

Clint Penick PHD

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Department of Applied Ecology
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EDUCATION

- 2012 **Ph.D. Biology**
Arizona State University
School of Life Sciences, Tempe, AZ
Advisor: Jürgen Liebig
- 2005 **B.S. Biology (honors)**
Florida State University
Department of Biology, Tallahassee, FL
Thesis advisor: Walter Tschinkel

RESEARCH APPOINTMENTS

- Current **Postdoctoral fellow** (2013-present)
NC State University & NC Museum of Natural Sciences
Department of Applied Ecology, Raleigh, NC
PI: Robert R. Dunn

PUBLICATIONS

- 2016 **Penick CA**, Diamond SE, Sanders NJ, Dunn RR. Beyond thermal limits: Comprehensive metrics of performance identify key axes of thermal adaptation in ants. *Functional Ecology*.
- 2016 Cahan SH, Nguyen AD, Stanton-Geddes J, **Penick CA**, Hernáiz-Hernández Y, DeMarco BB, Gotelli NJ. Modulation of the heat shock response is associated with acclimation to novel temperatures but not adaptation to climatic variation in the ants *Aphaenogaster picea* and *A. rudis*. *Comparative Biochemistry & Physiology A*.
- 2016 Diamond SE, Nichols LM, Pelini SL, **Penick CA**, Barber GW, Cahan SH, Dunn RR, Ellison AM, Sanders NJ, Gotelli NJ. Climatic warming destabilizes forest ant communities. *Science Advances* 2: e1600842.
- 2016 Karlik J, Epps MJ, Dunn RR, **Penick CA**. Life inside an acorn: How microclimate and microbes influence nest organization in *Temnothorax* ants. *Ethology* 122:790-797.
- 2016 Brent CS, **Penick CA**, Trobaugh B, Moore D, Liebig J. Induction of a reproductive-specific cuticular hydrocarbon pattern by juvenile hormone in the termite *Zootermopsis nevadensis*. *Chemoecology* 26:195-203.
- 2016 **Penick CA**, Crofton CA, Appler RH, Frank SD, Dunn RR, Tarpay DR. The contribution of human foods to honey bee diets in a mid-sized metropolis. *Journal of Urban Ecology* 2:juw001

- 2016 Sasaki T, **Penick CA** [co-first authors], Shaffer Z, Haight KL, Pratt SC, Liebig J. A simple behavioral model predicts the emergence of complex animal hierarchies. *The American Naturalist* 187:765-775.
- 2015 **Penick CA**, Smith AA. The true odor of the odorous house ant. *American Entomologist* 61:85-87.
- 2015 **Penick CA**, Savage AM, Dunn RR. Stable isotopes reveal links between human food inputs and urban ant diets. *Proceedings of the Royal Society B* 282:20142608.
- 2014 **Penick CA**, Brent CS, Dolezal K, Liebig J. Neurohormonal changes associated with ritualized combat and the formation of a reproductive hierarchy in the ant *Harpegnathos saltator*. *Journal of Experimental Biology* 217:1496-1503
- 2014 **Penick CA**, Ebie J, Moore D. A non-destructive method for identifying the sex of ant larvae. *Insectes Sociaux* 61:51-55
- 2013 Diamond SE, **Penick CA**, Pelini SL, Ellison AM, Gotelli NJ, Sanders NJ, Dunn RR. Using physiology to predict the responses of ants to climatic warming. *Integrative and Comparative Biology* 53:965-974 [Faculty of 1000 Prime recommended]
- 2012 **Penick CA**, Prager SS, Liebig J. Juvenile hormone induces queen development in late-stage larvae of the ant *Harpegnathos saltator*. *Journal of Insect Physiology* 58:1643-1649
- 2012 **Penick CA**, Copple RN, Mendez RA, Smith AA. The role of anchor-tipped larval hairs in the organization of ant colonies. *PLOS One* 7: e41595
- 2012 **Penick CA**, Liebig J. Regulation of queen development through worker aggression in a predatory ant. *Behavioral Ecology* 23:992-998
- 2012 **Penick CA**, Trobaugh B, Brent CS, Liebig J. Head-butting as an early indicator of reproductive disinhibition in the termite *Zootermopsis nevadensis*. *Journal of Insect Behavior* 26:23-34
- 2011 **Penick CA**, Liebig J, Brent CS. Reproduction, dominance, and caste: endocrine profiles of queens and workers of the ant *Harpegnathos saltator*. *Journal of Comparative Physiology A* 197:1063-1071
- 2010 Holbrook CT, Clark RM, Moore D, Overson RP, **Penick CA**, Smith AA. Social insects inspire human design. *Biology Letters* 6:431-433 [Top 10 most downloaded article of 2010]
- 2008 **Penick CA**, Tschinkel WR. Thermoregulatory brood transport in the fire ant, *Solenopsis invicta*. *Insectes Sociaux* 55:176-182

GRANTS & AWARDS

- 2016 Mentor for undergraduate research grant, NCSU, awarded to Omar Halawani **\$1,000**
- 2016 Research grant, Triangle Center for Evolutionary Medicine (TriCEM), co-PI, **\$20,000**
- 2016 Mentor for undergraduate research grant, NCSU, awarded to Omar Halawani and Bria Pearson **\$2,000**
- 2015 Mentor for undergraduate research grant, NCSU, awarded to Jacquelyn Fitzgerald **\$3,000**
- 2014 Mentor for undergraduate research grant, NCSU, awarded to Joseph Karlik **\$1,000**
- 2014 Mentor for undergraduate research grant, NCSU, awarded to Jacquelyn Fitzgerald **\$1,000**
- 2014 Award, YouTube *Your Entomology* award for best science outreach video (*Termite Hunter*, with Adrian Smith & Martin Hoogeboom) from the Entomological Society of America **\$200**
- 2014 Travel award, W.M. Keck Center for Behavioral Biology **\$430**

- 2013 George C. Eickwort Student Research Award – recognizes outstanding research by students in the field of social insect biology, awarded by North American Section of the IUSSI **\$1,000**
- 2013 Travel award, Biomimicry 3.8: Education Summit and Global Conference **\$400**
- 2013 Best talk, W. M. Keck Center for Behavioral Biology Student/Postdoc Symposium
- 2012 Best poster, session II, North American Chapter of the IUSSI Breakout Meeting, North Carolina
- 2012 Travel award, North American Chapter of the IUSSI **\$100**
- 2012 Research Grant, Graduate and Professional Students Association, ASU **\$500**
- 2011 Nominated, Design Excellence Award, Herberger Institute for Design and the Arts, ASU
- 2011 Travel award, Graduate and Professional Students Association, ASU **\$717**
- 2010 Award, Best in show for *Nest cast of the desert harvester ant*, Pogonomyrmex rugosus. Arizona State Fair outreach section
- 2009 NSF conference organization grant, (PI Jennifer Fewell), award #0964277 **\$16,838**
- 2009 Research grant, Graduate and Professional Students Association, ASU **\$2,000**
- 2009 Research grant, Graduate and Professional Students Association, ASU **\$750**
- 2009 Conference organization grant, Frontiers in Life Sciences workshop (co-PI), ASU **\$30,000**
- 2009 Training grant, Graduate Initiative Fellowships for Training, ASU **\$1,000**
- 2008 Travel award, North American Chapter of the IUSSI **\$250**
- 2008 Travel award (x4), School of Life Sciences, ASU, (2008-2012) **\$1,650**

INVITED TALKS

- 2017 Department seminar speaker, The University of North Carolina, Pembroke, NC (pending)
- 2016 Symposium speaker, International Conference of Entomology (ICE) XXV, Orlando, FL
- 2016 Department seminar speaker, University of the Ryukyus, Okinawa, Japan
- 2016 Featured speaker, Science communication workshop, The Graduate School, NC State University, Raleigh, NC
- 2016 Keynote symposium speaker, Georgia Entomological Society meeting, Pine Mountain, GA
- 2016 Symposium speaker, SE Branch Meeting, Entomological Society of America, Raleigh, NC
- 2016 Department seminar speaker, Entomology, NC State University, Raleigh, NC
- 2016 Department seminar speaker, Research In Progress seminar, Eastern Carolina University, Greenville, NC
- 2015 Featured speaker, Carolina Science Café series, UNC, Chapel Hill, NC
- 2015 Featured speaker, North Carolina Museum of Natural Sciences, Raleigh, NC
- 2015 Featured speaker, Wild West Naturalist Association, Raleigh, NC
- 2015 Symposium speaker, Experimental Biology meeting, Boston, MA
- 2015 Symposium speaker, Entomological Society of America Annual Meeting, Portland, OR
- 2013 Symposium speaker and panelist, Biomimicry 3.8: Education Summit and Global Conference, Boston, MA
- 2011 Featured speaker, Arizona Audubon Society, Phoenix, AZ
- 2011 Symposium speaker, Managing the Hive: Organization of Work in Business and Eusocial Colonies, Tempe, AZ

TEACHING

Instructor

- 2017 Bio-inspired design (co-instructor), Biological Sciences and College of Design, NCSU
- 2016 Travelling design studio: Hawaii (visiting instructor), College of Arts and Design, ASU
- 2015 Public health: From humans to social insects (co-instructor), Biological Sciences, NCSU
- 2012 Bio-inspired design, College of Arts and Design, ASU
- 2012 Innovation Space (co-instructor), College of Arts and Design, ASU

Teaching Assistant

- 2011 Anatomy and Physiology Lab, Life Sciences, ASU
- 2010 General Genetics, Life Sciences, ASU
- 2009 Techniques in Animal Behavior, Life Sciences, ASU
- 2008 The Living World Lab (Biology for Non-Majors), Life Sciences, ASU
- 2007 General Biology Lab, Life Sciences, ASU
- 2006 The Living World Lab (Biology for Non-Majors), Life Sciences, ASU

Mentorship

Undergraduate students (17):

Steven Prager, Beth Trobaugh, Neale Copple, Joseph Karlik, Jacquelyn Fitzgerald, Catherine Crofton, Bria Pearson, Omar Halawani, Samantha Dietz, Matt Farrell, Chris Williams, Meredith West, Jakini Kauba, Mary Vincent, Natavia Ray, Victoria Figueiredo Paixao, and Jordan Bednarz.

High school students (2):

John Delpapa, Michael Taffe

**Underlined students were co-authors on papers and/or funded grants.*

SCIENCE WRITING & OUTREACH

Contributing writer

- Current Your Wild Life blog, www.yourwildlife.org (2013-present)
- 2016 Oxford University Press blog (OUPblog), invited writer
- 2016 Verve postdoc magazine
- 2016 *North Carolina Naturalist*, biannual magazine
- 2015 Journal of Investigative Dermatology blog, invited writer
- 2013 *ZQ: Zygote Quarterly*, magazine for biomimicry
- 2012 *SOLS Magazine*, Arizona State University (2009-2012)

Media interviews

Print and online:

New York Times, The New Yorker, TIME, Mental Floss, WIRED, The Guardian, Newsweek, National Geographic, Scientific American, Science News, Discover, Discovery News, Fast Company, Food Network Magazine, Highlights Magazine, Associated Press, IFL Science, The Wildlife Society, Alaska Airlines Magazine, Pest Control Technology, Nature World News, Chemical & Engineering News, The Journal of Improbable Research blog, EGU Biogeosciences blog, Myrmecos blog, Charlotte Observer,

Raleigh News and Observer, Mitchell News-Journal, NC State Alumni Magazine, NCSU Technician, and NC State News.

Radio Interviews:

NPR *Science Friday*, CBC *Quirks and Quarks*, WUNC (NPR affiliate) *All Things Considered* and *Morning Edition*, “Science for the People” podcast (NSF Science360), “Pulse of the Planet” podcast, “Completely Optional Knowledge” podcast (Greenpeace USA), “Nature and Nurture” podcast, KCBS San Francisco, 1010 WINS NYC, WFVU Cityscape NY, and WKNC Raleigh.

Video features:

New York Times (*ScienceTake*), National Geographic TV, National Geographic online, Reuters News Service, and WRAL Raleigh.

Event organizer

- 2016 Organizer, Warm Forests/Warm Cities breakout meeting, Hunt Library, Raleigh, NC – 30 attendees from 9 institutions
- 2016 Co-organizer, *The Insects of M.C. Escher*, college night at the North Carolina Museum of Art, Raleigh, NC – 1,600 attendees
- 2015 Co-organizer, *The physics of ant colonies*. BugFest, North Carolina Museum of Natural History, Raleigh, NC – 35,000 attendees
- 2015 *Cocktails and Cosmonauts*, hosted and designed outreach table for this event at the Museum of Life and Science, Durham, NC
- 2014 *Ants In Space*, an education project through BioEdOnline and NASA; provided pavement ant colonies that traveled to the International Space Station
- 2014 Co-organizer: *School of Ants* at NSF outreach section, USA Science and Engineering Festival, Washington, DC – 350,000 attendees
- 2014 Co-organizer, *Social insect biology* Outreach event at BugFest, North Carolina Museum of Natural History, Raleigh, NC – 35,000 attendees
- 2013 Organizer, *What is that smell?* Outreach project and event on identifying ants by smell at BugFest, North Carolina Museum of Natural History, Raleigh, NC – 40,000 attendees
- 2010 Co-organizer, Social Insect Science EXPO, community event, Phoenix Desert Botanical Gardens, Phoenix, AZ – 150 attendees
- 2010 Co-organizer, Social Biomimicry: Insect Societies and Human Design, international conference, Arizona State University, Phoenix, AZ – 80 attendees from 18 institutions

Reviewer

The American Naturalist, Annals of the Entomological Society of America, Behavioral Ecology and Sociobiology, Biology Letters, BioScience, Conservation Physiology, Current Zoology, Ecology, Ecology Letters, Environmental Conservation, F1000Research, Global Ecology and Biogeography, Insect Conservation and Diversity, Insectes Sociaux, Insects, Journal of Animal Ecology, Journal of Agricultural Biotechnology and Sustainable Development, Journal of Behavior, Journal of Experimental Biology, Journal of Insect Science, Journal of Thermal Biology, Myrmecological News, Naturwissenschaften–The Science of Nature, Oikos, PLOS One.

Book reviewer: University of Chicago Press

Grant reviewer: National Science Foundation (NSF), Graduate & Professional Students Association ASU

Conference presentations

- 2016 International Conference of Entomology (ICE) XXV, Orlando, FL
- 2016 IUSSI International Colloquium, Orlando, FL
- 2016 Georgia Entomological Society Meeting, Pine Mountain, GA
- 2016 Southeastern Branch Meeting of the Entomological Society of America, Raleigh, NC
- 2015 Experimental Biology meeting, Boston, MA
- 2015 W. M. Keck Center for Behavioral Biology student/postdoc symposium, Raleigh, NC
- 2014 Entomological Society of America annual meeting, Portland, OR
- 2014 IUSSI XVII International Congress, Cairns, Australia
- 2014 Evolution meeting, Raleigh, NC
- 2014 NC State Postdoc Association research symposium, Raleigh, NC
- 2013 Entomological Society of America annual meeting, Austin, TX
- 2013 Biomimicry 3.8: Education Summit and Global Conference, Boston, MA
- 2013 W. M. Keck Center for Behavioral Biology student/postdoc symposium, Raleigh, NC
- 2012 IUSSI breakout meeting of the North American section, Greensboro, NC
- 2011 Entomological Society of America annual meeting, Reno, NV
- 2011 Animal Behavior Society meeting, Bloomington, IN
- 2010 Entomological Society of America annual meeting. San Diego, CA
- 2010 IUSSI XVI International Congress. Copenhagen, Denmark
- 2010 Social Biomimicry: Insect Societies and Human Design conference. Tempe, AZ
- 2009 Graduates in Earth, Life, and Social Sciences. Tempe, AZ
- 2008 IUSSI breakout meeting of the North American section. Puerto Rico
- 2008 RISE symposium. Tempe, AZ
- 2006 IUSSI XV International Congress. Washington D.C.
- 2005 Entomological Society of America annual meeting, Miami, FL