

ELIZABETH GREENE PRINGLE

ASSOCIATE PROFESSOR

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EDUCATION

- 2011 PhD Stanford University, Biology
2004 AB Harvard University, Environmental Science and Public Policy, *cum Laude*

APPOINTMENTS

- 2023— Associate Professor, Department of Biology, University of Nevada, Reno
2016-2023 Assistant Professor, Department of Biology, University of Nevada, Reno
2015-2018 Alexander von Humboldt Fellow, Max Planck Institute for Chemical Ecology, Jena, Germany
2011-2015 Junior Fellow, Michigan Society of Fellows, Department of Ecology and Evolutionary Biology, School of Natural Resources and Environment, University of Michigan

GRANTS, FELLOWSHIPS, AWARDS

Grants

- 2022-2025 Nevada Department of Transportation: Feasibility study of unmanned aerial vehicle imagery for mapping roadside milkweeds and nectaring plants for the monarch butterfly
2022-2027 NSF DEB 21-45757: CAREER: Feedbacks from drought on the phytochemical landscape
2020-2023 Bureau of Land Management: Managing milkweeds (*Asclepias* spp.) for monarch butterflies
2020-2022 Western Integrated Pest Management Center (USDA): Habitat management in alfalfa irrigation ditches: evaluating the potential for conservation biological control of aphid pests
2019-2023 NSF DEB 19-35498: EAGER: Tracking carbon allocation to unravel how a mutualism and its breakdown affect the carbon cycle

Fellowships

- 2015-2016 Postdoctoral Fellowship, Alexander von Humboldt Research Fellowship
2011-2015 Postdoctoral Fellowship, University of Michigan Society of Fellows
2007-2011 Hubert Shaw and Sandra Lui Stanford Graduate Fellowship
2006-2009 National Science Foundation Graduate Research Fellowship
2003 Radcliffe Fellowship, Harvard University

Awards

- 2017, 2023 Senior Scholar Mentoring Award, University of Nevada, Reno
2015 New Phytologist Tansley Medal Finalist

- 2011 Frances Lou Kallman Award for excellence in research and teaching, Stanford University
2007 Excellence in Teaching Award, Department of Biology, Stanford University

PUBLICATIONS

Peer-reviewed articles (*mentees)

34. Diethelm, A.C.*, M. Reichelt, and **E.G. Pringle**. *In press*. Herbivores disrupt clinal variation in plant responses to water limitation. *J Ecol*.
33. Robinson, MR, [...], and W.C. Wetzel [+ 193 authors, including **E.G. Pringle**]. 2023. Plant size, latitude, and phylogeny explain within-population variability in herbivory. *Science* 382: 679-683.
32. Mizell, G.M.*, T. Kim, B.W. Sullivan, J.S. Lemboi, J. Mosiany, T.M. Palmer, and **E.G. Pringle**. 2023. Carbon allocation in an East African ant-acacia: field-testing a ¹³C-labeling method for evaluating biotic impacts on the carbon cycle. *Plant Ecol* 224: 953-963.
31. Diethelm, A.C.*, K. Kost*, and **E.G. Pringle**. 2023. Plant water limitation and its impact on the oviposition preferences of the monarch butterfly, *Danaus plexippus* (Lepidoptera: Nymphalidae). *J Ins Sci* 23(4): 20; 1-5.
30. Carvalho, R.L., A.F. Resende, J. Barlow, [...], and J. Ferreira [+ 502 authors, including **E.G. Pringle**]. 2023. Pervasive gaps in Amazonian ecological research. *Curr Biol* 33: 1-9.
29. Vasey, G.L.*, A.K. Urza, J.C. Chambers, **E.G. Pringle**, and P.J. Weisberg. 2023. Clinal variations in seedling traits and responses to water availability correspond to seed-source environmental gradients in a foundational dryland tree species. *Ann Bot-London* 132: 203-216. *Commentary by Solé-Medina and Ramírez-Valiente. 2023. Common garden experiments reveal acquisitive strategies for responding to drought in seedlings of forest tree species. Ann Bot-London* 132: i-ii.
28. Milligan, P.D.*, T.M. Palmer, J.S. Lemboi, J. Mosiany, S. Mutisya, B. Gituku, A. Kibungei, and **E.G. Pringle**. 2023. Ant invasion is associated with lower root density and different root distribution of a foundational savanna tree species. *Biol Invasions* 25: 1683-1691.
27. Milligan, P.D.*, T.A. Martin, **E.G. Pringle**, K.M. Prior, and T.M. Palmer. 2023. Symbiotic ant traits produce differential host-plant carbon and water dynamics in a multi-species mutualism. *Ecology* 104: e3880.
26. Diethelm, A.C.*, M. Reichelt, T.E. Dilts, J.P. Farlin*, A. Marlar*, and **E.G. Pringle**. 2022. Climatic history, constraints, and the plasticity of phytochemical traits under water stress. *Ecosphere* 13: e4167.
25. Milligan, P.D.*, T.A. Martin, **E.G. Pringle**, C. Riginos, G.M. Mizell*, and T.M. Palmer. 2022. A soil-nesting invasive ant disrupts carbon dynamics in saplings of a foundational ant-plant. *J Ecol* 110: 359-373.
24. Mundim, F.M.* and **E.G. Pringle**. 2020. Phytochemistry-mediated disruption of ant-aphid interactions by root-feeding nematodes. *Oecologia* 194: 441-454.
23. Hazelwood, K., C.E.T. Paine, F.H. Cornejo Valverde, **E.G. Pringle**, H. Beck, and J. Terborgh. 2020. Changing tree community structures in defaunated forests are not driven only by dispersal limitation. *Ecol Evol* 10: 3392-3401.

22. **Pringle, E.G.**, T. Ferreira dos Santos*, M.S. Gonçalves, J.E. Hawes, C.A. Peres, and F.B. Baccaro. 2019. Arboreal ant abundance tracks primary productivity in an Amazonian whitewater river system. *Ecosphere* 10: e02902.
21. **Pringle, E.G.** 2019. Convergence, constraint, and the potential for mutualism between ants and their gut microbes. *Molec Ecol.* 28: 699-702.
20. Pruitt, J.N., A. Berdahl, C. Riehl, N. Pinter-Wollman, H.V. Moeller, **E.G. Pringle**, L.M. Aplin, E.J.H. Robinson, J. Grilli, P. Yeh, V.M. Savage, M.H. Price, J. Garland, I.C. Gilby, M.C. Crofoot, G.N. Doering, and E.A. Hobson. 2018. Social tipping points in animal societies. *P Roy Soc B* 285: 20181282.
19. Mundim, F.M.* and **E.G. Pringle**. 2018. Whole-plant metabolic allocation under water stress. *Front Plant Sci* 9: 852. doi: 10.3389/fpls.2018.00852.
18. **Pringle, E.G.**, I. Ableson*, J. Kerber*, R.L. Vannette, and L. Tao. 2017. Orthogonal fitness benefits of nitrogen and ants for nitrogen-limited plants in the presence of herbivores. *Ecology* 98:3003-3010.
17. **Pringle, E.G.** and C.S. Moreau. 2017. Community analysis of microbial sharing and specialization in a Costa Rican ant-plant-hemipteran symbiosis. *P Roy Soc B* 284: 20162770.
16. **Pringle, E.G.** 2016. Orienting the interaction compass: resource availability as a major driver of context dependence. *PLOS Biol* 14(10): e2000891.
15. **Pringle, E.G.** 2016. Integrating plant carbon dynamics with mutualism ecology. *New Phytol* 210: 71-75.
14. Bonilla, N.O.* and **E.G. Pringle**. 2015. Contagious seed dispersal and the spread of avian-dispersed exotic plants. *Biol Invasions* 17: 3409-3418.
13. **Pringle, E.G.**, A. Novo*, I. Ableson*, R.V. Barbehenn, and R.L. Vannette. 2014. Plant-derived differences in the composition of aphid honeydew and their effects on colonies of aphid-tending ants. *Ecol Evol* 4: 4065-4079.
12. **Pringle, E.G.** 2014. Harnessing ant defence at fruits reduces bruchid seed predation in a symbiotic ant-plant mutualism. *P Roy Soc B* 281: 20140474.
11. **Pringle, E.G.** and D.M. Gordon. 2013. Protection mutualisms and the community: geographic variation in an ant-plant symbiosis and the consequences for herbivores. *Sociobiology* 60: 242-251.
10. **Pringle, E.G.**, E. Akçay, T. Raab, R. Dirzo, and D.M. Gordon. 2013. Water stress strengthens mutualism among ants, trees and scale insects. *PLOS Biol* 11(11): e1001705.
Featured in PLOS Biology Synopsis 11(11): e1001706, on the journal's cover, and in PLOS Collections: Ecological impacts of climate change, ed. Bond-Lamberty, B. Reviewed by Denison, R.F. 2014. Trends in Plant Science 19: 411-413.
Selected media coverage: Science Editors' Choice, Los Angeles Times, Discover Magazine, AAAS Science Update, Spanish-language news via Agencia EFE, NPR
9. **Pringle, E.G.**, R. Dirzo, and D.M. Gordon. 2012. Plant defense, herbivory, and the growth of *Cordia alliodora* trees and their symbiotic *Azteca* ant colonies. *Oecologia*. 170: 677-685.
8. **Pringle, E.G.**, S.R. Ramírez, T.C. Bonebrake, D.M. Gordon, and R. Dirzo. 2012. Diversification and phylogeographic structure in widespread *Azteca* plant-ants from the northern Neotropics. *Mol Ecol* 21: 3576-3592.
7. **Pringle, E.G.**, R.I. Adams, E. Broadbent, P.E. Busby, C.I. Donnatti, E.L. Kurten, K. Renton, and R. Dirzo. 2011. Distinct leaf-trait syndromes of evergreen and deciduous trees in a seasonally dry tropical forest. *Biotropica*. 43: 299-308.
Figure 3 reproduced and discussed in Thompson, J.N. 2013. Relentless Evolution.

6. **Pringle, E.G.**, R. Dirzo, and D.M. Gordon. 2011. Indirect benefits of symbiotic coccoids for an ant-defended myrmecophytic tree. *Ecology*. 91: 37-46.
Featured on the cover of Ecology and in the Bulletin of the Ecological Society of America.
5. Ramírez, S.R., T. Eltz, F. Fritzsche, R. Pemberton, **E.G. Pringle**, and N. Tsutsui. 2010. Intraspecific geographic variation of fragrances acquired by orchid bees in native and introduced populations. *J Chem Ecol* 36: 873-84.
4. Terborgh, J., G. Nuñez-Ituri, N.C.A. Pitman, F.H. Cornejo-Valverde, P. Alvarez, V. Swamy, **E.G. Pringle**, and C.E.T. Paine. 2008. Tree recruitment in an empty forest. *Ecology*. 89: 1757-1768.
Featured on the cover of Ecology.
3. **Pringle, E.G.**, P. Álvarez-Loayza, and J. Terborgh. 2007. Seed characteristics and susceptibility to pathogen attack in tree seeds of the Peruvian Amazon. *Plant Ecol* 193: 211-222.
2. **Pringle, E.G.**, S.W. Baxter, C.L. Webster, A. Papanicolaou, S.F. Lee, and C.D. Jiggins. 2007. Synteny and chromosome evolution in the Lepidoptera: evidence from mapping in *Heliconius melpomene*. *Genetics*. 177: 417-426.
Reviewed by T. Long in Faculty of 1000 Biology.
1. Cui, J., A.K. Bahrami, **E.G. Pringle**, G. Hernandez-Guzman, C.L. Bender, N.E. Pierce, and F.M. Ausubel. 2005. *Pseudomonas syringae* manipulates systemic plant defenses against pathogens and herbivores. *P Natl Acad Sci USA*. 102: 1791-1796.
Highlighted in Nature Rev. Microbiol. 3: 192-193. Reviewed by M. Sabelis in Faculty of 1000 Biology.

Book chapters (peer-reviewed)

2. **Pringle, E.G.** 2021. Ant-Hemiptera associations. pp 45-48 in Starr, C.K. (ed), Encyclopedia of Social Insects. Springer, Cham.
1. Palmer, T.M., **E.G. Pringle**, A. Stier, and R.D. Holt. 2015. Mutualism in a community context. pp 159-180 in Bronstein, J.L. (ed), Mutualism. Oxford University Press, Oxford, UK.

Manuscripts in review/revision

Call, A.*, S. Akiba*, and **E.G. Pringle**. *In review*. Remote sensing reveals the importance of seminatural habitat and irrigation on aphid biocontrol in arid agroecosystems.

Outreach publications

- 2023 Moore, C.M., A.K. Shaw, B. Bruninga-Socolar, E. Caves, A.T. Karnish, K. Kiesewetter, A. Nelson, and E.G. Pringle. The movement ecology of mutualism. *Bulletin of the Ecological Society of America*. 104: 1-7.
- 2020 Pringle, E.G., K. Moeller, and C. Kazilek. Virtual Biomes: Savanna VR 360, Arizona State University "Ask a Biologist" project: <https://askabiologist.asu.edu/explore/Virtual-360-Biomes>.
- 2016 Pringle, E.G. and R. Dirzo. Effects of anthropogenic climate change on mutualistic interactions among tropical species. *Ciencias* [in Spanish]
- 2014 Field team member and blogger for Ants, Diet, and Diversity: Costa Rica Expedition with The Field Museum of Chicago: <http://expeditions.fieldmuseum.org>.
- 2013 PLOSable Biology story "Trees Get By with Ant Aides," Arizona State University "Ask a Biologist" project: <http://askabiologist.asu.edu/plosable/trees-aided-ants>.
- 2011 Indirect benefits of scale insects for ant-defended trees. *Bulletin of the Ecological Society of America*. 92:101-105.

TEACHING

Instructor

- 2017— BIOL 415/615: Evolution, University of Nevada, Reno
2016–2022 BIOL 100: Biology: Principles and Applications, University of Nevada, Reno
2015 Tropical Biology: An Ecological Approach, Organization for Tropical Studies (OTS)
2015 Field Ecology in Kenya, University of Florida Study Abroad Program
2012–2013 EEB 401/NRE 501: Macroecology, University of Michigan

Guest lecturer

- 2016— EECB 703: Elements of EECB, University of Nevada, Reno
2013 EEB 120: Elements of Evolution: Amazon Rainforests, University of Michigan
2013 EEB 445: Biogeography, University of Michigan
2012–2013 EEB 477/NRE556: Field Ecology, University of Michigan
2009 Biology 2: Current Research in Biology, Stanford University

Teaching assistant

- 2008 Biology 143/243: Evolution, Stanford University
2008 Bing Overseas Seminar Program in Mexico: Natural History, Behavioral and Evolutionary Ecology in Tropical Dry Forests, Stanford University
2007 Biosciences 125: Ecosystems of California, Stanford University
2006 Biosciences 41: Genetics, Biochemistry, & Molecular Biology, Stanford University

MENTORING

Graduate adviser (6 students): Anson Call, Stephanie Coronado, Gabriella Mizell, Gino Zamboni, Aramee Diethelm (PhD 2023), N. Omar Bonilla (MS 2014)

Postdoctoral adviser: James Farlin, Patrick Milligan, Fabiane Mundim

Graduate committee member (20 students): Jessica Buelow, Megan Burroughs, Charlene Duncan, Ari Grele, Alex Kardish, Tanzil Mahmud, Kemi Osho, Devon Picklum, Jeremy Adkins (MS 2023), Alison Agneray (PhD 2022), Katie Uckele (PhD 2022), Mary Fennimore (PhD 2021), Jacob Anderson (MS 2021), Jordin Jacobs (MS 2021), Riley Kellermeyer (PhD 2021), Georgia Vasey (MS 2021), Cordi Craig (MS 2019), Cody Ernst-Brock (MS 2018), Naim Edwards (MS 2014), Lizette Ramírez (MS 2014)

Undergraduate adviser (48 students): Hania Amezcua, Benjamin Baker, Peter Beardsley, Kalysta Branco, Priscilla Chan, Douglas Collins, Emily Cook, Brooke DerAshodian, Yvette Diaz, Allison Dooley, Tyler Duvernay, Alejandra Garcia, Cassidy Gosse, Jade Johnson, Noah Jordan, Jared Kerr, Konnor Kost, Mackenzie Lange, Samantha Lebario, Logan Lorentzen, Audrey Marlar, Connor Monfalcone, Eric Mullinix, Ivory Rok, Justin Solorio, Elizabeth Stephens, Marielle Tedlos, Alexandra Tierney, Hunter Wyatt, Ian Ableson, Jennifer Kerber, Alexandria Novo, Bhavneet Singh, Victor García, Alberto Mora, Cara Brook, Becca Castro, Hannah Donaghe, Ben Ginsberg, Georgia Griffin, Annie Loggins, Samuel Lum, Rose Monahan, Elizabeth Murphy, Arpita Sinha, Eric Slessarev, Kenji Tanabe, Ian Will

Career Development Panelist: The Field Museum of Chicago, Max Planck for Chemical Ecology, University of Michigan, University of Nevada, Reno

INVITED TALKS

- 2022 Organized Oral Session, Ecological Society of America Meeting, Montreal, Canada
- 2022 Department of Biology, University of Nebraska, Lincoln (Virtual)
- 2021 Department of Biology, University of Central Florida (Virtual)
- 2021 Department of Biology, University of Pennsylvania (Virtual)
- 2021 Department of Biochemistry, University of Nevada, Reno (Virtual)
- 2020 Section Symposium, Entomological Society of America Meeting (Virtual)
- 2020 Department of Biology, University of San Francisco (Virtual)
- 2019 Cellular and Molecular Biology Seminar Series, University of Nevada, Reno, Reno, NV
- 2019 Symposium, International Society for Chemical Ecology Meeting, Atlanta, GA
- 2019 Department of Biology, Virginia Commonwealth University, Richmond, VA
- 2018 Department of Biochemistry, University of Nevada, Reno, Reno, NV
- 2018 Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, AZ
- 2018 Program Symposium, Entomological Society of America, Pacific Branch Meeting, Reno, NV
- 2018 Department of Environmental Studies, University of California, Santa Cruz, CA
- 2018 Biology Department, Portland State University, Portland, OR
- 2018 Department of Entomology, University of California, Riverside, CA
- 2017 Member Symposium, Entomological Society of America Meeting, Denver, CO
- 2017 Organized Oral Session, Ecological Society of America Meeting, Portland, OR
- 2017 Department of Biological Sciences, California State University, Chico, CA
- 2017 Discussion Leader, Gordon Research Conference: Plant-Herbivore Interactions, Ventura, CA
- 2017 Department of Ecology and Evolutionary Biology, University of California, Los Angeles, CA
- 2017 Ecology and Evolutionary Biology Seminar, Texas A&M University, College Station, TX
- 2016 Department of Entomology, Pennsylvania State University, State College, PA
- 2016 Ants 2016 Symposium, Institute for Systematic Botany and Mycology, Munich, Germany
- 2016 German Centre for Integrative Biodiversity Research (iDiv), Leipzig, Germany
- 2015 Department of Biology, University of Nevada, Reno, Reno, NV
- 2015 Department of Ecology and Evolutionary Biology, Princeton University, Princeton, NJ
- 2014 Member Symposium, Entomological Society of America Meeting, Portland, OR
- 2014 Department of Biology, University of Florida, Gainesville, FL
- 2014 Gordon Research Conference: Unifying Ecology Across Scales, Biddeford, ME
- 2014 4th Annual Chicago Plant Science Symposium, The Field Museum, Chicago, IL
- 2014 Department of Ecology and Evolutionary Biology, University of Michigan, Ann Arbor, MI
- 2013 XXI Myrmecological Symposium, Fortaleza, Brazil
- 2012 Department of Biology, University of Missouri-St. Louis, MO
- 2011 Department of Biological Sciences, Universidad de los Andes, Bogotá, Colombia
- 2011 Ecology and Evolution Colloquium, San Francisco State University, San Francisco, CA
- 2010 Plant-Insect Group, Cornell University, Ithaca, NY

- 2010 Microbial Diversity Institute, Yale University, New Haven, CT
- 2010 Max Planck Institute for Chemical Ecology, Jena, Germany
- 2009 Harvard University 5th Annual Plant Biology Symposium, Cambridge, MA
- 2008 Chamela Biological Station, Universidad Nacional Autónoma de México, Jalisco, Mexico
- 2002 Australian Institute of Marine Science, Cape Ferguson, Australia

CONTRIBUTED TALKS

- 2020 American Society of Naturalists Stand-Alone Meeting, Asilomar, CA
- 2016 Association for Tropical Biology and Conservation Annual Meeting, Montpellier, France
- 2015 Poster, Gordon Research Conference: Animal-Microbe Symbioses, Waterville Valley, NH
- 2013 Association for Tropical Biology and Conservation Annual Meeting, San José, Costa Rica
- 2013 Poster, Gordon Research Conference: Plant-Herbivore Interactions, Ventura, CA
- 2012 Entomological Society of America Meeting, Knoxville, TN
- 2012 Ecological Society of America Meeting, Portland, OR
- 2011 Evolution Meeting, Norman, OK
- 2010 Poster, Entomological Society of America Meeting, San Diego, CA
- 2010 International Union for the Study of Social Insects Meeting, Copenhagen, Denmark
- 2009 Stanford-UCSC Species Interactions Workshop, Stanford, CA
- 2009 Ecological Society of America Meeting, Albuquerque, NM
- 2007 Poster, Association for Tropical Biology and Conservation Annual Meeting, Morelia, Mexico

SERVICE & OUTREACH

- 2023— Associate Editor, *Journal of Animal Ecology*
- 2017— Associate Editor, *Plant Ecology*
- 2014— NSF Advisory Panels (2014, 2021, 2022 x 2, 2024)
- 2007— *Ad hoc* reviewer: ~10-12 manuscript and proposal reviews per year
- 2006— Member: Association for Tropical Biology and Conservation, Ecological Society of America, International Union for the Study of Social Insects, Entomological Society of America
- 2020 Organizer of Ecological Society of America meeting symposium, “Mutualists as community architects: a trait-based approach”, Salt Lake City, UT
- 2016 Co-organizer of Association for Tropical Biology and Conservation symposium "Defaunation: a local process with global implications", Montpellier, France
- 2010-12, 2014 Co-organizer and instructor of annual field workshop entitled Biodiversity and Ecology of the Dry Forest for preparatory-school students and secondary-school teachers in Jalisco, Mexico [in Spanish]
- 2010-2013 Associate Faculty Member, Faculty of 1000 Biology, Conservation & Restoration
- 2009 Co-organizer of 11th Bay Area Conservation Biology Symposium, Stanford University

ADDITIONAL TRAINING

- 2022 Diversity, Equity and Inclusion in STEM, faculty course, University of Nevada, Reno
- 2021 Practical Strategies for Inclusive Mentoring in Undergraduate Research Workshop, NSHE-Council on Undergraduate Research
- 2020 Going Online Fall 2020, Teaching & Learning Technologies, University of Nevada, Reno
- 2018 Mentoring Mentors: Faculty Workshop, University of Nevada, Reno
- 2009 Bodega Bay Applied Phylogenetics Workshop, University of California, Davis
- 2008 Ant Course in Aragua, Venezuela, California Academy of Sciences