Sciences. **Invited seminar.**
- 2012 **Smith, A. A.** *Policing of worker reproduction in the ant *Aphaenogaster cockerelli**. University of Illinois at Urbana-Champaign, **Department of Entomology Colloquium.**
- 2008 **Smith, A. A., Hölldobler, B. and Liebig, J.** Warranted aggression: the informational basis of physical policing in an ant society. North American Section – **International Union for the Study of Social Insects**, Arecibo, Puerto Rico. (*awarded best student presentation*)
- 2006 **Smith, A. A.** and King, J. R. Poster: Observations on predation of the trap-jawed ant, *Odontomachus brunneus*, by *Formica archboldi*. **Congress of International Union for the Study of Social Insects**, Washington D.C

## Notable Published Media

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### Podcast

**Age of Discovery** - <http://www.aodpod.com/>

*An audio show I created in 2013 featuring in-depth interviews with biologists about their personal academic histories. Freely distributed online and through iTunes.*

Episodes:

[Dr. Alex Wild](#) (University of Texas at Austin), [Prof. May Berenbaum](#) (University of Illinois), [Prof. Joan Strassmann](#) (Washington University), [Prof. Walter Tschinkel](#) (Florida State University), [Prof. Eric Pianka](#) (University of Texas at Austin), [Prof. Bert Hölldobler](#) (Arizona State University), [Prof. Jerry Coyne](#) (University of Chicago), [Prof. Marlene Zuk](#) (University of Minnesota), [Prof. Steven Vogel](#) (Duke University), [Prof. Ted Schultz](#) (Smithsonian Institution)

### Videos

My research internet video channels – [YouTube](#) & [Vimeo](#)

Highlights:

[Ant Course 2015 student workshop videos](#) – Outreach component of 10 day field course.

[“Escape from the Jaws of Death!”](#) – A part of my [“Explained by the Author”](#) video series.

Featuring a colleague explaining research paper results; featured by Smithsonian, National Geographic News, Wired, Huffington Post, among others. 59,000+ views. Winner 2015 YouTube Your Entomology, Entomological Society of America.

[“Eric Pianka reads Kurt Vonnegut’s \*Requiem\*”](#) – Part one of a series of dramatic readings and visual interpretations of ecologically-inspired poetry, with Prof. Eric R. Pianka of UT Austin.  
[“Termite Hunter – Trap-jaw ants and termites”](#) – Winner 2014 YouTube Your Entomology, Entomological Society of America.  
[“Trap-jaw ant, \*Odontomachus brunneus\*”](#) – 15 sec. short that received national [blog attention](#) and was [featured on exhibit](#) in “The Machine Inside: Biomechanics” at The Field Museum in Chicago.

**Cover photos** *Molecular Biology and Evolution* (vol. 32, issue 11, November 2015)  
*Biology Letters* (vol.11, issue 1, January 2015)  
*Naturwissenschaften* (vol. 98, issue 4, April 2011)  
*Cold Spring Harbor Protocols* (vol. 4, issue 7, July 2009)

## Notable Media Appearances

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### Press release authorship

“Research yields new details about trap-jaw ants” 08May2017. Covered by Live Science, Gizmodo, Entomology Today  
“Researchers get first look at new extremely rare galaxy” 04Jan2017. Covered by CNN, Fox News, Gizmodo, Wired, BBC, Space.com, and more.

### Research coverage

BBC news, National Geographic News, Time.com, Times of India, Chemical & Engineering News, Wired & NPR’s Science Friday, Discovery Channel, Der Spiegel

### Television

2011 National Geographic & Ammonite Production: *City of Ants*  
2008 KAET 8; ASU Research Review: *Social Interactions of Ants*

### Radio

2016 NPR – WUNC, State of Things, 14 June, *The Ant Man*  
2015 NPR – Science Friday, 12 June 2015, *This Ant Stinks*  
2010 NPR – KJZZ Phoenix, Morning Edition, February 8th. *Biomimicry Institute @ ASU*

### Internet (print)

2015 Wired – contributor to [“Let’s nerd out about ants before you see \*Ant-man\*”](#)

### Podcast

2015 Breaking Bio Episode 77 – [“From Ants to Academics with Dr. Adrian Smith”](#)

### Print

2016 “Counting the reasons to love ants” - newspaper column, *The News & Observer*