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J. MASON HEBERLING

EDUCATION

- 2015 **Ph.D.** in Biology, Syracuse University, Syracuse, NY
Functional traits and resource-use strategies of native and invasive plants in Eastern North American forests
Advisor: Jason Fridley
- 2010 **B.S.** in Biology (Statistics minor), Penn State University, University Park, PA
Mentor: Katriona Shea
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APPOINTMENTS

- 2019-present **Assistant Curator of Botany & Co-Chair of Collections,**
Carnegie Museum of Natural History, Pittsburgh, PA, USA
- 2019-present Adjunct Research Scientist, Hunt Institute for Botanical Documentation,
Carnegie Mellon University, Pittsburgh, PA, USA
- 2017-present Research Assistant Professor, Ecology and Evolutionary Biology
University of Tennessee Knoxville
- 2017-2018 NSF Postdoctoral Fellow, Carnegie Museum of Natural History
Sponsors: Stephen J. Tonsor & Susan Kalisz
- 2016-2019 Research Associate, Botany, Carnegie Museum of Natural History
- 2015-2016 Postdoctoral Research Associate, Ecology and Evolutionary Biology
University of Tennessee Knoxville
Mentor: Susan Kalisz
- 2014-2016 Visiting Scholar, Dept. of Biological Sciences, University of Pittsburgh
- 2008-2010 Research Assistant, Department of Biology, Penn State
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RESEARCH GRANTS & FELLOWSHIPS

- 2020-2023 NSF Division of Environmental Biology, Population and Community Ecology
Collaborative Research: Phenological mismatch between trees and wildflowers mediated by climate change and plant invasions (DEB-1936971; PI, with co-PIs Sara Kuebbing [University of Pittsburgh] and Richard Primack [Boston University]) \$198,97 (CMNH portion)

- 2020 Systematic Review of the GBIF-mediated Scientific Literature (fixed-term contract), Global Biodiversity Information Facility (GBIF) Secretariat, Copenhagen, Denmark
- 2018-2021 NSF Advancing Digitization of Biodiversity Collections (ADBC)
Digitization PEN: Connecting Rust Belt dynamics to the Mid-Atlantic Megalopolis Project utilizing the Carnegie Museum herbarium (DBI-1612079; PI with co-PI B.L. Isaac), \$173,614
- 2019-2020 Pennsylvania Department of Conservation and Natural Resources (DCNR)
Wild Resource Conservation Program: *Measuring Long-Term Ecological Change in Rare Plants of Pennsylvania* (co-PI with PI B.L. Isaac) \$27,081.
- 2017-2018 NSF Postdoctoral Research Fellowship in Biology,
Research using Collections track (DBI-1801022, sole PI)
Leveraging centuries of herbarium data to track invasion processes: functional trait shifts, local adaptation, and rapid evolution \$138,000
- 2012-2015 NSF Graduate Research Fellowship

AWARDS

- 2020 George Mercer Award, Ecological Society of America
(shared with co-author Caitlin McDonough MacKenzie)
- 2016 Alexander Gourevitch Memorial Award, Syracuse University
- 2015 All University Doctoral Prize, Syracuse University
- 2010-2012 Syracuse University Graduate Fellowship
- 2009-2010 Morrow Family Endowed Prize, Penn State Eberly College of Science

PUBLICATIONS (peer-reviewed or in review)

- In review Perez, T.M., Rodriguez, J. & **Heberling, J.M.** Reliable herbarium-derived proxies for three functional traits. In revision at: *American Journal of Botany*
- Gorchov, D.L., Blossey, B., Averill, K.M., Dávalos, A., **Heberling, J.M.**, Jenkins, M.A., Kalisz, S., McShea, W.J., Morrison, J., Nuzzo, V., Webster, C.R., & Waller, D.M. Contrasting impacts of invasive plants and abundant white-tailed deer, and implications for management, in eastern U.S. forests. Target: *Biological Invasions*
- In press Reeb, R.A., Acevedo, I., **Heberling, J.M.**, Isaac, B.L. & Kuebbing, S. Nonnative old-field species inhabit early-season phenological niches and exhibit unique sensitivity to climate. *Ecosphere*, in press.
- Pearson, K.D., Nelson, G., Aronson, M., Bonnet, P., Brenskelle, L., Davis, C.C., Denny, E.G., Ellwood, E.R., Goëau, H., **Heberling, J.M.**, Joly, A., Lorieul, T., Mazer, S.J., Meineke, E.K., Stucky, B., Sweeney, P., White, A., Soltis, P.S. Machine learning using digital herbarium specimens to accelerate phenological research. *BioScience*, in press.

- 2020 Shouman, S., Mason, N.W.H., **Heberling, J.M.**, Kichey, T., Closset-Kopp, D., Kobeissi, A. & Decocq, G. Leaf functional traits at home and abroad: a community perspective of sycamore maple invasion. *Forest Ecology & Management* 464:118061.
- Hedrick, B. P., **Heberling, J. M.***, Meineke, E.*, Turner, K. G.*, Grassa, C. J., Park, D., Kennedy, J., Clarke, J., Cook, J., Edwards, S. V., Davis, C. The future of natural history collection digitization. *BioScience* 70:243-251.
*denotes equal contributors (see *PeerJ Preprints* 7:e27859v1)
- Kattge, J., Bönisch, G., Díaz, S., Lavorel, S., Prentice, I.C., Leadley, P., Tautenhahn, S., Werner, G., ...[data paper with 715 additional co-authors including **Heberling, J.M.**]... and Wirth, C. TRY plant trait database - enhanced coverage and open access. *Global Change Biology* 26:119-188.
- 2019 **Heberling, J.M.**, Prather L.A. & Tonsor, S.J. The changing uses of herbarium data in an era of global change: An overview using automated content analysis. *BioScience* 69:812-822. [*featured on cover of Oct 2019 issue]
- Heberling, J.M.**, Burke, D.J. Utilizing herbarium specimen roots to quantify historical mycorrhizal communities. *Applications in Plant Sciences* 7(4):e1223. [*Special Issue on Methods in Belowground Botany]
- Heberling, J.M.**, McDonough Mackenzie, C., Fridley, J.D., Kalisz, S. & Primack, R.B. Phenological mismatch with trees reduces wildflower carbon budgets. *Ecology Letters* 22:616-623. [*winner of 2020 George Mercer Award from the Ecological Society of America]
- Heberling, J.M.**, Cassidy, S., Fridley, J.D. & Kalisz, S. Carbon gain phenologies of spring-flowering perennials in a deciduous forest indicate a novel niche for a widespread invader. *New Phytologist* 221:778-788.
- 2018 **Heberling, J.M.** & Isaac, B.L. iNaturalist as a tool to expand the research value of museum specimens. *Applications in Plant Sciences* 6(11):e1193.
- Heberling, J.M.** & Mason, N.W.H. Are endemics functionally distinct?: Leaf traits of native and invasive woody species in a New Zealand forest. *PLOS ONE* 13(5):e0196746
- 2017 Shouman, S., Mason, N.W.H., Kichey, T., **Heberling, J.M.**, Closset-Kopp, D. & Decocq, G. Functional shift of sycamore (*Acer pseudoplatanus* L.) towards greater plasticity and shade tolerance in its invasive range. *Perspectives in Plant Ecology, Evolution, & Systematics* 29:30-40.
- Heberling, J.M.** & Isaac, B.L. Herbarium specimens as exaptations: new uses for old collections. *American Journal of Botany* 104(7):963-965.
- Wavrek, M., **Heberling, J.M.**, Fei S. & Kalisz, S. Herbaceous invaders in temperate forests: a systematic review of their ecology and proposed mechanisms. *Biological Invasions* 19(11):3079-3097.

- 2017 **Heberling, J.M.**, Brouwer, N.L. & Kalisz, S. Effects of deer on the photosynthetic performance of invasive and native forest herbs. *AoB PLANTS* 9:plx011. [*Special Issue on Interactions between white-tailed deer and invasive plants in North American forests]
- Heberling, J.M.**, Jo, I., Kozhevnikov, A., Lee, H. & Fridley, J.D. Biotic interchange in the Anthropocene: strong asymmetry in East Asian and eastern North American plant invasions. *Global Ecology and Biogeography* 26:447-458.
- 2016 **Heberling, J.M.** & Fridley, J.D. Invaders do not require high resource levels to maintain physiological advantages in a temperate deciduous forest. *Ecology* 97:874-884
- Heberling, J.M.**, Kichey, T., Decocq, G. & Fridley, J.D. Plant functional shifts in the invaded range: a test with reciprocal forest invaders of Europe and North America. *Functional Ecology* 30:875-884
- 2013 **Heberling, J.M.** & Fridley, J.D. Resource-use strategies of native and invasive plants in Eastern North American forests. *New Phytologist* 200:523-533.
- 2012 **Heberling, J.M.** & Fridley, J.D. Biogeographic constraints on the worldwide leaf economics spectrum. *Global Ecology and Biogeography* 21:1137-1146.
- Siefert, A., Ravenscroft, C., Althoff, D., Alvarez-Yapiz, J., Carter, E., Glennon, K., **Heberling, J.M.**, Jo, I., Pontes, A., Sauer, A., Willis, A. & Fridley, J.D. Scale dependence of vegetation-environment relationships: a meta-analysis of multivariate data. *Journal of Vegetation Science* 23:942-951.
- 2011 Russo, L., Stehouwer, R., **Heberling, J.M.** & Shea, K. The composite insect trap: an innovative combination trap for biologically diverse sampling. *PLoS ONE* 6(6):e21079.
- Zhang R., **Heberling, J.M.**, Haner, E. & Shea, K. Tolerance of two invasive thistles to repeated disturbance. *Ecological Research* 26:575-581.

PUBLISHED ORAL ABSTRACTS (first author only)

- 2018 **Heberling, J.M.**, Tonsor, S.J. & Prather, L.A. "The changing roles of herbaria in an era of global change: A systematic review" Ecological Society of America Annual Meeting, New Orleans, LA, USA. Organized Oral Session: "New Uses For Old Collections: Herbarium Data in an Era of Ecological Change" [*Heberling organized oral session with S. Tonsor and A. Prather]
- 2017 **Heberling, J.M.** "The changing roles of herbaria in an era of global change" International Council of Museums Committee for Museums and Collections of Natural History (ICOM NAT HIST) Annual Meeting, Pittsburgh, PA, USA.

- Heberling, J.M.** “Old collections with new uses: the roles of herbaria in the Anthropocene” Northeast Natural History Conference, Cromwell, CT, USA.
- 2016 **Heberling, J.M.** & Kalisz, S. “Physiological mechanisms behind *Alliaria petiolata* success and native decline: deer increase invader photosynthetic rates” 101th Ecological Society of America Annual Meeting, Ft. Lauderdale, FL, USA.
- Heberling, J.M.**, Brouwer, N.L. & Kalisz, S. “Plant invasion mediated by deer overabundance: linking demographic patterns and ecophysiological mechanisms” Botany 2016 Meeting (Botanical Society of America), Savannah, GA, USA.
- 2015 **Heberling, J.M.** & Fridley, J.D. “Physiological ecology of forest invaders along experimental light and nutrient gradients: does invader advantage depend on disturbance?” 100th Ecological Society of America Annual Meeting, Baltimore, MD, USA.
- 2014 **Heberling, J.M.**, Kichey, T., Decocq, G., Fridley, J.D. "Pre-adapted to invade? Resource-use strategies of reciprocal woody invaders in Northeastern US and France." Northeast Natural History Conference, Springfield, MA, USA.
- 2013 **Heberling, J.M.** & Fridley, J.D. “Functional comparisons of native and invasive plants in Eastern North American forests: do they differ in resource-use strategies?” 56th International Association of Vegetation Science Annual Symposium, Tartu, Estonia.
- 2012 **Heberling, J.M.** & Fridley, J.D. “East Asian plants in Eastern US forests: Are invaders pre-adapted for more efficient resource use?” International symposium on the East Asian flora and its role in the formation of the world’s vegetation. Botanical-Garden Institute, Russian Academy of Sciences, Vladivostok, Russia.
- 2011 **Heberling, J.M.** & Fridley, J.D. “Biogeographic constraints on the worldwide leaf economic spectrum.” 96th Ecological Society of America Annual Meeting, Austin, TX, USA.
- 2010 **Heberling, J.M.**, Russo, L., Yang, S. & Shea, K. “Complex plant community responses to invasion by the thistle *Carduus acanthoides*.” 95th Ecological Society of America Annual Meeting, Pittsburgh, PA, USA.

INVITED RESEARCH PRESENTATIONS (scientific & public audiences)

- 2020 Pennsylvania Botany Symposium, Penn State University, State College, PA
GBIF Science Committee, GBIF Secretariat, Copenhagen, Denmark
- 2019 “Rethinking the herbarium specimen in the digital age,” 45th Annual Southern California Botanists Symposium, *New Frontiers in Botany: Discoveries and Emerging Tools*, Pomona College, Claremont, CA

- 2019 “Emerging roles for herbaria in functional trait ecology” *Special symposium: Early career innovators in herbarium-enabled research*, Society of Herbarium Curators, Tucson, AZ
- “Rethinking the museum specimen in the digital age” *R.W. Moriarty Science Seminar Series*, Carnegie Museum of Natural History, Pittsburgh, PA
- “Stories from the dead: What museums specimens tell us about the living world” *Scientist Lecture Series*, Holden Arboretum, Kirkland, OH
- “All about timing: Plant phenology and mismatch in our changing forests” Pymatuning Laboratory of Ecology, University of Pittsburgh
- “Measuring change through a century of invasion” [keynote speaker] *Plants in the City: Mid-Atlantic Megalopolis Project symposium*, Rutgers University, New Brunswick, NJ
- “Of wildflowers and weeds: Our changing Pittsburgh forests” Mt. Lebanon Nature Conservancy, Mt. Lebanon, PA
- 2018 *Biophilia public seminar series*, Phipps Conservatory and Botanical Gardens, Pittsburgh, PA
- 2017 *NSF Postdoc Research Symposium*, Harvard University, MA
- 2016,2018 Botanical Society of Western Pennsylvania, Pittsburgh, PA
- 2016 *Biological Invasions in Forests Workshop*, International Union of Forest Research Organizations, Shepherdstown, WV
- 2015 R.W. Moriarty Seminar Series, Carnegie Museum of Natural History
- 2014 Department of Biological Sciences, University of Pittsburgh, Pittsburgh, PA
- 2013 Ecology and Dynamics of Human Influenced Systems (EDYSAN), Université de Picardie Jules Verne, Amiens, France

TEACHING EXPERIENCE (academic)

- 2015 Instructor (sole), Function and Structure of Organisms, Penn State New Kensington, New Kensington, PA
- 2013-present Occasional guest lecturer for: *Inside Natural History Museums* (Museum Studies, University of Pittsburgh), *Population Biology* (University of Pittsburgh), *Ecology* (Onondaga Community College, Syracuse, NY)
- 2012 Teaching assistant, *Physiology Lab* (advanced undergraduate), Syracuse University
- 2011 Teaching assistant, *Introductory Biology*, Syracuse University
- 2011-2014 Teaching fellow, Future Professoriate Program, Syracuse University

OUTREACH

- 2017-present *Collected On This Day* (www.collectedonthisday.com)
Weekly blog featuring specimens and collectors in the Carnegie Museum Herbarium. I work with CM staff to contribute these posts to various social media platforms (e.g., Facebook, Instagram, Tumblr). Facebook posts have reached an estimated 76,833 people (as of 8 Aug 2017).
- 2014 Scientist Demonstrator, West Genesee School District, Camillus, NY
Conducted a research demonstration to eighth graders.
- 2012 Volunteer, Early College High School Summer Science Institute, with Department of Education, Syracuse University. Guided Syracuse 10-12th grade students through biology hands-on modules.
- 2012 High School Science Tutor, Say Yes to Education program, Nottingham High School, Syracuse City School District. Tutored individual students and small groups in Biology, Earth Science, and Algebra.
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ACADEMIC AND SCIENTIFIC SERVICE

- 2011-present Reviewer for >35 manuscripts: *BioScience*, *Ecological Applications*, *Global Change Biology*, *Applications in Plant Sciences* (x3), *Scientific Reports*, *Oecologia* (x4), *New Phytologist* (x3), *Castanea*, *Botany Letters*, *Plant Ecology*, *Photosynthesis Research*, *PLoS ONE* (x2), *Forest Ecology and Management*, *Functional Ecology* (x2), *American Journal of Botany* (x2), *Journal of the Torrey Botanical Society*, *Nature Plants*, *Biological Invasions* (x4), *Ecology Letters*, *Global Ecology and Biogeography* (x2), *Journal of Ecology*, *Journal of Plant Ecology* (x2), *Diversity and Distributions*, *Journal of Vegetation Science* (x3), *Botanica Pacifica*, *International Journal of Plant Biology*, *Botanical Studies*, *Northeastern Naturalist* (x3)
- 2020 Ad hoc reviewer, NSF Division of Environmental Biology
- 2018 Organized Oral Session: "New Uses For Old Collections: Herbarium Data in an Era of Ecological Change" (Heberling organized oral session with S. Tonsor and L.A. Prather)
<https://eco.confex.com/eco/2018/meetingapp.cgi/Session/14000>
- 2013,2014 Graduate Representative, Undergraduate Curriculum Committee, Department of Biology, Syracuse University
- 2013 Panelist, Pre-doctoral Fellowship Workshops, Office of Research, Syracuse University
- 2012 Vice President, Biology Graduate Student Organization, Syracuse University
- 2012 Library Committee Member and Biology Department Senator, Graduate Student Organization, Syracuse University
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GRADUATE COMMITTEES

2019-present Rachel Reeb (PhD committee), University of Pittsburgh (external)

LABORATORY/TEACHING PROTOCOLS (not peer-reviewed)

2013 Heberling, J.M. A practical guide to measuring leaf-level photosynthesis.
[online resource: <https://sites.google.com/site/fridleylab/home/protocols>].

PROFESSIONAL AFFILIATIONS

Ecological Society of America (ESA), Society of Herbarium Curators (SHC), Botanical Society of America (BSA), International Association for Vegetation Science (IAVS), Society for the Preservation of Natural History Collections (SPNHC), International Council of Museums (ICOM), American Alliance of Museums (AAM)
