

Chelsea Nicole Cook

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EDUCATION

- 2016 – Present: Postdoctoral Fellow, Arizona State University.
National Institutes of Health Ruth L. Kirschstein National Research Service Award
Postdoctoral Advisors: Dr. Brian H. Smith & Dr. Noa Pinter-Wollman
- 2015 – PhD., Ecology and Evolutionary Biology. University of Colorado, Boulder.
Dissertation Title: *Stay Cool: Exploring the Group Performed Thermoregulatory Fanning Behavior in Honeybees*
Major Advisor: Dr. Michael Breed
- 2009 – B.S., Biology. State University of New York at Cortland.
Major Advisor: Dr. Peter Ducey

PUBLICATIONS

*Indicates Undergraduate Author

- 12.) Tsvetkov, N., **Cook, C.N.**, & A. Zayed. In Revision. Effects of Group Size on Learning and Memory in the Honey Bee, *Apis mellifera*. *Journal of Experimental Biology*.
- 11.) Kraberger, S. **Cook, C.N.**, Schmidlin, K., Fontenele, R.S., *Bautista, J. Smith, B.H., & A. Varsani. In Revision. Diverse single stranded DNA viruses associated with honey bees (*Apis mellifera*). *Infection, Genetics, and Evolution*.
- 10.) **Cook, C.N.**, Lawson, S. & Rehan, S. 2019. Biogenic amines shift during the solitary-to-subsocial transition in the small carpenter bee, *Ceratina calcarata*. *Apidologie*.
<https://doi.org/10.1007/s13592-018-0624-9>
- 9.) **Cook, C.N.**, Mosqueiro, T., Gadau, J., Ozturk, C., Pinter-Wollman, N., & B.H. Smith. 2018. Individual differences in learning and biogenic amine levels influence the behavioural division between foraging honey bee scouts and recruits. *Journal of Animal Ecology*.
<https://doi.org/10.1111/1365-2656.12911>
- 8.) *Kaspar, R., **Cook, C.N.**, Breed, M.D. 2018. Experienced individuals influence the thermoregulatory fanning behaviour in honey bee colonies. *Animal Behaviour*. 142:69-76.
<https://doi.org/10.1016/j.anbehav.2018.06.004>
- 7.) Mosqueiro, T., **Cook, C.N.**, Huerta, R., Gadau, J., Smith, B.H., & N. Pinter-Wollman. 2017. Task allocation and site fidelity jointly influence foraging regulation in honey bee colonies. *Royal Society Open Science*. 4 170344. <https://doi.org/10.1098/rsos.170344>
- 6.) **Cook, C.N.**, Brent, C., & Breed, M.D. 2017. Octopamine and Tyramine Regulate the Thermoregulatory Fanning Response in Honeybees. *Journal of Experimental Biology*. jeb-149203. <https://doi.org/10.1242/jeb.149203>
- 5.) **Cook, C.N.**, *Kaspar, R., & Breed, M.D. 2016. Rapidly Changing Environment Modulates the Thermoregulatory Fanning Response in Honeybee Groups. *Animal Behaviour*. 115:237-243.
<https://doi.org/10.1016/j.anbehav.2016.03.014>
- 4.) **Cook, C.N.**, *Scheckel, K, *Durzi, S., and Breed, M.D. 2016. Larvae influence thermoregulatory

fanning behavior in honeybees (*Apis mellifera* L.). *Insectes Sociaux*. 63:271-278.

<https://doi.org/10.1007/s00040-016-0463-5>

- 3.) Breed, M.D., **Cook, C.N.**, McCreery, H., and Rodriguez, M. 2014. Nestmate and kin recognition in honeybees. in "Social Recognition in Invertebrates", L. Aquiloni and E. Tricarico, eds., Springer.
- 2.) **Cook, C.N.** and Breed, M.D. 2013. Social context influences the initiation and threshold of thermoregulatory behaviour in honey bees. *Animal Behaviour*. 86: 323-329.
<https://doi.org/10.1016/j.anbehav.2013.05.021>
- 1.) Breed, M.D., **Cook, C.N.** and Ochomogo, M. 2012. Cleptobiosis in Social Insects. *Psyche*. Article ID 484765. <http://dx.doi.org/10.1155/2012/484765>

Media Coverage for Publications

"Honey Bee Scouting and the Virtues of Being Easily Distracted" PolliNation Podcast by Andony Melathopoulos at Oregon State University. 2018.

<http://blogs.oregonstate.edu/pollinationpodcast/2018/12/03/dr-chelsea-cook/>

"Bees specialize in different food jobs for higher efficiency" ASU Now by Scott Sekel. 2018.

<https://asunow.asu.edu/20181102-discoveries-bees-specialize-different-food-jobs-higher-efficiency>

"The Bee Biologist And The Behavioral Neuroscientist" Undisciplined Podcast*. 2018.***An undergraduate researcher, Rachael Kaspar, discussed our research on this podcast**

<http://www.upr.org/post/undisciplined-bee-biologist-and-behavioral-neuroscientist>

"Honeybees devise wing-fanning trick to survive heat spikes", Denver Post by Bruce Finley. 2016.

<http://www.denverpost.com/2016/05/14/honeybees-devise-wing-fanning-trick-to-survive-heat-spikes/>

"Cooling down in honeybees is affected by what others are doing" Not Bad Science, Scientific American by Felicity Muth. 2013.

<http://blogs.scientificamerican.com/not-bad-science/2013/08/29/cooling-down-in-honeybees-is-affected-by-what-others-are-doing/>

Publications in Preparation

- 5.) **Cook, C.N.**, Mosqueiro, T., Gadau, J., Ozturk, C., Pinter-Wollman, N., & B.H. Smith. Gene expression differences drive division of foraging labor in honey bees.
- 4.) **Cook, C.N.**, Mosqueiro, T., Gadau, J., Ozturk, C., Smith, B.H., and N. Pinter-Wollman. Differential genetic backgrounds influence waggle dance in foraging honey bees.
- 3.) **Cook, C.N.**, Kraberger, S., Varsani, A., Smith, B.H. Virus prevalence across honey bee worker castes and subspecies.
- 2.) **Cook, C.N.**, Lei, H., & B.H. Smith. Differences in antennal lobe signaling in scouts and recruits.
- 1.) Lei, H., S. Haney, C. Jernigan, X.J. Guo, **C.N. Cook**, M. Benzhanov and B.H. Smith. Novelty detection in early olfactory processing of the honeybee, *Apis mellifera*.

GRANTS AND SCHOLARSHIPS

**Indicates Undergraduate Mentee*

- 20.) 2018 US Department of Agriculture Small Business Innovation Research Grant, Phase 2

- (USDA SBIR), Co-PI, **\$599,900**
"Honeybee Health Monitoring and Management System to Improve Survival Rates and Colony Strength"
- 19.) 2017 National Institutes of Health Ruth L. Kirschstein National Research Service Award Postdoctoral Fellowship (NIH NRSA F32), **\$115,000**
"The Role of Social Environment on Learning and Gene Regulation"
 - 18.) 2017 Arizona State University Fostering Post-Doctoral Research in the Life Sciences with Dr. Simona Kraberger, **\$3,750**.
"Bee-nereal disease: Investigating sexual transmission of viruses in honey bees"
 - 17.) 2017 US Department of Agriculture Small Business Innovation Research Grant (USDA SBIR), Phase 1, Co-PI, **\$96,000**
"Honeybee Hive Monitoring System for Varroa Mite Management & Honeybee Health"
 - 16.) 2016 New Venture Challenge University of Colorado, 1st Place. **\$10,000**
 - 15.) 2016 Women's Entrepreneurial Award, **\$10,000**
 - 14.) 2015 Undergraduate Research Opportunity Grant with *Rachael Kaspar, **\$2,800**
 - 13.) 2014 National Science Foundation Doctoral Dissertation Improvement Grant (NSF DDIG), **\$16,896**
"Stay Cool: Connecting the Proximate Physiological Mechanisms to the Performance and Variation of Thermoregulatory Behavior in Apis mellifera I"
 - 12.) 2014 Undergraduate Research Opportunity Grant with *Logan Manaker, **\$800**
 - 11.) 2014 IUSSI Travel Grant to IUSSI International Conference, **\$2,000**
 - 10.) 2013 Dean's Research Grant, University of Colorado, Boulder, **\$8,167**
 - 9.) 2013-2015 Achievement Rewards for College Scientists Scholarship, **\$12,500**
 - 8.) 2013 Animal Behavior Society Student Research Grant, **\$921**
 - 7.) 2013 University of Colorado Ecology and Evolutionary Biology Grant, **\$1,300**
 - 6.) 2013 University of Colorado Graduate School, Beverly Sears Graduate Research Grant, **\$1,000**
 - 5.) 2012 International Union for the Study of Social Insects – North American Section Conference Housing Grant, **\$100**
 - 4.) 2012 University of Colorado Ecology and Evolutionary Biology Grant, **\$500**
 - 3.) 2012 University of Colorado Graduate School, Beverly Sears Graduate Student Grant, **\$1,000**
 - 2.) 2011 University of Colorado Ecology and Evolutionary Biology Grant, **\$1,300**
 - 1.) 2008 SUNY Cortland Research Foundation Grant, **\$500**

HONORS AND AWARDS

2016 New Venture Challenge, University of Colorado
 2016 Women's Entrepreneurial Prize, University of Colorado
 2014 Excellence in Teaching Award, Animal Behavior, Fall 2013
 2013 Excellence in Teaching Award, Animal Behavior, Fall 2012
 2012 Excellence in Teaching Award, Animal Behavior, Fall 2011
 2011 Honorable Mention, National Science Foundation Graduate Research Fellowship Program
 2009 Phi Kappa Phi Honor Society
 2008 Beta Beta Beta Biology Honor Society
 2007 Phi Eta Sigma Freshman Honor Society

TEACHING EXPERIENCE

TEACHING CERTIFICATIONS

2014 – Certificate in College Teaching, Graduate Teacher's Program, University of Colorado, Boulder

COURSES TAUGHT

- 2015 – Pedagogy for Graduate Students, EBIO 5460, Co-Instructor, University of Colorado, Boulder
2011 – 2015: Animal Behavior Lab, EBIO 3240, Teaching Assistant, University of Colorado, Boulder
2010 – 2015: General Biology I for Majors Lab, EBIO 1210, Teaching Assistant, University of Colorado, Boulder
2011 – 2012: General Biology II for Majors Lab, EBIO 1220, Teaching Assistant, University of Colorado, Boulder
2011 – 2015: General Biology for Non-Majors Lab, Teaching Assistant, University of Colorado, Boulder

Guest Lectures

- 2015: Behavioral Ecology lecture in Ecology, EBIO 2040, Instructor: Dr. Katie Suding
2014: Evolution of Sociality lecture in Sexual and Social Behavior Course, EBIO 4460 Instructor: Dr. Joanna Hubbard
2013: Eusocial Insects lecture in Insect Biology, EBIO 4660, Instructor: Dr. Cesar Nufio

Workshops and Seminars in Teaching Taken

- 2014: Pedagogy For Graduate Student Teachers, EBIO 5460, University of Colorado, Boulder
2014: Best Practices in Science Education Workshop with Dr. Nichole Barger, University of Colorado, Boulder
2014: Graduate Lead Teacher Training, 16 hours, University of Colorado, Boulder
2013: Best Practices in Science Education Reading Group, EBIO 6100, Dr. Nichole Barger
2010 – 2015: 20 Hours of Graduate Teacher Program workshops, including Kolb Learning Styles, Learning Goals, Bloom's Taxonomy, Lesson Planning, Assessment construction, etc., University of Colorado, Boulder

STUDENTS MENTORED

ASU, 2016 – Current

- Eric Miller – Undergraduate Research Assistant
Sydney Ohrt – Undergraduate Research Assistant, currently an education coordinator at the Desert Botanical Garden, Phoenix, AZ
Alexa Phillips – Undergraduate Research Assistant
Eda Sezen – Undergraduate Research Assistant
Nisha Kulkarni – High School Research Assistant
Joshua Bautista – Undergraduate Research Assistant
Steven Macknight – Undergraduate Research Assistant
Maxwell Edwards – Undergraduate Research Assistant
Dallin Shipp – Undergraduate Research Assistant

CU Boulder, 2011-2015

- Matthew Nolasco – Undergraduate Research Assistant
Chloe Ramsay – Undergraduate Research Assistant, Currently a PhD student at University of South Florida
Braeden Miguel – Undergraduate Research Assistant
Zoe Burger – High School Research Assistant, Currently an undergraduate at UCLA
Joshua Cropanzano – High School Research Assistant
Kelsey Scheckel – Undergraduate Research Assistant, Performed independent project, Currently a PhD student at UC Berkeley with Neil Tsutsui

Logan Manaker – Undergraduate Research Assistant
Sharif Durzi – Undergraduate Research Assistant
Rachael Kaspar – Undergraduate Research Assistant, Completed Honor's Project, Currently a professional research assistant at CU Anschutz, Denver, CO
John Ternest – Undergraduate Research Assistant, Completed Honor's Project, Currently a Master's student at Purdue with Ian Kaplan
Liam Cullinane – Undergraduate Research Assistant, Currently a Master's student at CU Denver with Dr. Rebecca Hufft

SERVICE AND OUTREACH

2018 – Current: International Union for the Study of Social Insects Code of Conduct Committee
2018 – Judge for graduate student presentation competition, Entomological Society of America Conference
2018 – Honey bee learning and health workshop, Ordu, Turkey
2017 – Judge for Western Alliance to Expand Student Opportunities Student Poster Competition
2016 – 2017: Prison Education Volunteer, Eymann State Prison, Florence AZ
Teaching college-level biology to prisoners
2016 – Honey bee biology class, Desert Botanical Gardens Summer Camp
2013 – 2014: Beekeeping Basics, Denver Rescue Mission at Harvest Farm, Fort Collins, CO.
Teaching beekeeping to men who are recovering from addiction.
2012 - 2015: Organizer, Animal Behavior Reading Group. CU Boulder, EBIO.
Organizing a reading group for graduate students to read current literature.
2012 – 2015: Colloquium Committee, CU Boulder, EBIO. Graduate student run group that organizes a weekly seminar.
2011 – 2015: Finance Chair, University of Colorado Student Government Health Board.
2010 – 2015: Evolution Outreach Committee. Roles: Organizing a teaching workshop for middle and high school teachers for improving evolution curriculum.
2007 – 2009: Treasurer, Cortland Students Advocating for a Valued Environment.
2008 – 2009: Treasurer, Biology Club, SUNY Cortland.

RESEARCH AND WORK EXPERIENCE

2018 – National Institutes of Health Ruth L. Kirschstein Postdoctoral Research Fellow
2016 – Present: Chief Science Officer and Co-Founder, HiveTech Solutions
Developing a smart hive technology for the monitoring and research of honey bee populations
2015 – Present: Postdoctoral Researcher, Arizona State University.
Postdoctoral Advisor: Dr. Brian H. Smith
2010 – 2016: Ph.D research, University of Colorado, Boulder.
Dissertation: Stay Cool: Exploring the Group Performed Thermoregulatory Fanning Behavior in Honeybees - PhD Advisor: Dr. Michael Breed
2014 – 2015: Lead Teaching Assistant for the Graduate Teacher Program. University of Colorado, Boulder. Lead Coordinator: Dr. Laura L.B. Border
2010 – 2015: Teaching Assistant Ecology and Evolutionary Biology Department, University of Colorado Boulder.
2011 – 2015: Teacher, Science Discovery - Beekeeping Basics and Evolution for 8-10 year olds.
Supervisor: Anjali Maus
2009 - 2010: Tissue Procurement Technologist in the Department of Hematopathology, University of

Rochester, Rochester New York. Cell processing, cryostorage of leukemia and lymphoma cell lines.

Supervisor: Dr. Richard Burack, MD, PhD

2007 - 2009: Laboratory Manager at the State University of New York, Cortland.

Project: Distribution and ecology of native and invasive earthworms.

Primary Investigator: Dr. Peter Ducey

RESEARCH PRESENTATIONS

Invited Presentations

Cook, C.N. 2018. Exploring the individual and social dynamics of task organization in honey bees. Santa Fe Institute.

Cook, C.N., Mosquero, T., Gadau, J., Brent, C., Ozturk, C., Pinter-Wollman, N., Smith, B.H. 2018. Variation in learning shapes foraging behavior in Honey Bees. International Union for the Study of Social Insects. Guarujá, Brazil.

Cook, C.N., Woolwine, K.J., Belucci, J., K. Drennan. 2018. Predicting honey bee thermoregulatory response to climate change using a closed-loop control systems approach. International Union for the Study of Social Insects. Guarujá, Brazil.

Cook, C.N., Mosquero, T., Gadau, J., Brent, C., Ozturk, C., Pinter-Wollman, N., Smith, B.H. 2018. Variation in learning shapes foraging behavior in Honey Bees. Research Seminar Series. Santa Clara University.

Cook, C.N. 2014. Why are bees so good at what they do? Exploring division of labor in the honey bee society. Wyoming Bee College Conference.

Cook, C.N. 2014. Stay Cool: How honeybees work together to thermoregulate their hive. ARCS Scholarship Member's Meeting.

Oral Presentations:

**Indicates Undergraduate Mentee*

Cook, C.N., Mosquero, T., Pinter-Wollman, N., Smith, B.H. 2017. Foraging Phenotypes Influenced by Learning Behavior, Neurotransmitters in Honey Bees Animal Behavior Society. Toronto, Canada.

Cook, C.N., Brent, C.S., & Breed, M.D. 2016. Octopamine and Tyramine Modulate the Thermoregulatory Fanning Behavior in Honey Bees. International Congress of Entomology.

C.N. Cook. 2016. Stay cool: exploring a group performed thermoregulatory fanning behavior in honeybees. Social Insect Research Group. Arizona State University.

Cook, C.N. & Breed, M.D. 2015. Social cues mediate thermoregulatory fanning behavior in honeybees, *Apis mellifera* L. The Entomological Society of America. Portland, Oregon, USA.

*Kaspar, R., M.D. Breed, & **Cook, C.N.** 2015. Social learning in the thermoregulatory fanning behavior in honey bees, *Apis mellifera* L. The Entomological Society of America, Portland, Oregon, USA.

Cook, C.N., *Kaspar, R., Breed, M.D. 2015. Rapidly Changing Environments Alter A Decentralized Thermoregulatory Fanning Response in Honeybee Groups. Animal Behavior Society

Cook, C.N. 2015. Exit Seminar - Stay cool: exploring a group performed thermoregulatory fanning behavior in honeybees. University of Colorado EBIO Colloquia Series

Cook, C.N. 2014. Stay Cool: Exploring proximate social cues in a group performed thermoregulatory behavior in honeybees. Entomological Society of America.

Cook, C.N. 2014 Stay Cool: How honeybees work together to thermoregulate their hive. Guild of Rocky Mountain Ecologists and Evolutionary Biologists, Fort Collins, CO

- Cook, C.N.** 2014. Stay Cool: Social coordination of a thermoregulatory behavior in honey bees. International Union for the Study of Social Insects. Cairns, Australia.
- Cook, C.N.** 2014. Stay Cool: Performance of group thermoregulatory behavior in honey bees. University of Colorado, Boulder Interdisciplinary STEMinar.
- Cook, C.N.** 2013 How do neurotransmitters regulate thermoregulatory behavior in honey bees? Dean's Research Grant Symposium.
- Cook, C.N.** and Breed, M.D. 2013: Social context influences the initiation and threshold of thermoregulatory behaviour in honey bees. Animal Behavior Society.
- Cook, C.N.** 2012. Exploring Response Thresholds As A Hypothesis for Fanning Behavior in Honey Bees. Brown Bag, EBIO Department Presentation.
- Cook, C.N.** 2012. Social Context Alters Behavioral Response in *Apis mellifera* L. Guild of Rocky Mountain Ecologists and Evolutionary Biologists Conference.
- Cook, C.N.** 2009. *A Natural History of Facts: An Ecological Debate of Earthworm Distribution in the Northern Hemisphere*. SUNY Cortland Scholar's Day.

Poster Presentations:

**Indicates Undergraduate Mentee*

- Cook, C.N.** & May, A. 2017. "Transmissible Cancer and Eusociality: 'Sharing' Selfishness with Others". International Conference for Ecology, Evolution and Cancer.
- Cook, C.N.** 2016. Stay Cool: Exploring fanning behavior in Honey Bees. International Union for the Study of Social Insects – North American Section, Orlando, Florida.
- *Kaspar, R., *Manaker, L., *Durzi, S., & **Cook, C.N.** 2014. The Effects of Variable Rates of Temperature in the Thermoregulation Fanning Behavior of *Apis mellifera* L. Entomological Society of America. Portland, Oregon, USA
- *Durzi, S., *Kaspar, R., *Manaker, L., & **Cook, C.N.** 2014. Honeybees and their social cues in the context of porch fanning behavior. Entomological Society of America. Portland, Oregon, USA.
- *Manaker, L., *Durzi, S., *Kaspar, R., & **Cook, C.N.** 2014. Changes in thermoregulatory fanning behavior over honeybee lifespan. Entomological Society of America. Portland, Oregon, USA.
- Cook, C.N.** and Breed, M.D. 2012. Social Context Alters Behavioral Response in *Apis mellifera*. International Union for the Study of Social Insects – North American Section. Greensboro, North Carolina, USA.
- Broadwell, D., **Cook, C. N.**, and Ducey, P. *The Natural History of Planarians*. Northeast Natural History Conference. Albany, New York, USA

Online Encyclopedia Articles

- Cook, C.N.** and N. Pinter-Wollman. 2018. Social Behavior and Interactions. Encyclopedia of Ecology. Elsevier.
- Cook, C. N.**, Ochomogo, M., and Breed, M.D. 2011. "Animal Behavior". Scitable by Nature Education.
- Ochomogo, M., **Cook, C.N.**, and Breed, M.D. 2011. "Mating Systems", Scitable by Nature Education.

JOURNALS REFEREED

Current Biology
 Proceedings of the Royal Society B
 Biology Letters
 Animal Behaviour
 PLOS One

CONFERENCES ATTENDED

**Moderator*

- 2018 Entomological Society of America, Vancouver, British Columbia, Canada
- 2018 International Union for the Study of Social insects – Guarujá, Brazil
- 2017 Entomological Society of America, Denver Colorado, USA*
- 2017 Animal Behavior Society, Toronto, Canada*
- 2016 International Congress of Entomology, Orlando, Florida. USA
- 2016 International Union for the Study of Social insects – North American Section, Orlando, FL, USA
- 2015 Entomological Society of America, Minneapolis Minnesota. USA
- 2015 Animal Behavior Society, Anchorage Alaska. USA.
- 2014 Entomological Society of America, Portland, Oregon. USA
- 2014 Guild of the Rocky Mountain Ecologists and Evolutionary Biologists, Fort Collins, CO, USA
- 2014 International Union for the Study of Social Insects, Cairns, Australia.
- 2014 Wyoming Bee College Conference, Laramie, Wyoming, USA.
- 2013 Animal Behavior Society, Boulder, Colorado, USA.
- 2012 International Union for the Study of Social Insects – North American Section, Greensboro, North Carolina, USA.
- 2012 Guild of the Rocky Mountain Ecologists and Evolutionary Biologists, Nederland, Colorado, USA.
- 2011 Entomological Society of America, Reno, Nevada, USA.
- 2011 Guild of the Rocky Mountain Ecologists and Evolutionary Biologists, Nederland, Colorado, USA.
- 2009 Northeastern Natural History Conference, Albany, New York, USA.

OTHER EXPERIENCE

- 2018 Learning Behavior in Honeybees Workshop. Apiculture Institute. Ordü, Turkey.
- 2014 Introduction to Tropical Ecology Course. Organization of Tropical Studies
- 2014 Research Experience with Dr. Colin Brent, USDA Insect Physiology Research