

# Adrian A. Smith

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North Carolina Museum of Natural Sciences  
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## 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

## Experience & Training

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- 2018            2018 Filmmaker Labs Fellow; International Wildlife Film Festival, Filmmaker Labs  
Missoula, Montana
- 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

## Professional Publications [peer reviewed, unless noted ^ as editorial review; \*undergraduate mentee]

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- 26 **Smith, A. A.** 2018. Prey specialization and chemical mimicry between *Formica archboldi* and *Odontomachus* ants. *Insectes Sociaux*. DOI: 10.1007/s00040-018-0675-y
- 25 Larabee, F., **Smith, A. A.**, Suarez, A. 2018. Snap-jaw morphology is optimized for high-speed power amplification in the Dracula ant, *Mystrium camillae*. *Royal Society Open Science*. 5:181447.
- 24 **Smith, A. A.**, Suarez, A. V., Liebig, J. L. 2018. Queen pheromones out of context: a comment on Holman. *Behavioral Ecology* 29: 1212.  
[Invited commentary on Holman, L. 2018. *Queen pheromones and reproductive division of labour: a meta-analysis*]
- 23 **Smith, A. A.** 2018. Use video to cut through jargon. *Nature* 556: 397-398. ^  
[Careers column; Online posting title: *YouTube Your Science*]
- 22 Penick, C. A., Halawani, O. \*, Pearson, B. \*, López-Urbe, M. M., Mathews, S., Dunn, R. R., **Smith, A. A.** 2018. External immunity in ant societies: Sociality and colony size do not predict investment in antimicrobials. *Royal Society Open Science* 5:171332.
- 21 Dunn, R. R., Duggan, G., **Smith A. A.** Ants, art, and science. *SciArt Magazine* Feb. 2018. Online: <https://www.sciartmagazine.com/collaboration-ants-art-and-science.html> ^ [Reprinted in May-June 2018 issue of *American Scientist*]
- 20 **Smith, A. A.**, Liebig, J. 2017. The evolution of cuticular fertility signals in eusocial insects. *Current Opinion in Insect Science* 22: 79-84.
- 19 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. *Mymecological News* 25: 17-28.
- 18 **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]
- 17 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.
- 16 Penick, C. A. and **Smith, A. A.** 2015. The true odor of the odorous house ant. *American Entomologist*. 61: 127-128.
- 15 **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]
- 14 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.

- 13 **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.
- 12 **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.
- 11 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.
- 10 **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.
- 9 **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.
- 8 **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]
- 7 **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]
- 6 **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. ^
- 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.
- 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

- 2018            **BIO 592 Creative Video Production for Scientists** (Instructor and Curriculum Creator)  
Department of Biological Sciences, North Carolina State University
- 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**

- 2014, 2015, 2017    **ENV 394 Science Communication: The art and practice of science storytelling.** Biology, Northern Kentucky University
- 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            **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.

## Student Mentorship

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### Undergraduate Research Publications

- 2016 - 2017    Bria Pearson & Omar Halawani, North Carolina State University; **co-authorship** to publication 20 above.
- 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 Copple: 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 Undergraduate 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

### Graduate Student Advisement

- 2017 - 2019    Omar Halawani, M.S. Biology program, North Carolina State University

## Research Grants and Awards

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2018	Stinger Award – 2018 YouTube Your Entomology Contest, Entomological Society of America
2016 - 2018	PI - “Finding the next antibiotics: Putting evolutionary theory into practice”, TriCEM Seed Research Grant, \$20,000
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
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. <i>One of six conference organizers</i> (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. <i>Insect communication through cuticular chemicals</i> . International Society of Chemical Ecology & Chemical Signals in Vertebrates meeting
2009 - 2011	Biomimicry Fellow; Biomimicry 3.8. Missoula, Montana; <a href="http://biomimicryinstitute.org">http://biomimicryinstitute.org</a>
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* (2), *Current Opinion in Insect Science*, *Insectes Sociaux* (2), *Journal of Chemical Ecology* (3), *Journal of Ethology*, *Journal of Experimental Biology* (3), *Journal of Insect Behavior* (2), *Journal of Insect Physiology* (3), *Journal of Insect Science*, *Journal of Thermal Biology*, *Molecular Ecology*, National Science Foundation, *Naturwissenschaften*, *Physiological Entomology*, *PloS One* (4), *Proceedings of the Royal Society B*, *Scientific Reports*, *The Science of Nature*

#### Professional Society Membership

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

## Selected Presentations

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- 2018 Smith, A. A. *Incredible & under our feet: how insects can inspire our future*. 16<sup>th</sup> Annual Design Institute, The Nature Learning Initiative, North Carolina Museum of Art. **Plenary Speaker.**
- 2017 Smith, A. A. *Bugs in the news: why and how to be a spokesperson for your science in mass media*. Annual Meeting, North Carolina Entomological Society. **Keynote Address.**
- 2017 Smith, A. A. *Science communication, chemical communication, and the study of ant societies*. Department of Biology, James Madison University. **Invited seminar.**
- 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 podcast**  
*An audio show I created and published from 2013-2015 featuring in-depth interviews with biologists about their personal academic histories. Freely distributed online and through iTunes. (~90,000 lifetime plays)*
- Videos** **AntLab [YouTube Channel](#)** – 270,000+ views  
**Explained by the Author** – short films of scientists presenting their primary scientific research papers. Videos are paired with institutional press releases and media packages. Publication outlets include: Washington Post, National Geographic News, Wired, Live Science, Huffington Post, among others.
- 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

- “New research uncovers the predatory behavior of Florida’s skull-collecting ant.” 16Nov2018. Covered by *Nature, Discover, Nat Geo News, Inverse, The Verge, Newsweek, IFLScience, Smithsonian Magazine*
- “How coyotes conquered the continent.” 22May2018. Covered by *New York Times, Washington Post, Science*
- “New research solves the 60-year-old paleontological mystery of a “phantom” dicynodont.” 14Mar2018. Covered by *Der Standard, Inverse, Science Daily*
- “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*

### Television

- 2018 CNN, Erin Burnett OutFront; *Twitter stunned by islands of ants*



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)**

2018 *Charlotte Observer*; “Did Carolinas really have millions of floating fire ants during Hurricane Florence?”  
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*