

Seema Nayan Sheth

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Department of Plant and Microbial Biology
North Carolina State University
Raleigh, NC 27695

PROFESSIONAL APPOINTMENTS

- Assistant Professor** 2018 - present
Department of Plant and Microbial Biology
North Carolina State University
- National Science Foundation Postdoctoral Fellow** 2016 - 2017
Department of Integrative Biology
University of California, Berkeley
Supporting scientists: Dr. David Ackerly and Dr. Bruce Baldwin
- Postdoctoral Research Associate** 2014 - 2015
Department of Ecology, Evolution, and Behavior
University of Minnesota
Advisor: Dr. Ruth Shaw
- Research Scientist: Conservation, Ecology, and Evolution** 2006 - 2008
Center for Conservation and Sustainable Development
Missouri Botanical Garden

EDUCATION

- Ph.D., Ecology** 2008 - 2014
Colorado State University
Advisor: Dr. Amy Angert
- M.S., Biology (Ecology, Evolution, and Systematics)** 2003 - 2006
University of Missouri - St. Louis
Advisor: Dr. Bette Loiselle
- B.A., Environmental Sciences and Spanish (double major)** 1998 - 2002
Washington University in St. Louis

PUBLICATIONS

22. Vtipil, E.E. and **S.N. Sheth**. In press. A resurrection study reveals limited evolution of phenology in response to recent climate change across the geographic range of the scarlet monkeyflower. *Ecology and Evolution*.
21. Wooliver, R., S.B. Tittes, and **S.N. Sheth**. 2020. A resurrection study reveals limited evolution of thermal performance in response to recent climate change across the geographic range of the scarlet monkeyflower. *Evolution* 74: 1699-1710.
20. **Sheth, S.N.**, N. Morueta-Holme, and A. L. Angert. 2020. Determinants of geographic range size in plants. *New Phytologist* 226: 650-665.
19. Briscoe Runquist, R. D., A. J. Gorton, J. B. Yoder, N. J. Deacon, J. J. Grossman, S. A. Kothari, M. P. Lyons, **S. N. Sheth**, P. Tiffin, and D. A. Moeller. 2020. Context dependence of local adaptation to abiotic and biotic environments: a quantitative and qualitative synthesis. In press, *American Naturalist* 195: 412-431.
18. Smithers, B. V., M. F. Oldfather, M. J. Koontz, J. Bishop, C. Bishop, J. Nachlinger, and **S. N. Sheth**. 2020. Community turnover by composition and climate affinity across scales in an alpine system. *American Journal of Botany* 107: 239-249.

17. Oldfather, M. F., M. M. Kling, **S. N. Sheth**, N. C. Emery, and D. D. Ackerly. 2020. Range edges in heterogeneous landscapes: integrating geographic scale and climate complexity into range dynamics. *Global Change Biology* 26: 1055-1067.
16. Lowry D. B., J. M. Sobel, A. L. Angert, T-L. Ashman, R. L. Baker, B. K. Blackman, Y. Brandvain, K. J. R. P. Byers, A. M. Cooley, J. M. Coughlan, M. R. Dudash, C. B. Fenster, K. G. Ferris, L. Fishman, J. Friedman, D. L. Grossenbacher, L. M. Holeski, C. T. Ivey, K. M. Kay, V. A. Koelling, N. J. Kooyers, C. J. Murren, C. D. Muir, T. C. Nelson, M. L. Peterson, J. R. Puzey, M. C. Rotter, J. R. Seeman, J. P. Sexton, **S. N. Sheth**, M. A. Streisfeld, A. L. Sweigart, A. D. Twyford, M. Vallejo-Marin, J. H. Willis, C. A. Wu, and Y. W. Yuan. 2019. The case for the continued use of the genus name *Mimulus* for all monkeyflowers. *Taxon* 68: 617-623.
15. Kulbaba, M. W., **S. N. Sheth**, R. E. Pain, V. M. Eckhart, and R. G. Shaw. 2019. Additive genetic variance for lifetime fitness and the capacity for adaptation in the wild. *Evolution* 73: 1746-1758.
14. **Sheth, S. N.**, M. W. Kulbaba, R. E. Pain, and R. G. Shaw. 2018. Expression of additive genetic variance for fitness in a population of partridge pea in two field sites. *Evolution* 72: 2537-2545.
13. **Sheth, S. N.** and A. L. Angert. 2018. Demographic compensation does not rescue populations at a trailing range edge. *Proceedings of the National Academy of Sciences (USA)* 115: 2413-2418.
12. Pain, R. E., R. G. Shaw, and **S. N. Sheth**. 2018. Costs associated with N-fixing rhizobia early in the life of partridge pea *Chamaecrista fasciculata*. *American Journal of Botany* 105: 796-802.
11. Morueta-Holme, N., M. F. Oldfather, R. L. Olliff-Yang, A. P. Weitz, C. R. Levine, M. M. Kling, E. C. Riordan, C. Merow, **S. N. Sheth**, A. H. Thornhill, and D. D. Ackerly. 2018. The language of climate change: best practices in research and publication. *Nature Climate Change* 8: 92-94.
10. Angert, A. L., M. Bayly, **S. N. Sheth**, and J. R. Paul. 2018. Testing range-limit hypotheses using range-wide habitat suitability and occupancy for the scarlet monkeyflower (*Erythranthe cardinalis*). *American Naturalist* 191: E76-E89.
9. **Sheth, S. N.** and A. L. Angert. 2016. Artificial selection reveals high genetic variation in phenology at the trailing edge of a species range. *American Naturalist* 187: 182-193. (American Naturalist 2016 Student Paper Award)
8. **Sheth, S. N.**, I. Jiménez, and A. L. Angert. 2014. Identifying the paths leading to variation in geographical range size in western North American monkeyflowers. *Journal of Biogeography* 41: 2344-2356.
7. **Sheth, S. N.** and A. L. Angert. 2014. The evolution of environmental tolerance and range size: a comparison of geographically restricted and widespread *Mimulus*. *Evolution* 68: 2917-2931.
6. **Sheth, S. N.**, L. G. Lohmann, T. Distler, and I. Jiménez. 2012. Understanding bias in geographic range size estimates. *Global Ecology and Biogeography* 21: 732-742.
5. Paul, J. R., **S. N. Sheth**, and A. L. Angert. 2011. Quantifying the impact of gene flow on phenotype-environment mismatch: a demonstration with the scarlet monkeyflower *Mimulus cardinalis*. *American Naturalist* 178: S62-S79.

4. Angert, A. L., **S. N. Sheth**, and J. R. Paul. 2011. Incorporating population-level variation in thermal performance into predictions of geographic range shifts. *Integrative And Comparative Biology* 51: 733-750.
3. **Sheth, S. N.**, B. A. Loiselle, and J. G. Blake. 2009. Phylogenetic constraints on fine-scale patterns of habitat use by eight primate species in eastern Ecuador. *Journal of Tropical Ecology* 25: 571-582.
2. **Sheth, S. N.**, L. G. Lohmann, T. Consiglio, and I. Jiménez. 2008. Effects of detectability on estimates of geographic range size in Bignoniaceae. *Conservation Biology* 22: 200-211.
1. Amend, J. P., D. A. R. Meyer-Dombard, **S. N. Sheth**, N. Zolotova, and A. C. Amend. 2003. *Palaeococcus helgesonii* sp. nov., a facultatively anaerobic, hyperthermophilic archaeon from a geothermal well on Vulcano Island, Italy. *Archives of Microbiology* 179: 394-401.

Preprints

Querns, A., R. Wooliver, M. Vallejo-Marín, and **S.N. Sheth**. The evolution of thermal performance in native and invasive populations of *Mimulus guttatus*.
<https://doi.org/10.1101/2020.09.10.291252>

GRANTS, FELLOWSHIPS, AND AWARDS

NCSU Faculty Research and Professional Development Fund, \$5,000	2019 - 2020
<i>Rapid evolution of thermal tolerance across a species' geographic range</i> (PI)	
American Naturalist 2016 Student Paper Award	2017
NSF Postdoctoral Research Fellowship in Biology, \$138,000	2016 - 2017
<i>Relationships among climatic tolerance, trait evolution, and diversification in the California flora</i>	
Postdoctoral Association Career Development Award, Univ. of Minnesota, \$400	2015
Finalist, University of California President's Postdoctoral Fellowship	2014
NSF DEB Evolutionary Ecology, \$14,984	2012 - 2014
<i>Dissertation Research: Role of evolutionary potential in limiting species' distributions</i> (co-PI)	
Outreach Grant, Society for the Study of Evolution, \$800	2012
Global Sustainability Leadership Fellow, Colorado State University	2012
Rosemary Grant Award, Society for the Study of Evolution, \$2,500	2010
Graduate Student Research Award, Botanical Society of America, \$500	2010
Finalist, Environmental Protection Agency STAR Graduate Fellowship	2009
Steinkamp Fund, Colorado Native Plant Society, \$1,000	2009
Women in Natural Sciences Travel Grant, Colorado State University, \$300	2009
Awards from Department of Biology, Colorado State University, \$7,425	2009 - 2014
Grad. Degree Program in Ecology Fellowship, Colorado State University, \$1,000	2008
NSF GK-12 Fellowship, Colorado State University, \$4,000	2008
NSF GK-12 Fellowship, Univ. of Missouri-St. Louis, \$30,000	2005 - 2006
Awards from Department of Biology, Univ. of Missouri-St. Louis, \$3,500	2004 - 2005
Primate Action Fund, Conservation International, \$3,000	2004

PRESENTATIONS

Invited symposia

46th Annual Southern California Botanists Symposium (virtual; upcoming)	2020
Living on the edge - Plants in extreme environments	
“The role of demographic and evolutionary processes in buffering populations from climate change”	
International Biogeography Society Humboldt-250 Meeting, Quito, Ecuador	2019
Symposium: Architects of variation: How climate and physiology shape patterns of biodiversity	
“Can plant thermal tolerance evolve under climate change? A comparison of central and edge populations” (R. Wooliver, S. Tittes, and S.N. Sheth ; presented by R. Wooliver)	
Green Life Sciences, University of Michigan, Ann Arbor, MI	2018
Symposium: Plant-environment interactions across scales	
“Do demographic compensation and adaptation buffer species from changing climate?”	
Society for the Study of Evolution, Portland, OR	2017
American Society of Naturalists Symposium: Across the Nth dimension: Quantitative and conceptual advances in the study of niche breadth	
“Does niche breadth predict vulnerability to changing environments? From population-level traits and demography to diversification in deep time”	
SACNAS, Long Beach, CA	2016
Scientific Symposium: (Day and) Night at the Museum: Exploring Research in Ecology and Evolution Behind the Scenes of Natural History Museums	
“Harnessing the power of herbarium specimen data for ecological and evolutionary studies”	
Jornadas Argentinas de Botanica, Corrientes, Argentina	2007
Symposium: Conservation and Threat Assessments of Plants	
“Riesgo de extinción en Bignonieae (Bignoniaceae): una perspectiva filogenética” (Sheth, S.N. , L.G. Lohmann, T. Consiglio, and I. Jiménez)	
Botanical Society of America and Plant Biology Joint Congress, Chicago, IL	2007
Colloquium: Integration of spatial and ecological data in evolutionary studies	
“Extinction risk in Bignonieae (Bignoniaceae): a phylogenetic perspective” (Sheth, S.N. , L.G. Lohmann, T. Consiglio, and I. Jiménez)	

Invited seminars

Department of Integrative Biology, University of California, Berkeley (upcoming)	2020
Department of Ecology and Evolutionary Biology, University of Arizona	2020
Department of Ecology and Evolutionary Biology, Tulane University	2019
Program in Ecology, Duke University	2019
Kellogg Biological Station, Michigan State University	2019
Genetics and Genomics Seminar Series, North Carolina State University	2019
Bio-Pop Seminar Series, Department of Biology, University of North Carolina	2018
Department of Plant Biology, University of Vermont	2018

EEBio Seminar Series, Department of Biology, University of Virginia	2018
Department of Forestry and Environmental Resources, North Carolina State University	2018
Department of Biological Sciences, California Polytechnic State University	2017
Department of Ecology and Evolutionary Biology, University of California, Los Angeles	2017
Environmental Systems Graduate Group, University of California, Merced	2017
School of Integrative Plant Science, Plant Biology Section, Cornell University	2017
Center for Population Biology, University of California, Davis	2017
Department of Biology, University of Utah	2017
Natural History Museum of Utah	2017
Department of Plant and Microbial Biology, North Carolina State University	2017
Department of Biology, Williams College	2016
Department of Biology, University of San Francisco	2016
Department of Biology, Grinnell College	2015
Department of Plant Biology, University of Minnesota	2015
Department of Biology, Washington University in St. Louis	2007
Department of Biology, St. Louis University	2007

Contributed conference presentations

Smithers, B. V., M. F. Oldfather, M. J. Koontz, J. Bishop, C. Bishop, J. Nachlinger, and S. N. Sheth . "Community turnover by composition and climate affinity across scales in an alpine system." Ecological Society of America (virtual; presented by B. Smithers)	2020
Wooliver, R., E.E. Vtipil, and S.N. Sheth . "A call for unified study of plant thermal performance in a warming world." Botany (virtual; presented by R. Wooliver)	2020
Querns, A., R. Wooliver, M. Vallejo-Marín, and S.N. Sheth . "The evolution of thermal performance in native and invasive populations of <i>Mimulus guttatus</i> ." Botany (virtual; poster presented by A. Querns) *** Winner of Best Graduate Student Poster in Ecology ***	2020
Wooliver, R., S. Tittes, and S.N. Sheth . "Can plant thermal tolerance evolve under climate change? A comparison of central and edge populations." Southeast Population Ecology and Evolutionary Genetics, Clemson, SC (presented by postdoc R. Wooliver)	2019
Vtipil, E.E. and S.N. Sheth . "The evolution of flowering time in response to climate change in <i>Erythranthe cardinalis</i> ." Southeast Population Ecology and Evolutionary Genetics, Clemson, SC (poster presented by E. Vtipil). *** Winner of Second Best Graduate Student Poster ***	2019
Kulbaba, M., S.N. Sheth , R.E. Pain, V.M. Eckhart, and R.G. Shaw. "Adaptive potential and realized changes in fitness in natural populations." Society for the Study of Evolution, Montpellier, France (poster presented by M. Kulbaba)	2018
Sheth, S.N. and A.L. Angert. "Demographic compensation does not rescue <i>Erythranthe cardinalis</i> populations at the southern edge of the species range." Ecological Society of America, Portland, OR	2017
Kulbaba, M., R.E. Pain, V.M. Eckhart, S.N. Sheth , and R.G. Shaw. "The immediate capacity for adaptation and its realization in natural plant populations." International Botanical Congress, Shenzhen, China	2017

Sheth, S.N. , M. Kulbaba, R.E. Pain, and R.G. Shaw. "Expression of additive genetic variance for fitness in a population of partridge pea grown in two field sites." Society for the Study of Evolution, Portland, OR (presented by R.G. Shaw)	2017
Sheth, S.N. , W.A. Freyman, B.G. Baldwin, and D.D. Ackerly. "Relationships among rates of climatic niche evolution and diversification." Society for the Study of Evolution, Austin, TX (poster)	2016
Sheth, S.N. and A.L. Angert. "Artificial selection reveals high genetic variation in phenology at the trailing edge of a species range." Ecological Society of America, Baltimore, MD	2015
Sheth, S.N. and A.L. Angert. "Does a jack-of-all-temperatures have a large geographic range?" Society for the Study of Evolution, Snowbird, UT	2013
Sheth, S.N. , I. Jiménez, and A.L. Angert. "Effects of niche properties on variation in geographic range size among species of western North American monkeyflowers." Ecological Society of America, Portland, OR	2012
Sheth, S.N. , L.G. Lohmann, T. Distler, and I. Jiménez. "The Wallacean shortfall: bias in estimates of geographic range size." Botanical Society of America, St. Louis, MO (presented by I. Jiménez)	2011
Sheth, S.N. and A.L. Angert. "Ecological niche attributes and geographic range size in western North American monkeyflowers." Society for the Study of Evolution, Portland, OR	2010
Sheth, S.N. , L.G. Lohmann, I. Jiménez, and T. Consiglio. "Riesgo de extinción en Bignonieae (Bignoniaceae) estimado con datos de herbario." Congreso Latinoamericano de Botánica. Santo Domingo, Dominican Republic (presented by L. G. Lohmann)	2006

TEACHING

North Carolina State University

Plant Ecology, PB495/595-003, solo instructor	2019 - present
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Colorado State University

Principles of Plant Biology Laboratory, teaching assistant	2008 - 2014
Plant Ecology, guest lecturer	2012 - 2013
Plant Ecology, teaching assistant	2011 - 2012
Biology of Organisms, guest lecturer	2009
Cache La Poudre Junior High School, NSF GK-12 fellow, LaPorte, CO	2008 - 2009

Missouri Botanical Garden

Neotropical Plant Families, guest lecturer for University of Michigan course	2008
Conservation Biology, guest lecturer for University of Missouri - St. Louis course	2008

University of Missouri - St. Louis

McCluer High School, NSF GK-12 fellow, Florissant, MO	2005 - 2006
Organisms and th Environment Laboratory, guest lecturer	2005

AmeriCorps Partnership for Youth

Woodward Elementary School, tutor and teaching assistant, St. Louis, MO	2002 - 2003
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MENTORING

North Carolina State University

Postdoctoral associates

Dr. Rachel Wooliver 2018 - 2020

Graduate students

Emma Vtipil (Ph.D.) 2020 - present

Aleah Querns (M.S.) 2018 - 2020

Emma Vtipil (M.R.) 2019 - 2020

Undergraduate researchers

Brooke Caldwell 2019 - 2020

Natalie Gold 2019

Mariah Kidd 2019 - 2020

Daisy Ryan 2020 - present

Jessie Torres 2018 - 2019

Emma Vtipil (Honor's thesis student; recipient of NCSU Chilton Research Award) 2018 - 2019

Mia Wiegmann 2018 - present

Collin Yurish 2018 - 2019

Graduate student committees

Samuel Flake, NCSU 2018 - present

Ryan O'Connell, Duke University 2020 - present

Simon Pinilla-Gallego, NCSU 2018 - present

Anita Simha, Duke University 2020 - present

Greg Wilson, NCSU 2018 - 2019

University of California, Berkeley

Mentored 7th graders at King Middle School as part of Be a Scientist outreach program 2017

University of Minnesota

Sam Weaver (NSF REU student from St. Olaf College) 2015

Colorado State University

Amber Weimer (Honor's thesis undergraduate student) 2013 - 2014

Trained, mentored, and supervised 17 undergraduates & recent college graduates 2009 - 2014

Biological Summer Undergraduate Research Experience program committee member 2012

SERVICE

University service

Ecology faculty search committee, Dept. of Plant and Microbial Biology, NCSU 2019 - 2020

College of Agricultural and Life Sciences greenhouse committee, NCSU 2019 - present

Plant Biology Graduate admissions committee, NCSU 2018 - present

Biology faculty search committee, Colorado State University 2012 - 2013

Professional service

Manuscript reviewer: <i>American Journal of Botany</i> , <i>American Naturalist</i> , <i>Annals of Botany</i> , <i>AoB PLANTS</i> , <i>BMC Evolutionary Biology</i> , <i>Current Biology</i> , <i>Ecography</i> , <i>Ecological Applications</i> , <i>Ecology</i> , <i>Ecology Letters</i> , <i>Evolution</i> , <i>Evolutionary Ecology</i> , <i>Functional Ecology</i> , <i>Journal of Animal Ecology</i> , <i>Journal of Ecology</i> , <i>Molecular Ecology</i> , <i>New Phytologist</i> , <i>Science Advances</i> , <i>Trends in Ecology and Evolution</i>	2009 - present
Hamilton student award committee member, Society for the Study of Evolution	2020 - present
Book proposal reviewer: Oxford University Press	2018
Proposal reviewer: NSF DEB, Population and Community Ecology	2014

Other service

Volunteer: Global Observation Research Initiative in Alpine Environments (GLORIA), White Mountains Wilderness, California	2017 - present
Exhibitor, Darwin Day, North Carolina Museum of Natural Sciences	2019
Judge, Southeast Population Ecology and Evolutionary Genetics	2019
Advisory board member: Science Ambassador Scholarship (for undergraduate women in science, technology, engineering, or math), Cards Against Humanity	2017 - 2018
Collaborated with National Park Service to recruit Navajo Nation students to assist with fieldwork in Canyon de Chelly National Monument, AZ	2009
Volunteer, Putnam Elementary Science Carnival, Fort Collins, CO	2009
Volunteer, Unidad Técnica (environmental NGO), Managua, Nicaragua	2001

WORKING GROUPS AND WORKSHOPS

Agricultural Leadership Learning Institute for Faculty, North Carolina State University, Raleigh, NC	2019
Evolution in Changing Seas Synthesis Workshop, Shoals Marine Laboratory, Appledore, ME	2019
Software Carpentry Workshop, Berkeley Institute of Data Sciences, Berkeley, CA	2016
Early Career Centennial Mentoring Program, Ecological Society of America, Baltimore, MD	2015
Quantitative Genetics and Mixed Models in Quantitative Genetics, Summer Institute in Statistical Genetics, University of Washington, Seattle, WA	2013
Intro to Python for ArcGIS Workshop, Colorado State University, Fort Collins, CO	2013
Science Communication Workshop, Colorado State University, Fort Collins, CO	2012
Living on the edge: integrating science into the management of range-margin populations, University of Wyoming, Laramie, WY	2010
Applied Phylogenetics Workshop, Bodega Bay Marine Laboratory, CA	2010
Working with ArcGIS Spatial Analyst (short course), Environmental Systems Research Institute, St. Charles, MO	2007
Distance Sampling Workshop, University of Missouri - St. Louis, St. Louis, MO	2006

Assessing extinction risk in Bignoniaceae (summer internship), Center for Conservation and Sustainable Development, Missouri Botanical Garden, St. Louis, MO	2005
Geographic Information Systems (course), University of Missouri - St. Louis	2004
Tropical Biology: An Ecological Approach (course), Organization for Tropical Studies, Costa Rica	2004
Historical Biogeography (short course), University of Missouri - St. Louis	2004

PROFESSIONAL AFFILIATIONS AND SOCIETIES

Science Director: GLORIA (Global Observation Research Initiative in Alpine Environments) Great Basin

Faculty Affiliate: Southeast Climate Science Center

American Society of Naturalists

Botanical Society of America

Ecological Society of America

Society for the Study of Evolution

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