

ADRIAN L. CARPER

Postdoctoral Associate and Lecturer
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EDUCATION

- 2008-2013 Ph.D., Ecology and Evolutionary Biology
Dept. of Biological Sciences
Dartmouth College, Hanover NH
Advisor: Dr. Rebecca Irwin
- 1999-2003 Bachelor of Science, Fisheries and Wildlife Sciences
North Carolina State University, Raleigh, NC
Minor in Environmental Science
Magna Cum Laude

ACADEMIC APPOINTMENTS

- 2013-2018 Postdoctoral Associate and Lecturer
Dept. Ecology and Evolutionary Biology (2013-2018)
University of Colorado, Boulder, CO, 80309
- Dept. Entomology (2013-2015)
University of Wisconsin, Madison, WI, 53706
- Dept. Biological Sciences (2016), *Senior Research Assistant*
Oakland University, Rochester, MI, 48309

PROFESSIONAL EXPERIENCE

- 2015 Museum Associate
Entomology, Invertebrate Paleontology, and Public Sections
Museum of Natural History, University of Colorado
Boulder, CO 80309
- 2008 Research Technician, Dept. of Biological Sciences, Dartmouth College, Hanover, NH
Supervisor: Dr. Rebecca Irwin. Conducted independent research, sampled bee diversity and abundance, sampled arthropod diversity and abundance.
- 2006-2008 Laboratory/Field Assistant, Dept. of Entomology, North Carolina State University, Raleigh, NC
Supervisor: Dr. Fred Gould. Care and maintenance of captive Heliiothine moth strains, pheromone trapping, field collection and specimen processing, observational data collection: oviposition, foraging, greenhouse rearing of host plants, assisted in design, construction and implementation of field experiments.

- 2004-2006 Agricultural Research Technician, Dept. of Entomology, North Carolina State University, Raleigh, NC. Supervisor: Dr. Jules Silverman. Care and maintenance of structure infesting ant colonies, conduct bioassays, rearing of *Chrysanthemum morifolium* for aphid complex, construct and run laboratory and field experiments with structure infesting ants, database management, field data collection, pesticide application, independent research.
- 2001-2004 Laboratory Assistant, Dept. of Entomology, North Carolina State University, Raleigh, NC. Supervisor: Dr. Jules Silverman. Coordinated the care and maintenance of structure infesting ant colonies, field collection of colonies, general lab maintenance.
- 2001 Conservation Intern/Field Research Assistant, Sandhills Ecological Institute, Southern Pines, NC. Supervisor: Kerry Brust. Assist in the banding and monitoring of endangered red-cockaded woodpeckers, *Picoides borealis*, in and around Southern Pines and Fort Bragg.

PUBLICATIONS

- Carper, A. L.**, Enger, M., and M.D. Bowers. 2019. Host plant effects on immune response across development of a specialist caterpillar*. *Frontiers in Ecology and Evolution: in review.*
- Jamieson, M. A, **Carper, A. L.**, Wilson, C. J., Scott, V. L, and J. Gibbs. 2019. Geographic biases in bee research limits understanding of species distribution and response to anthropogenic disturbance. *Frontiers in Ecology and Evolution (2019). in revision.*
- Carper, A. L.**, Schwantes, C. J., and M. A. Jamieson. 2019. A new state record of the rare bee, *Cemolobus ipomoeae* (Hymenoptera, Apidae), from Colorado, USA. *Journal of the Kansas Entomological Society: 91(2): 171-175.*
- Schwantes, C. J., **Carper, A. L.**, and M.D. Bowers. 2018. Solitary floral specialists do not respond to cryptic flower-occupying predators. *Journal of Insect Behavior: 31 (6):642 – 655.*
- Carper, A. L.** and R. E. Irwin. 2016. Effects of florivory on plant-pollinator interactions: implications for male and female components of plant reproduction. *American Journal of Botany: 103 (6): 1061-1070.*
- Carper, A. L.**, L. S. Adler, P. S. Warren, and R. E. Irwin. 2014. Effects of suburbanization on forest bee communities. *Environmental Entomology 43 (2):253-262.*
- Irwin, R., P. Warren, **A. Carper**, and L. Adler. 2013. Plant–animal interactions in suburban environments: implications for floral evolution. *Oecologia 174 (3): 803-815.*

MANUSCRIPTS IN PREPARATION

* manuscript available on request

- Carper, A. L.**, Schwantes, C. J., Norton, A.P., Bowers, M.D., and M. A. Jamieson. Ecological efficacy of three different capture techniques for wild bee inventories*. *for Insect Conservation and Diversity (2019).*
- Morphew, A.M., **Carper, A.L.**, Bowers, M.D. and M.A. Jamieson. Assessing the value of conservation Reserve Program grasslands for cavity-nesting bees*. *for Ecological Entomology (2019).*

- Carper, A. L.**, Schwantes, C. J., Endriss, S. B., Norton, A.P., Bowers, M.D., and M. A. Jamieson. Local and landscape factors driving wild bee community dynamics across Colorado agroecosystems *. *for* Journal of Insect Conservation (2019).
- Carper, A. L.**, R. E. Irwin, L. S. Adler, and P. S. Warren. Pollination in suburban environments: implications for pollen limitation of native plant reproduction*. *for* Oecologia (2019).

GRANTS AND FELLOWSHIPS

- 2016 Boulder County Parks & Open Space: \$10,000. The conservation value of woody debris for cavity-nesting bees on Boulder County open space. PI. D. Bowers co-PI Undergraduate Research Opportunity Program Team Grant: \$3,000. Exploring Patterns of Cavity-Nesting Bee Community Dynamics across Colorado. PI.
- 2015 Undergraduate Research Opportunity Program Team Grant: \$3,000. The Bees' Needs: Integrating Ecological Research with Citizen Science. PI.
Boulder County Parks and Open Space: \$11,452. Agricultural Practices on Boulder County Open Space: implications for pollinator conservation. Co-PI with C. Kearns and D. Oliveras.
Biological Undergraduate Research Skills & Training Grant: \$2,500. Pollen-host use and cavity-nesting bee performance in conservation grasslands of Colorado. PI. In collaboration with honors student, A. M. Morphew.
Undergraduate Research Opportunity Program Team Grant: \$3,000. Digital Curation of Colorado's Native Bees: Practical Applications. PI.
- 2014 Undergraduate Research Opportunity Program Team Grant: \$3,000. Growth and Reproduction of Cavity Nesting Bees across an Agricultural Gradient. PI.
Undergraduate Research Opportunity Program Team Grant: \$3,000. Biological effects of extreme weather events: Response of native bees to the Colorado flood. PI.
- 2012 National Science Foundation: Doctoral Dissertation Improvement Grant: \$13,560. DISSERTATION RESEARCH: Effects of suburbanization on multispecies plant-animal interactions. PI.
Dartmouth Graduate Studies Travel Award: \$1,000
- 2009 Graduate Assistance in Areas of National Need Fellowship. \$30,000

MENTORED STUDENT GRANTS

- 2018 The Garden Club of America Centennial Pollinator Fellowship: \$4,000. Changes in Wild Bee Diversity and Abundance Along an Urban to Rural Gradient. CU-Denver MS student Ms. Kristen Birdshire.
- 2016 CU-Boulder Undergraduate Research Opportunity Program Individual Grant: \$2,400. The impact of nest-site limitation on the population dynamics of native cavity-nesting bees. Undergraduate researcher Ms. K. Bohanon.
CU-Boulder Undergraduate Research Opportunity Program Individual Grant: \$2,400. Impacts of flood restoration efforts on riparian plant and pollinator communities. Undergraduate researcher Mr. Tyler Streb.
- 2016 Eve Verderber Undergraduate Research Fellowship: \$1,500. Assessing wild bee growth and development across agroecosystems in Colorado: impacts of the Conservation Reserve Program. Undergraduate and Honors Thesis student Ms. Alex Morphew.

- 2016 CU-Boulder Undergraduate Research Opportunity Program Individual Grant: \$2,400. Factors driving competitive and host-parasite dynamics of native bees across the Front Range. Undergraduate researcher Ms. Linnea Mendoza.
- 2015 CU-Boulder Undergraduate Research Opportunity Program Individual Grant: \$1,200. The impacts of land-use on bees in agroecosystems: Does the Conservation Reserve Program promote cavity-nesting bee communities? Undergraduate and Honors Thesis student Ms. Alex Morphew.

COURSES TAUGHT

- 2019 *Principles of Ecology*, EBIO 2040. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Lecturer: developed and gave lectures on the major disciplines, theories, and classical hypotheses in the field of ecology.
- 2018 *Insect Biology*, EBIO 4660, Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Instructor: Explore insect biology, ecology, systematics and evolution of insects through lectures, active learning activities, field trips, and laboratory.
- 2015 *Principles of Ecology*, EBIO 2040-20. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Lecturer: developed and gave lectures on the major disciplines, theories, and classical hypotheses in the field of ecology.

GUEST LECTURES

- 2018 *Principles of Ecology*, EBIO 2040. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Lectured on pollinator conservation and lead a field research trip to Red Wagon Farm where students surveyed pollinators to aid Boulder Co. Parks and Open Space in restoration efforts.
- 2018 *Landscape Architecture*, ENVD 3200 Praxis, Program in Environmental Design, University of Colorado-Boulder. Guest lectured on wild pollinator ecology in relation to urban pollinator habitat design, gave tours of the Entomology Collection, and served as a research advisor for course research projects.
- 2018 *Biogeography*, GEOG 3351, Geography, University of Colorado-Boulder. Guest lectured on wild pollinator ecology in relation to local, landscape, continental, and global scales of biodiversity. Explored current knowledge, areas in need of research, and theoretical drives of large scale patterns of biodiversity.
- 2017 *Insect Biology*, EBIO 4460. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Guest lecturer for pollination biology.
- 2016 *Insect Biology*, EBIO 4460. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Guest lecturer for pollination biology.
- 2013 *Insect Biology*, EBIO 4460. Department of Ecology and Evolutionary Biology, University of Colorado-Boulder. Guest lecturer for pollination biology.

TEACHING ASSISTANTSHIPS

- 2012 *Statistics and Experimental Design I*, BIO 128. Dept. of Biological Sciences, Dartmouth College, Hanover, NH. Teaching Assistant: taught graduate laboratory session, introducing students to R programming, experimental design and analysis.

- 2011 *Animal Behavior*, BIO 27. Dept. of Biological Sciences, Dartmouth College, Hanover, NH. Teaching Assistant: Cooperated in the development and teaching of observational and experimental laboratory exercises to explore and test hypotheses about animal behavior.
- 2009 *Ecology*, BIO 16. Dept. of Biological Sciences, Dartmouth College, Hanover, NH. Teaching Assistant: organized and led review sessions for lecture exams and graded lecture assignments.
- 2009 *Animal Behavior*, BIO 27. Dept. of Biological Sciences, Dartmouth College, Hanover, NH. Teaching Assistant: cooperated in the development and teaching of observational and experimental laboratory exercises to explore and test hypotheses about animal behavior.

CONFERENCE PRESENTATIONS

* Undergraduate co-author

- 2017 Ecological Society of America Meeting, Portland, OR. *Exploring variation in local and landscape factors driving grassland bee communities in Colorado*. **A. L. Carper**, C. J. Schwantes, S. M. Endriss, M. D. Bowers, A. P. Norton, and M. A. Jamieson. Contributed oral session.
- Front Range Open Space Research Symposium, Boulder, CO. **A. L. Carper** & M. D. Bowers. *The conservation value of woody debris for cavity-nesting bees on Boulder County Open Space*.
- Guild of Rocky Mountain Ecologists and Evolutionary Biologists, University of Colorado Mountain Research Station, CO. **A.L. Carper**. *The impacts of woody debris and its management on Boulder County's wild bee communities*.
- 2016 Ecological Society of America Meeting, Ft Lauderdale, FL. *Local and landscape factors driving bee communities across agroecosystem in Colorado*. **A. L. Carper**, C. J. Schwantes, S. M. Endriss, M. D. Bowers, A. P. Norton, and M. A. Jamieson. Contributed oral session.
- 2014 Entomological Society of America Meeting, Portland, OR. *Conservation grasslands support diverse native bee assemblages in agroecosystems*. **A. L. Carper**, A. P. Norton, M. D. Bowers, C. J. Schwantes, S. M. Endriss, and M. A. Jamieson. Poster presentation.
- 2013 Entomological Society of America Meeting, Austin, TX. *Pollination in suburban environments: Implications for native plant reproduction*. **A. L. Carper**, L. S. Adler, P. S. Warren, and R. E. Irwin. P-IE Section Symposium.
- 2012 Ecological Society of America Meeting, Portland, OR. *Pollination in suburban landscapes: increased bee abundance does not benefit native plants*. **A. L. Carper**, L. S. Adler, P. S. Warren, and R. E. Irwin. Contributed oral session.
- 2010 Entomological Society of America Meeting, San Diego, CA. *Effects of suburbanization on forest bee diversity*. **A. L. Carper**, R. E. Irwin, L. S. Adler, and P. S. Warren. Poster presentation.
- Ecological Society of America Annual Meeting, Pittsburgh, PA. *Effects of suburbanization on bee abundance, diversity, and plant-pollinator interactions*. **A. L. Carper**, R. E. Irwin, and L. S. Adler. Contributed oral session.
- 2009 Ecological Society of America Annual Meeting, Albuquerque, NM. *Effects of urbanization on bee abundance and diversity*. **A. L. Carper**, R. E. Irwin, and L. S. Adler. Poster presentation.

COAUTHORED CONFERENCE PRESENTATIONS

* Undergraduate co-author

- 2018 Entomological Society of America Annual Meeting, Vancouver, BC. *Host-plant dependent variation in survival against a lepidopteran densovirus*. A. Smilanich, A. Wantanabe1, N. Muchoney, C. Chung, **A. L. Carper** and M. D. Bowers. Contributed oral session.
- Entomological Society of America Annual Meeting, Vancouver, BC. *Larval host-plant species influences development and survival of viral infection in *Anartia jatrophae* (Lepidoptera: Nymphalidae)*. N. Muchoney, M. D. Bowers, **A. L. Carper**, and A. Smilanich. Contributed oral session.
- American Association of Geographers Meeting, New Orleans, LA. *Changes in wild bee diversity and abundance along an urban-rural gradient*. K. Birdshire, C. Briles, and **A. L. Carper**. Poster session.
- 2017 Entomological Society of America Meeting, Denver, CO. *Assessing the effects of the Conservation Reserve Program on cavity-nesting bees in Colorado agroecosystems*. A. M. Morphew*, **A. L. Carper**, M. D. Bowers, and M. A. Jamieson. Poster session.
- Ecological Society of America Meeting, Portland, OR. *Effects of woody debris and its management on wild bee communities along Colorado's Front Range*. K. Bohanon*, **A. L. Carper**, and M. D. Bowers. Poster session.
- 2016 Ecological Society of America Meeting, Ft Lauderdale, FL. *Conservation grassland plantings promote wild cavity-nesting bee reproduction in agroecosystem*. A. M. Morphew*, **A. L. Carper**, M. D. Bowers, and M. A. Jamieson. Poster session.
- 2015 Entomological Society of America, Annual Meetings, Minneapolis, Minnesota. Scott V.L., A.P. Rose, C.J. Schwantes, K.B. Wolfson, **A.L. Carper**, and M.D. Bowers. *The Bees' Needs: Assessing the conservation value of bee nesting blocks through citizen science*.
- 2014 Entomological Society of America, Annual Meetings, Portland, OR. *Extreme weather events and native bees: Effects of the 2013 Colorado Flood*. Scott, V.L., **A. Carper**, M.D. Bowers.
- GECO Conference, Grand Junction, CO. *Wild bees living on the edge*. C. J. Schwantes, **A. L. Carper**, A . P. Norton, M. D. Bowers, and M. A. Jamieson.

INVITED SEMINARS

- 2016 Oakland University, Dept. of Biological Sciences, Seminar (10/25/2016): *Factors driving wild bee community dynamics across agroecosystems of Colorado*.
- 2014 Colorado State University, Dept. of Bioagricultural Sciences and Pest Management, Seminar (2/26/2014): *Land-use change, bees, and plant-pollinator interactions*.
- 2013 University of Wisconsin-Madison, Dept. of Entomology, Seminar (9/13/2013): *Land-use change, bees, and plant-pollinator interactions*.

INVITED TALKS

- 2018 3rd Annual Colorado Pollinator Summit: Plenary Speaker (11/9/2017): *The Natural history of Colorado's native bees: informing conservation through ecological research*.

- 2018 Pollinator Appreciation Month, CU Museum of Natural History (9/19/2018):
Colorado's wild bees: The fascinating ecologies of our most important pollinators.
Audubon Society of Greater Denver, Conservation in Colorado Adult Lecture Series (1/24/2018): *Wild bee diversity, ecology, and conservation in Colorado.*
- 2017 2nd Annual Colorado Pollinator Summit: Science and Research Panel (11/2/2017):
Factors driving wild bee community dynamics in Colorado.
- 2016 Boulder County Parks and Open Space Advisory Committee Meeting (11/17/2016):
Native pollinators on riparian open spaces.
High Country Conservation Advocates, Environmental Possibility Series (8/21/2016):
Native bee conservation along the Front Range and beyond.
Boulder County Parks and Open Space Brown Bag Lunch (7/5/2016): *Pollinators on Boulder County's Riparian Open Spaces.*
The Mile Hive Bee Club (6/14/2016): *Native bee diversity, ecology, and conservation.*
University of Colorado Museum of Natural History, Public outreach event seminar (3/15/2016): *What we're learning about The Bees' Needs: an update on research, discoveries, and lessons from your backyards.*

GRADUATE COMMITTEES

Birdshire, Kristen. *Changes in Wild Bee Diversity and Abundance Along an Urban to Rural Gradient* (2018). Master's Thesis. CU-Denver.

MENTORED UNDERGRADUATE RESEARCH

- Morphew, Alexandra. *Assessing the effects of the Conservation Reserve Program on cavity nesting bees in Colorado* (2017). Undergraduate Honors Theses. 1405.
https://scholar.colorado.edu/honr_theses/1405
- Enger, Micaela. *Effects of host plant and developmental stage on caterpillar immune response* (2017). Undergraduate Honors Theses. 1333.
http://scholar.colorado.edu/honr_theses/1333
- Bohanon, Kelsey. *Impacts of woody debris management on cavity-nesting bees and wasps* (2017). Independent Research.
- Morphew, Alexandra. *The impacts of land-use on bees in agroecosystems: does the Conservation Reserve Program promote cavity-nesting bee communities* (2015). Independent Research.

SYNERGISTIC ACTIVITIES

- (a) *Mentoring*: I have supervised and mentored many undergraduate students from the University of Colorado-Boulder and Dartmouth College through research activities and general advising. During my dissertation, I mentored four female students through their participation with field research. Two completed graduate degrees in the Departments of Entomology and Plant Biology at North Carolina State University and one in Biology at Eastern Carolina University. The fourth completed vet school at the College of Veterinarian Medicine at North Carolina State University. At CU-Boulder, I have mentored 35 undergraduate students, including 25 women, across a wide diversity of ages, ethnicities, and

backgrounds, and through independent research, grant writing, and honor's thesis. I have also helped mentor three graduate students, and serve on the graduate committee for a student at CU-Denver. I am currently collaborating with three students to prepare separate manuscripts from undergraduate research and three additional manuscripts with former graduate students.

- (b) *Outreach*: I engage the public whenever possible through direct interactions with homeowners and landowners, including personal meetings and correspondence, but also through the development of informational booklets that I have provided to cooperating communities. I have cooperated with the USDA Farm Service Agency, the Natural Resource Conservation Service, and farmers and ranchers in eastern Colorado to document patterns of native bee diversity. I have developed a blog based on the importance of native pollinators and their conservation and have worked with individual land-owners interested in bee conservation on their land. I have collaborated with the University of Colorado Biological Science Initiative to document and share my research through their ScienceLIVE program. Finally, outreach is becoming a major tenant of my research through collaboration with educators and the Museum of Natural History on our citizen science research program, *The Bees' Needs*. I also served as the content expert for the development of two exhibits at the Museum of Natural History: *Becoming Butterflies* and *Curious Connections*. I helped a Kao Kupadakvinij with specimen photography and ecological expertise for his Honor's Thesis Exhibition: *Entomology in the Fine Arts: A Voice for the Little Guys*. I have given numerous outreach talks to local organizations, through the CU Museum of Natural History, and through regional conservation organizations.
- (c) *Professional Service*: My primary service in my academic profession has been through peer review. I have reviewed manuscripts for *Functional Ecology*, *Perspectives in Plant Ecology*, *Evolution and Systematics*, *Urban Ecosystems*, and *Global Change Biology*. In addition, through graduate school I served on the Ecology and Evolutionary Biology Retreat Planning Committee, planning and organization the Dartmouth EEB program annual departmental retreat. I also served as the departmental seminar organizer, moderating intradepartmental seminar series for the EEB Program and arranging presenter schedules and weekly departmental email updates.