# Megan Bontrager

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## Research interests

My research focuses on understanding the factors that shape geographic ranges, how populations have adapted to their environments, and how species will respond to climate change. I approach these questions using a variety of methods, including large-scale field experiments, meta-analysis, and landscape genetics.

## Academic positions

**University of California, Davis** 2018–
Postdoctoral researcher
Faculty advisors: Johanna Schmitt, Sharon Strauss, Jennifer Gremer, Julin Maloof

## Education

**University of British Columbia** 2012–2018
Ph.D. in Botany
Title: *Pollination, genetic structure, and adaptation to climate across the geographic range of* Clarkia pulchella.
Advisor: Amy Angert
Committee: Sally Aitken, Michael Whitlock, and Jeannette Whitton

**University of California, Santa Cruz** 2008–2011
B.Sc. in Plant Sciences
B.Sc. in Molecular, Cell, and Developmental Biology
Undergraduate research advisor: Ingrid Parker

**Cabrillo Community College** 2007–2008
Prerequisites for transfer to B.Sc.

## Preprints and in review

12. A. L. Angert, **M. Bontrager**, and Jon Ågren. What do we really know about adaptation at range edges? In review for the Annual Review of Ecology, Evolution, and Systematics.
11. **M. Bontrager** and A. L. Angert. Genetic differentiation is determined by geographic distance in *Clarkia pulchella*. bioR$\chi$iv 374454. In revision for resubmission to the American Journal of Botany.

## Publications

10. [in press] J. R. Gremer, A. Chiono, E. Suglia **M. Bontrager**, L. Okafor, and J. Schmitt (2020). Variation in the seasonal germination niche across an elevational gradient: the role of germination cueing in current and future climates. American Journal of Botany.
9. A. L. Hargreaves, R. M. Germain, **M. Bontrager**, J. Persi, and A. L. Angert (2020). Local adaptation to biotic interactions: a meta-analysis across latitudes. The American Naturalist, 195(3).
8. **M. Bontrager**, C. D. Muir, and A. L. Angert (2019). Geographic variation in reproductive assurance of *Clarkia pulchella*. Oecologia 190(1): 59-67.
7. **M. Bontrager** and A. L. Angert (2018). Gene flow improves fitness at a range edge under climate change. Evolution Letters, 3(1): 55-68 .
6. D. E. Gamble*, **M. Bontrager**, and A. L. Angert (2016). Floral trait variation and links to climate in the mixed-mating annual *Clarkia pulchella*. Botany, 96(7): 425–435.
5. **M. Bontrager** and A. L. Angert (2016). Effects of range-wide variation in climate and isolation on floral traits and reproductive output of *Clarkia pulchella*. American Journal of Botany, 103(1): 10–21.
4. J. A. Lee-Yaw, H. M. Kharouba, **M. Bontrager**, C. Mahony, A. M. Csergő, A. M. Noreen, Q. Li, R. Schuster, and A. L. Angert (2016). A synthesis of transplant experiments and ecological niche models suggests that range limits are often niche limits. Ecology Letters, 19(6): 710–722.
3. I. M. Parker, M. Saunders, **M. Bontrager**, A. P. Weitz, R. Hendricks, R. Magarey, K. Suiter, and G. S. Gilbert (2015). Phylogenetic structure and host abundance drive disease pressure in communities. Nature, 520(7548): 542-544.
2. **M. Bontrager**, K. Webster, M. Elvin, and I. M. Parker (2014). The effects of habitat and competitive/facilitative interactions on reintroduction success of the endangered wetland herb, *Arenaria paludicola*. Plant Ecology, 215(4): 467–478.
1. J. M. Yost, **M. Bontrager**, S. W. McCabe, D. Burton, M. G. Simpson, K. M. Kay, and M. Ritter (2013). Phylogenetic relationships and evolution in *Dudleya* (Crassulaceae). Systematic Botany, 38(4): 1096–1104.

* Undergraduate mentee

## Non-refereed contributions

K. R. Acierto, R. S. Hendricks, **M. Bontrager**, and I.M. Parker (12 December 2012). Transplant success for the endangered herb *Arenaria paludicola* at Golden Gate National Recreation Area: effects of site, propagation type, and competition. Technical report to the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

I. M. Parker and **M. Bontrager** (29 February 2012). Propagation and establishment of new populations of marsh sandwort (*Arenaria paludicola*) in Santa Cruz County. Technical report to the U.S. Fish and Wildlife Service and the California Department of Fish and Game.

**M. Bontrager** and I. M. Parker (26 September 2011). Effects of serpentine soil on plant community composition in natural populations and seedling growth in a bioassay. Technical report to Midpeninsula Regional Open Space District.

## Fellowships and awards

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| Society for the Study of Evolution Hamilton Finalist (500 USD) | 2019 |
| UBC Biology teaching award (500 CAD) | 2018 |
| Best research presentation, Brackendale Ecology and Evolution Retreat | 2016 |
| Li Tze Fong Memorial Fellowship (25000 CAD) | 2016 |
| Botanical Society of America Genetics Section Grad Research Award (500 USD) | 2016 |
| Botanical Society of America Graduate Student Research Award (500 USD) | 2016 |
| Washington Native Plant Society Research Grant (1200 USD) | 2016 |
| Vladimir J. Krajina Prize in Plant Ecology (2000 CAD) | 2013 |
| UBC Four Year Doctoral Fellowship (102400 CAD) | 2012 |

## Selected presentations

**M. Bontrager***, J. Maloof, J. R. Gremer, and S. Y. Strauss (4 January 2020). Climatic drivers of the flowering niche in the *Streptanthus* clade. Poster presentation at the American Society of Naturalists meeting. Asilomar, California.

**M. Bontrager*** (28 June 2019). Local adaptation at range edges and under anomalous climates. Invited presentation in the Hamilton symposium at Evolution. Providence, Rhode Island. Video link.

**M. Bontrager*** (26 February 2019). Local adaptation at range edges and under anomalous climates. Invited seminar in the Population Biology Seminar Series, U.C. Davis.

**M. Bontrager***, C.R. Mahony, D.E. Gamble, R.M. Germain, A.L. Hargreaves, E.J. Kleynhans, C.S. Leven, K.A. Thompson, and A.L. Angert (6 January 2018). Climate anomalies drive local maladaptation. Presentation at the American Society of Naturalists meeting. Asilomar, California.

**M. Bontrager*** and A.L. Angert (24 June 2017). Effects of gene flow on the performance of Clarkia pulchella at the species' northern range margin. Presentation at Evolution. Portland, Oregon. Video link.

**M. Bontrager*** and A.L. Angert (9 May 2017). Effects of gene flow on the performance of Clarkia pulchella at the species' northern range margin. Presentation at the Annual Meeting of the Canadian Society for Ecology and Evolution. Victoria, British Columbia.

**M. Bontrager*** and A.L. Angert (5 November 2016). Effects of gene flow on the performance of Clarkia pulchella at the species' northern range margin. Presentation at Ecology and Evolution Retreat. Brackendale, British Columbia.

**M. Bontrager*** and A.L. Angert (16 April 2016). Effects of gene flow on the performance of Clarkia pulchella at the species' northern range margin. Poster presentation at Evo-Wibo. Port Townsend, Washington.

**M. Bontrager*** and A.L. Angert (22 May 2015). Effects of range-wide variation in climate and isolation on floral traits and reproductive output of Clarkia pulchella. Presentation at the Annual Meeting of the Canadian Society for Ecology and Evolution. Saskatoon, Saskatchewan.

**M. Bontrager***, K. Webster, M. Elvin, and I.M. Parker (12 January 2012). Factors influencing growth and survival of a critically endangered plant, Arenaria paludicola. Presentation at the California Native Plant Society 2012 Conservation Conference. San Diego, California.

J. Yost, **M. Bontrager***, S. McCabe, K.M. Kay, and M. Ritter (11 July 2011). A classification of California's diploid Dudleya species based on molecular phylogenetic data. Poster presentation at Botany 2011 Conference. St. Louis, Missouri.

* presenting author

## Professional experience

**Staff research associate** 2011–2012

Supervisors: Ingrid Parker and Greg Gilbert

Trained and led crews in the field, greenhouse, and molecular biology lab. Designed greenhouse experiments and field monitoring protocols.

**Undergraduate research assistant** 2010–2011

Supervisors: Ingrid Parker, Kathleen Kay, and Jenn Yost

Developed and performed molecular protocols and greenhouse experiments. Assisted with field experiments.

## Mentoring and teaching

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| Advisor to undergraduate independent project students (UC Davis) | 2018– |
| Leader, R workshop for undergraduate research assistants | 2018 |
| Head teaching assistant, Biostatistics | 2017–2018 |
| Teaching assistant, Plant Ecology | 2017 |
| Teaching assistant and guest lecturer, Phytogeography | 2016 |
| Advisor to undergraduate honours thesis students (UBC) | 2016–2017 |
| Supervisor of undergraduate research volunteers | 2014–2017 |

## Service and outreach

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| Grad representative, Biodiversity Research Centre postdoc search committee | 2018 |
| Co-organizer of Biodiversity Centre Women in STEM Workshop | 2017 |
| Coordinator of Florum, a weekly meeting of UBC plant ecologists | 2013–2016 |
| Modules in Ecology and Evolution Development, curriculum developer | 2013–2015 |
| UBC Let's Talk Science, visiting scientist in primary school | 2012–2014 |
| UBC Let's Talk Science, science fair mentor | 2012–2013 |
| Beaty Biodiversity Museum Nature Club, volunteer | 2012–2013 |

## Professional engagement

Member: American Society of Naturalists, Botanical Society of America, Canadian Society for Ecology and Evolution, Society for the Study of Evolution, Washington Native Plant Society

Reviews since 2019: American Journal of Botany (1), Ecology Letters (1), Evolution (1), Global Change Biology (1), Journal of Ecology (1), Journal of Systematics and Evolution (1), New Phytologist (2), PeerJ (1).