Megan Bontrager

Assistant Professor
University of Toronto
Department of Ecology and Evolutionary Biology
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Research interests

I study the determinants of species' geographic ranges and the drivers of local adaptation. I conduct large-scale, rigorous field and greenhouse experiments, quantitative syntheses of the the literature, and analyses using herbarium collections.

Academic positions

Assistant Professor (started July 2022) 2022–
Department of Ecology and Evolutionary Biology
University of Toronto
Includes maternity leave October 2023–May 2024

Postdoctoral Fellow 2021–2022
University of Toronto
Advisor: John Stinchcombe
Includes maternity leave September 2021–March 2022

Postdoctoral Researcher 2018–2020
University of California, Davis
Advisors: Jennifer Gremer, Julin Maloof, Johanna Schmitt, Sharon Strauss

Research Associate 2011–2012
University of California, Santa Cruz
Supervisors: Ingrid Parker, Greg Gilbert

Education

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

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

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

Preprints

19. **M. Bontrager**, S. J. Worthy, N. I. Cacho, L. Leventhal, J. Maloof, J. R. Gremer, J. Schmitt, S. Y. Strauss. Herbarium specimens reveal a constrained seasonal climate niche despite diverged annual climates across a wildflower clade *bioRχiv* 2025.02.28.640808.

18. **M. Bontrager**, S. J. Worthy, L. Leventhal, J. Maloof, J. R. Gremer, J. Schmitt, S. Y. Strauss. Specimen-tailored "lived" climate reveals precipitation onset and amount best predict specimen phenology, but only weakly predict specimen reproductive success across a clade. *bioRχiv* 2025.02.03.636077.

17. **M. Bontrager**, C. D. Muir, C. R. Mahony, D. E. Gamble*, R. M. Germain, A. L. Hargreaves, E. J. Kleynhans, K. A. Thompson, and A. L. Angert. Climate warming weakens local adaptation. *bioRχiv* 2020.11.01.364349. (Status note: we are adding recent studies to the database and preparing to resubmit.)

16. **M. Bontrager** and A. L. Angert. Genetic differentiation is determined by geographic distance in *Clarkia pulchella*. *bioRχiv* 374454.

Publications

15. J. Bellis, M. A. Albrecht, J. Maschinski, S. Dalrymple, M. J. Keir, T. Chambers, J. Possley, E. D. Adkins, E. W. Parsons, M. Kunz, C. Radcliffe, E. Coffey, T. N. Kaye, C.L. Peterson, A. S. David, S. A. Herron, E. S. Menges, T. Bell, M. Coppoletta, C. Elam, K. McEachern, P. S. Williamson, D. Boensch, **M. Bontrager**, C. Breeden, N. Frade, D. R. Gordon, S. O. Link, T. Littlefield, S. Murray, R. O'Dell, N. B. Pavlovic, C. M. Reemts, D. D. Taylor, J. H. Titus, P. J. Titus, T. A. Stanley, and K. D. Heineman. The relative influence of geographic and environmental factors on rare plant translocation outcomes. *Journal of Applied Ecology* 62(3): 638-650.

14. J. Bellis, O. Osazuwa-Peters, J. Maschinski, M. J. Keir, E. W. Parsons, T. N. Kaye, M. Kunz, J. Possley, E. Menges, S. A. Smith, D. Roth, D. Brewer, W. Brumback, J. J. Lange, C. Niederer, J. B. Turner-Skoff, **M. Bontrager**, R. Braham, M. Coppoletta, K. D. Holl, P. Williamson, T. Bell, J. L. Jonas, K. McEachern, K. L. Robertson, S. J. Birnbaum, A. Dattilo, J. J. Dollard Jr, J. Fant, W. Kishida, P. Lesica, S. O. Link, N. B. Pavlovic, J. Poole, C. M. Reemts, P. Stiling, D. D. Taylor, J. H. Titus, P. J. Titus, E. D. Adkins, T. Chambers, M. W. Paschke, K. D. Heineman, and M. A. Albrecht (2024). Identifying predictors of translocation success in rare plant species. *Conservation Biology* 38(2): e14190.

    Maternity leave: October 2023-May 2024

13. D. S. Srivastava, L. Coristine, A. L. Angert, **M. Bontrager**, S. L. Amundrud, J. L. Williams, A. C. Y. Yeung, D.R. de Zwaan, P. L. Thompson, S. N. Aitken, J. M. Sunday, M. I. O'Connor, J. Whitton, N. E. M. Brown, C. D. MacLeod, L. Wegener Parfrey, J. R. Bernhardt, J. Carrillo, C. D. G. Harley, P. T. Martone, B. G. Freeman, M. Tseng, and S. D. Donner (2021). Wildcards in climate change biology. *Ecological Monographs* 91: e01471.

    Maternity leave: September 2021-March 2022

12. **M. Bontrager**, J. A. Lee-Yaw, T. Usui, A. L. Hargreaves, D. Anstett, H. A. Branch, C. D. Muir, and A. L. Angert (2021). Adaptation across geographic ranges is consistent with strong selection in marginal climates and legacies of range expansion. *Evolution* 75: 1316-1333.

11. A. L. Angert, **M. Bontrager**, and J. Ågren (2020). What do we really know about adaptation at range edges? *Annual Review of Ecology, Evolution, and Systematics* 51: 341-361.

10. 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*, 107(2): 350-363.

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): 395-411.

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 (2019). 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 trainee

Non-refereed contributions

3. 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.

2. 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.

1. **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.

Research grants and funding

Bontrager, M. 2023. Canadian Foundation for Innovation and Ontario Research Fund John R Evans Leaders' Fund. "Assessing plant responses to environmental change" $840,000.

Bontrager M. 2022. NSERC Discovery Grant. "Geographic range limits and adaptation to changing climates: the effects of phenotypic lag, selection, and genetic variance" $145,000 over 5 years.

Bontrager M. 2022. NSERC Discovery Launch Supplement. "Geographic range limits and adaptation to changing climates: the effects of phenotypic lag, selection, and genetic variance" $12,500.

Bontrager, M. 2021. Postdoc research funds from the University of Toronto. $30,000 over 2 years.

Fellowships and awards

Society for the Study of Evolution Hamilton Finalist (500 USD)	2019
Grand Challenges Postdoctoral Fellowship, University of Minnesota (declined; 107,000 USD)	2018
UBC Biology teaching award (500 CAD)	2018
Student talk award, Evo-Wibo, Port Townsend, Washington	2018
Best research presentation, Brackendale Ecology and Evolution Retreat	2016
Li Tze Fong Memorial Fellowship (25,000 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 (1,200 USD)	2016
Vladimir J. Krajina Prize in Plant Ecology (2,000 CAD)	2013
UBC Four Year Doctoral Fellowship (102,400 CAD)	2012

Invited seminars

McGill University, Biology Seminar Series, 3 April 2025.

Carnegie Institute for Global Ecology at Stanford University, Plant Biology Seminar Series, 3 March 2023.

University of Colorado Denver, Integrative Biology Seminar Series, 17 February 2023.

University of Toronto Mississauga, Biology Seminar Series, 4 November 2022.

Queens University, Biology Seminar Series, 20 September 2022.

Duke University, PopBio Seminar Series, 15 October 2020.

University of Utah, Frontiers in Plant Biology Symposium, 19 February 2020.

Hamilton Symposium at Evolution, Providence, Rhode Island, 28 June 2019. Video link.

University of California, Davis, Population Biology Seminar Series, 26 February 2019.

Maladaptation Symposium at the American Society of Naturalists Asilomar Meeting, 6 January 2018.

Selected presentations

Includes selected trainee presentations, presenter is in **bold**.

T. McGruder and M. Bontrager (July 2024). Analyzing the influence of abiotic factors on floral coloration and morphological traits in *Clarkia pulchella*. Poster presentation at Evolution 2024, Montreal.

E. Hector and M. Bontrager (July 2024). Characterizing *Phytoplasma* disease in *Trillium grandiflorum* populations in Southern Ontario. Poster presentation at Evolution 2024, Montreal.

L. Bartkovich and M. Bontrager (July 2024). Assessing the influence of local climatic conditions on flowering strategies in the wildflower *Clarkia pulchella*. Presentation at Evolution 2024, Montreal.

K. Maunder and M. Bontrager (May 2024). Populations of *Streptanthus tortuosus* vary in whether plant size affects the initiaion of reproduction. Presentation at CSEE 2024, Vancouver.

M. Bontrager, E. Suglia, J. Davis, J. Schmitt, J. Maloof and J. R. Gremer (17 August 2021). Divergent vernalization requirements across an elevational cline. Presentation at the Annual Meeting of the Canadian Society for Ecology and Evolution, online.

M. Bontrager, E. Suglia, J. Davis, J. Schmitt, J. Maloof and J. R. Gremer (20 July 2021). Evolution of vernalization requirements across an elevational cline in *Streptanthus tortuosus*. Presentation at the Annual Botany Meeting, online.

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 and A. L. Angert (4 April 2018). Effects of gene flow on performance at the northern range margin of *Clarkia pulchella*. Presentation at Evo-Wibo. Port Townsend, Washington.

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.

Teaching

At the University of Toronto

Biodiversity and Conservation Biology Seminar (EEB491; 15 undergrads; co-taught)	Fall 2024
Evolutionary Ecology (EEB324; 60 undergrads; co-taught)	Fall 2024
Temperate Field Biology (EEB405; 15 undergrads; co-taught)	Summer 2023
Evolutionary Ecology (EEB324; 60 undergrads; co-taught)	Fall 2022
Temperate Field Biology (EEB405; 15 undergrads; co-taught)	Summer 2022

As a graduate student at UBC

Lead teaching assistant, Biostatistics (BIO300, 2 terms)	2017–2018
Received UBC Biology Teaching Award for outstanding work in this role	
Teaching assistant, Plant Ecology (BIO406)	2017
Teaching assistant and guest lecturer, Phytogeography (BIO412)	2016

Mentoring

Graduate student supervision

PhD. Louisa Bartkovich	2022–
PhD. Katie Maunder (co-supervised with John Stinchcombe)	2022–
PhD. Juniper Malloff	2023–
MSc. Erin McHugh (co-supervised with Megan Frederickson)	2023–

Graduate student supervisory committees

MSc

Celina Yang (2022-2023)
Alicia Wong (2022-2023)
Samantha Ramphal (2023–)
Candace Ma (2024–)

PhD

Ferne Kotlyar (2022–)
Ella Martin (2022–)
Pooja Nathan (2022–)

Examination committees

MSc defence x 3; PhD appraisal x 4; PhD defence x 3

External examiner

PhD defence x 1

Undergraduate trainees at U of T

Ellie Balotovsky: work-study 2024-25
Lorien Simoes de Paiva: work-study 2024-25
Mia Bantas: EEB498 2024-25
Yunjung Jo: EEB397 2024-25
Julia Cruz: work-study summer 2024, 2024-25; EEB397 independent project 2024-25
Osmond Hui: work-study summer 2024
Shayne Enriquez: work-study summer 2024
Stephanie Leung: work-study summer 2023, 2023-24, summer 2024, 2024-25; EEB397 summer 2024
Tara McGruder: work-study summer 2023, 2023-24, EEB397 2023-24, NSERC USRA summer 2024

Maura McGregor: CGCS USRA summer 2023, work-study 2023-24
Noah Hake: NSERC USRA summer 2023, EEB497 student winter 2024
Heather Chong: EEB498 summer 2023, work-study summer 2023, research assistant fall 2023
Jo Fletcher: work-study 2022-23, 2023-24, field tech summer 2024
Ellie Hector: work-study 2022-23, EEB498 2023-24, NSERC USRA summer 2024

Trainees prior to starting faculty position

Advisor to undergraduate students (UC Davis; 5 project students and 8 research assistants)	2018–2020
Supervisor and mentor to post-baccalaureate lab technicians (UC Davis, 2 technicians)	2018–2020
Co-advisor of undergraduate honours thesis students (UBC, 2 students)	2016–2017
Supervisor of undergraduate research assistants (UBC, 4 students)	2014–2017
Supervisor of undergraduate research assistants (UC Santa Cruz, 3 students)	2011–2012

Workshops given

Leader and developer, Data management workshop (for colleagues at UC Davis)	2020
Leader and developer, Intro to R workshop (for undergraduate researchers at UC Davis)	2018

Pedagogical training

Participant, Center for Educational Effectiveness Accelerate Program, UC Davis	2020
Participant, Education Research and Evidence-based Teaching, UC Davis	2020

Service, outreach, and professional development

Faculty Sponsor, Field Research in Ecology and Evolution Diversified, U of T	2022–
Postdoc Committee, U of T	2024–2025
Undergrad Affairs Committee, U of T	2025
Organismal Faculty Search Committee, U of T	2023–2024
Undergrad Affairs Committee, U of T	2022–2023
Seminars Committee, U of T	2022–2023
Mentor, Evolution and Ecology Graduate School Preview, UC Davis	2020
Administrative member, Women in Life Sciences at UC Davis	2019–2020
Mentor, Evolution and Ecology Graduate Admissions Pathways, UC Davis	2019
Grad representative, Biodiversity Research Centre postdoc search committee, UBC	2018
Co-organizer, Biodiversity Centre Women in STEM Workshop, UBC	2017
Coordinator of Florum, a weekly meeting of plant ecologists, UBC	2013–2016
Curriculum developer, Modules in Ecology and Evolution Development, UBC	2013–2015
Visiting scientist in primary school classrooms, Let's Talk Science, UBC	2012–2014
Science fair mentor, Let's Talk Science, UBC	2012–2013
Volunteer, Beaty Biodiversity Museum Nature Club, UBC	2012–2013

Professional engagement

Reviewer for: American Journal of Botany, the American Naturalist, Ecology, Ecology Letters, Evolution, Evolutionary Applications, Evolution Letters, Global Change Biology, Global Ecology and Biogeography, Heredity, Journal of Ecology, Journal of Systematics and Evolution, New Phytologist, the National Science Foundation (US), Oikos, PeerJ, Trends in Ecology and Evolution.

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