KEN KEEFOVER-RING, PH.D.
ASSISTANT PROFESSOR

DEPARTMENTS OF BOTANY AND GEOGRAPHY
UNIVERSITY OF WISCONSIN-MADISON
B221 BIRGE HALL
430 LINCOLN DRIVE
MADISON, WI 53706, USA

EMAIL: ken.keefoverring@wisc.edu
WEB: https://keefover-ringlab.botany.wisc.edu/

RESEARCH INTERESTS
Chemical ecology • Biogeography • Plant secondary chemical variation • Plant-animal interactions • Herbivory • Pollination • Volatile organic compounds • Allelopathy • Plant competition • Analytical chemistry • Terpenoids • Phenylpropanoids

EDUCATION
- Ph.D., Dept. of Ecology and Evolutionary Biology (EEB), University of Colorado, Boulder, CO, - May 2008 - Advisor: Prof. Yan B. Linhart
- M.A., Dept. of Environmental, Population, and Organismic Biology (EPOB), University of Colorado, Boulder, CO - May 2001 - Advisor: Prof. Yan B. Linhart
- B.S., Dept. of Chemistry, Arizona State University, Tempe, AZ - December 1989
- B.S., Double Major Depts. of Biochemistry and Biology, Minor Dept. of Chemistry, Colorado State University, Fort Collins, CO - August 1987

RESEARCH AND ACADEMIC POSITIONS
- Assistant Professor, Depts. of Botany and Geography, University of Wisconsin-Madison, WI. January 2016 to present
- Assistant Scientist, Dept. of Entomology, University of Wisconsin-Madison, WI. August 2013 to December 2015
- Research Engineer, Umeå Plant Science Centre, Dept. of Plant Physiology, Umeå University, Umeå, Sweden. Dec 2012 to Nov 2014
- Postdoctoral Research Associate, Umeå Plant Science Centre, Dept. of Plant Physiology, Umeå University, Umeå, Sweden. Oct 2010 to Dec 2012
- Postdoctoral Research Associate, Dept. of Entomology, UW-Madison, WI. July 2008 to August 2013
- Research Assistant, EEB Dept., University of Colorado, Boulder, CO. January 2008 to June 2008
- Research Assistant, University of Colorado Museum entomology collection. August 2006 to December 2006
- Research Assistant, EEB Dept., University of Colorado, Boulder, CO. November 2001 to August 2005
- Undergraduate Research Assistant, Dept. of Biochemistry, Colorado State University, Fort Collins, CO. September 1986 to August 1987

PROFESSIONAL WORK EXPERIENCE

- Analytical Protein Chemist, Baxter Hemoglobin Therapeutics, Boulder, CO - HPLC method development for quality control (QC) and stability testing of recombinant hemoglobin. March 1999 to November 2001
- Analytical Chemist, Geneva Pharmaceuticals, Broomfield, CO - HPLC and GC method development for QC testing of small molecule pharmaceuticals. November 1994 to July 1998
- Development Chemist, ICI/Fiberite, Tempe, AZ - Development of lightweight fire resistant composites for commercial aircraft. Resin formulation, and flammability and mechanical testing. December 1987 to October 1993

PUBLICATIONS IN REVIEW OR REVISION (Underlined names denotes student when work completed. Underlined and asterisk denotes my student)

Hahn, P., **Keefover-Ring, K.**, Nguyen, L.*, and Maron, J. **2021**. Intraspecific correlations between growth and defense vary with resource environment and differ within- and among populations (submitted to *Functional Ecology*)

PEER-REVIEWED PUBLICATIONS

41. Sanderson, B. J., Feng, G., Hu, N., Carlson, C. H. Smart, L. B., **Keefover-Ring, K.**, Yin, T., Ma, T., Liu, J., DiFazio, S., P., and Olson, M. S. **2021**. Sex determination through X-Y heterogamety in *Salix nigra*. *Heredity* (Published online 28 Jan 2021)

40. Holeski, L. M., **Keefover-Ring, K.**, Sobel, J. M., and Kooyers, N. J. **2021**. Evolutionary history and ecology shape the diversity and abundance of phytochemical arsenals across monkeyflowers. *Journal of Evolutionary Biology* (Published online 22 Jan 2021)

39. Sandra, S., **Keefover-Ring, K**., Park, Y-L., Wimp, G. M. Grady, J., and DiFazio, S. **2021**. Characterization of *Salix nigra* floral insect community and activity of three native *Andrena* bees. Accepted at *Ecology and Evolution*

38. Cope, O., Lindroth, R. L., **Keefover-Ring, K.**, and Kruger, E. **2020**. Trait plasticity and tradeoffs shape intraspecific variation in competitive response in a foundation tree species. *New Phytologist* (Published online 30 Dec 2020)

37. Yang, W., Zhang, Z., Wang, D., Li, Y., Tong, S., Li, M., Zhang, X., Zhang, L., Ren, L., Ma, X., Zhou, R., Sanderson, B. J., **Keefover-Ring, K.**, Yin, T., Smart, L. B., Liu, J., DiFazio, S. P. Olson, M., Ma, T. **2020**. A general model to explain repeated turnovers of sex determination in the Salicaceae. *Molecular Biology and Evolution* (Published online 7 Oct 2020)

36. Francoeur, C. B., Khadempour, L., Moreira-Soto, R. D., Gotting, K., Book, A. J., Pinto-Tomás, A. A., **Keefover-Ring, K.**, and Currie, C. R. **2020**. Bacteria contribute to plant secondary compound degradation in a generalist herbivore system. *mBio* 11:e02146-20 (Published online 15 Sep 2020)

35. Khadempour, L., Fan, H., **Keefover-Ring, K**., Carlos-Shanley, C., Nagamoto. N. S, Dam, M. A., Pupo, M. T., and Currie, C. R. **2020**. Metagenomics reveals diet-specific specialization of bacterial communities in fungus gardens of grass- and dicot-cutter ants. *Frontiers in Microbiology* 11:570770 (Published online 24 Sep 2020)

34. Howe, M., Mason, C. J., Gratton, C., **Keefover-Ring, K.**, Wallin, K., Yanchuk, A., Zhu, J., and K. F. Raffa. **2020**. Relationships between conifer constitutive and inducible defenses against bark beetles change across levels of biological and ecological scale. *Okios* 129:1093-1107 (Published online 27 Apr 2020)

33. Simon, S., Tschaplinski, T. J., Leboldus, J., **Keefover-Ring, K.**, Azeem, M., Jin-Gui Chen, J-G., Macaya-Sanz, D. MacDonald, W. L., Muchero, W., Tuskan, G. A., and S. P. DiFazio. **2020**. Host plant genetic control of associated fungal and insect species in a *Populus* hybrid. *Ecology and Evolution* 10:5119-5134 (Published online 27 Apr 2020)

32. Feng, G., Sanderson, B. J., **Keefover-Ring, K.**, Liu, J., Ma, T., Yin, T., Smart, L., DiFazio, S., and M. Olson. **2020**. Pathways to sex determination in plants: How many roads lead to Rome? *Current Opinion in Plant Biology* 54:61–68 (Published online 25 Feb 2020)

31. Kruger, E., **Keefover-Ring, K.**, Holeski, L., and R. L. Lindroth. **2020**. To compete or defend: linking functional trait variation with life-history tradeoffs in a foundation tree species. *Oecologia* 192:893-907 (Published online 14 Feb 2020)

30. Wang, M., Zhang, L., Zhang Z., Li, M., Wang, D., Zhang, X., Xi, Z., **Keefover-Ring, K.**, Smart, L. B., DiFazio, S., Olson, M. S., Yin, T., Liu, J., and Ma, T. **2020**. Phylogenomics of the genus *Populus* reveals extensive interspecific gene flow and balancing selection. *New Phytologist* 225:1370-1382 (Published online 31 Oct 2019)

29. Moreira, X., Abdala-Roberts, L., Nell, C. S., Vázquez-González, C., Pratt, J. D., **Keefover-Ring, K.**, and Mooney, K. A. **2019**. Sexual and genotypic variation in terpene quantitative and qualitative profiles in the dioecious shrub *Baccharis salicifolia*. *Scientific Reports* 9, 14655 (Published online 10 Oct 2019)

28. Kolb, T., **Keefover-Ring, K.**, Burr, S. J., Hofstetter, R., Gaylord, M., and Raffa, K. F. **2019**. Drought-mediated changes in tree physiological processes weaken tree defenses to bark beetle attack. *Journal of Chemical Ecology* 45:888-900 (Published online 7 Sep 2019)

27. Thompson, J. D., Amiot, J., Borron, C., Linhart, Y. B., **Keeefover-Ring, K.**, and Gauthier, P. **2019**. Spatial heterogeneity of gall formation in relation to chemotype distribution in *Thymus vulgaris*. *Plant Ecology* 220:777-788 (Published online 5 Jul 2019)

26. Rehman, S., **Keefover-Ring, K.**, Haq, I. U., Dilshad, E., Khan, M. I., Akhtar, N., and Mirza, B. **2019**. Drier climatic conditions increase withanolide content of *Withania coagulans* enhancing its inhibitory potential against human prostate cancer cells. *Applied Biochemistry and Biotechnology* 188:460-480 (Published online 5 Dec 2018)

25. Mason, C. J., **Keefover-Ring, K.**, Villari, C., Klutsch, J. G., Cook, S., Bonello, P., Erbilgin, N., Raffa, K. F., and Townsend, P. A. **2019**. Anatomical defenses against bark beetles relate to degree of historical exposure between species and are allocated independently of chemical defenses within trees. *Plant, Cell & Environment* 42:633-646 (Published online 22 Sep 2018)

24. Fang, L., Liu, H., Wei, S., **Keefover-Ring, K.**, and Yin, T. **2018**. High-density genetic map of *Populus deltoides* constructed by using specific length amplified fragment sequencing. *Tree Genetics & Genomes* 14:79 (Published online 3 Oct 2018)

23. Falk, M., Lindroth, R. L., **Keefover-Ring, K.**, and Raffa, K. F. **2018**. Genetic variation in aspen phytochemical patterns structure windows of opportunity for gypsy moth larvae. *Oecologia* 187: 471–482 (Published online 23 May 2018)

22. Howe M., **Keefover-Ring, K.**, and Raffa, K. F. **2018**. Pine engravers carry bacterial communities whose members reduce concentrations of host monoterpenes with variable degrees of redundancy, specificity, and capability. *Environmental Entomology* 47:638–645 (Published online 16 Mar 2018)

21. Rubert-Nason, K., **Keefover-Ring, K.**, and Lindroth, R. L. **2018**. Purification of phenolic glycosides (salicinoids) from salicaceous foliage. *Current Analytical Chemistry* 14:423-429 (Published online Dec 2017)

20. Trowbridge, A. and **Keefover-Ring, K. 2017**. Home on the (expanding) range: evaluating the effectiveness of a novel host's induced defenses against the mountain pine beetle-fungal complex. Invited commentary. *Tree Physiology* 37:1593-1596 (Published online 26 Sep 2017)

19. Mason, C. J., Villari, C., **Keefover-Ring, K.**, Jagemann, S., Zhu J., Bonello, P., and Raffa, K. F. **2017**. Spatial and temporal components of induced plant responses in the context of herbivore life history and impact on host. *Functional Ecology* 31:2034–2050 (Published online 30 May 2017)

18. Raffa, K. F., Mason, C. J., Bonello, P., Cook, S., Erbilgin, N., **Keefover-Ring, K.**, Klutsch, J. G., Villari, C., and Townsend, P. A. **2017**. Defense syndromes in lodgepole-whitebark pine ecosystems relate to degree of historical exposure to mountain pine beetles. *Plant, Cell & Environment* 40:1791-1806 (Published online 24 May 2017)

17. Keefover-Ring, K., Rubert-Nason, K., Bennett, A. E., and Lindroth, R. L. **2016**. Growth and chemical responses of trembling aspen to simulated browsing and ungulate saliva. *Journal of Plant Ecology* 9:474-484 (Published online 13 Nov 2015)

16. Keefover-Ring, K., Trowbridge, A., Mason, C. J., and Raffa, K. F. **2016**. Rapid induction of multiple terpenoid groups by ponderosa pine in response to bark beetle-associated fungi. *Journal of Chemical Ecology* 42:1-12 (Published online 11 Dec 2015)

15. Barnes, P. W., Tobler, M. A., **Keefover-Ring**, **K.,** Flint, S. D., Barkley, A. E., Ryel, R. J., and Lindroth, R. L. **2016**. Rapid modulation of UV-shielding in plants is influenced by solar UV radiation and linked to alterations in flavonoids. *Plant, Cell & Environment* 39:222-230 (Published online 15 Jul 2015)

14. Keefover-Ring, K. 2015. Bergamot versus beetle: evidence for intraspecific chemical specialization. *AoB PLANTS* 7:plv132 (Published online 16 Nov 2015)

13. Linhart, Y. B., Gauthier, P., **Keefover-Ring**, **K.,** and Thompson, J. D. **2015**. Variable phytotoxic effects of *Thymus vulgaris* (Lamiaceae) terpenes upon associated species. *International Journal of Plant Sciences* 176:20-30 (Published online 17 Dec 2014)

12. Keefover-Ring, K., M. Ahnlund, I. Nacif Abreu, S. Jansson, T. Moritz, and Albrectsen, B. R. **2014**. No evidence of geographical structure of salicinoid chemotypes within *Populus tremula*. *PLoS ONE* 9:e107189 (Published online 9 Oct 2014)

11. Keefover-Ring, **K.**, L. M. Holeski, M. D. Bowers, A. D. Clauss, and Lindroth, R. L. **2014**. Phenylpropanoid glycosides of *Mimulus guttatus* (yellow monkeyflower). *Phytochemistry Letters* 10:132-139 (Published online 4 Sep 2014)

10. Pratt, J. D., **Keefover-Ring, K.**, Liu, L. Y., and Mooney, K. A. **2014**. Genetically based latitudinal variation in *Artemisia californica* secondary chemistry. *Oikos* 123:953-963 (Published online 3 Apr 2014)

9. Keefover-Ring, K., Carlsson, M., and Albrectsen, B. R. **2014**. 2'-(*Z*)-Cinnamoylsalicortin: a novel salicinoid from *Populus tremula. Phytochemistry Letters* 7:212-216 (Published online 13 Dec 2013)

8. Boone, C. K., **Keefover-Ring**, **K.,** Mapes, A. C., Adams, A. S., Bohlmann, J., and Raffa, K. F. **2013**. Bacteria associated with a tree-killing insect reduce concentrations of plant defense compounds*. Journal of Chemical Ecology* 39:1003-1006 (Published online 27 Jun 2013)

7. Holeski, L. M., **Keefover-Ring**, **K.,** Bowers, M. D., HarnEnz, Z. T., and Lindroth, R. L. **2013**. Patterns of phytochemical variation in *Mimulus guttatus* (yellow monkeyflower*). Journal of Chemical Ecology* 39:525-536 (Published online 7 Mar 2013)

6. Keefover-Ring, K. 2013. Making scents of defense: do fecal shields and herbivore-caused volatiles match host plant chemical profiles? *Chemoecology* 23:1-11 (Published online 13 Oct 2012)

5. Keefover-Ring, K. and Linhart, Y. B. **2010**. Variable chemistry and herbivory of ponderosa pine cones. *International Journal of Plant Sciences* 171:293-302

4. Keefover-Ring, K., Thompson, J. D., and Linhart, Y. B. **2009**. Beyond six scents: defining a seventh *Thymus vulgaris* chemotype new to southern France by ethanol extraction. *Flavour and Fragrance Journal* 24:117-122 (Published online 12 Feb 2009)

3. Groendahl, E., Ehlers, B. K., and **Keefover-Ring, K. 2008**. New *cis*-sabinene hydrate chemotype detected in large thyme (*Thymus pulegioides* L.) growing wild in Denmark. *Journal of Essential Oil Research* 20:40-41

2. Thompson, J. D., P. Gauthier, J. Amiot, Ehlers, B. K., Collin, C., Fossat, J., Barrios, V., Arnaud-Miramont, F., **Keefover-Ring**, **K.,** and Linhart, Y. B. **2007**. Ongoing adaptation to Mediterranean climate extremes in a chemically polymorphic plant. *Ecological Monographs* 77:421-439

1. Linhart, Y. B., **Keefover-Ring**, **K.,** Mooney, K. A., Breland, B., and Thompson, J. D. **2005**. A chemical polymorphism in a multi-trophic setting: Thyme monoterpene composition and food web structure. *American Naturalist* 166:517-529 (Published online 5 Aug 2005)

GRANTS AND AWARDS

- The Office of the Vice Chancellor for Research and Graduate Education (OVCRGE), UW-Madison: 2020 UW-Madison Fall Competition grant: Two continents, one chemistry: evolution, function, and maintenance of plant secondary chemical diversity **$47,379**
- The Office of the Vice Chancellor for Research and Graduate Education (OVCRGE), UW-Madison: 2020 UW-Madison Pandemic-Affected Research Continuation Initiative (PARCI) grant **$30,000**
- The Office of the Vice Chancellor for Research and Graduate Education (OVCRGE) , UW-Madison: Travel grant for **$1,000** to attend the Plant-Herbivore Interaction Gordon Research Conference in Ventura, California on February 24-March 1, 2019
- Spring 2018 UW-Madison University Housing Honored Instructor
- USDA Forest Service 18-CA-11100106-808 - 2018: Presumed resistant: phloem chemistry characteristics of white spruce susceptible or resistant to spruce beetle outbreaks. **$23,357**. Lead PI: **Ken Keefover-Ring**, Trish Wurtz, USDA-FS
- NSF IOS 1542479 - 2015: Dimensions US-China: Collaborative Research: Allozomes and dioecy in plants as drivers of multi-level biodiversity. Matt Olson (lead PI), Stephen Defazio, and Larry B. Smart. **$2.1 million** total, **$459,656** to **Ken Keefover-Ring**, Lead PI at UW-Madison
- NSF DEB 1547851 - 2015: EAGER: The evolution of anti-predator defenses in tortoise beetles (Coleoptera: Chrysomelidae: Cassidinae) **$149,637**. Lead PI: Caroline Chaboo; Co-PIs: Alex Trillo and **Ken Keefover-Ring**
- NSF DEB-1456592 - 2015: Richard L. Lindroth, Eric L. Kruger, and **Ken Keefover-Ring**. Growth-defense tradeoffs, context dependency and genetic variation in aspen: implications for plant-insect interactions - Population and Community Ecology - **$150,000**
- McIntire-Stennis Multi-Disciplinary Program - 2015: Richard L. Lindroth, Eric L. Kruger, and **Ken Keefover-Ring**. Impacts of genotype, environment, and G x E interactions on stand productivity in a woody biofuel crop - **$186,424**
- Gunnar and Ruth Björkman Fund for Northern Botanical Research, Sweden - 2012 - **$2,400**
- Carl Tryggers Research Fellowship, Sweden - 2010 - **$69,300**
- Bourse Chateaubriand International Fellowship, France **$15,600** - Fall 2008 - Awarded, but declined
- University of Colorado EEB Dept. graduate fellowship - Fall 2007 - **$12,000**
- NSF Doctoral Dissertation Improvement Grant (DIGG) - 2006 - **$7,921**
- University of Colorado EEB Dept. research grant - 2006 - **$500**
- Sigma Xi Research Grant - 2006 - **$700**
- John Marr Fund - 2006 - **$1,000**
- University of Colorado EEB Dept. grant - 2005 - **$1,435**
- Colorado Native Plant Society research grant - 2003 - **$325**
- Walker Van Riper Fund research grant, University of Colorado Museum - 2003 - **$761**
- Colorado Mountain Club Foundation research grant - 1999 - **$600**
- US Patent #5,418,050 - 1995 - **Keefover-Ring, K.**, G.T. Geisendorfer, and H.A. Yap, Light-weight impact resistant polyaramid fiber fire/heat barrier laminates for commercial aircraft cargo bays. ICI/Fiberite Composites Inc.

TEACHING EXPERIENCE

- Instructor – Geography 920/Botany 575 - Graduate seminar: Biogeography of Plant-Animal Interactions - UW-Madison - Spring 2021
- Instructor - Geography/Nelson Institute for Environmental Studies 127 - Physical Systems of the Environment - UW-Madison - Fall 2020
- Instructor - Biology 152 - Introductory Biology - UW-Madison - Fall 2020
- Instructor - Entomology/Botany/Integrative Biology 473 - Plant-Insect Interactions - UW-Madison - Spring 2020
- Instructor - Geography/Nelson Institute for Environmental Studies 127 - Physical Systems of the Environment - UW-Madison - Fall 2019
- Instructor - Biology 152 - Introductory Biology - UW-Madison - Fall 2019
- Instructor - Botany 575/Hort 375/Agronomy 375/Pl Path 375 - Frontiers in Plant Biology - UW-Madison - Spring 2019
- Instructor - Geography/Botany 338 - Environmental Biogeography - UW-Madison - Fall 2018
- Instructor - Biology 152 - Introductory Biology - UW-Madison - Fall 2018
- Instructor - Entomology/Botany/Integrative Biology 473 - Plant-Insect Interactions - UW-Madison - Spring 2018
- Instructor - Geography/Nelson Institute for Environmental Studies 120 - Introduction to the Earth System - UW-Madison - Spring 2018
- Instructor - Geography/Nelson Institute for Environmental Studies 120 - Introduction to the Earth System - UW-Madison - Fall 2017
- Instructor - Biology 152 - Introductory Biology - UW-Madison - Fall 2017
- Instructor - Geography/Nelson Institute for Environmental Studies 120 - Introduction to the Earth System - UW-Madison - Spring 2017
- Instructor - Geography/Botany 338 - Environmental Biogeography - UW-Madison - Fall 2016
- Instructor - Biology 152 - Introductory Biology - UW-Madison - Fall 2016
- Instructor - Plant-animal Interactions & Chemical Ecology - Umeå Plant Science Centre - Plant Biology and Biotechnology Ph.D. course. November 2014
- Instructor - Plant Defense - Umeå Plant Science Centre - Zoology and Plant Physiology Ph.D. course. May 2012
- Instructor - Pollination and Herbivory - Umeå Plant Science Centre -Zoology and Plant Physiology Ph.D. course. May 2011
- Instructor - Tree Resistance to Natural Enemies: Physiology, Ecology and Management - Swedish Agricultural University (SLU) Ph.D. course, Alnarp, Sweden. May 2011
- Instructor- Designed and led two day course - Introduction to Reversed Phase HPLC - Umeå Plant Science Centre. November 2010
- Teaching Assistant - Biometry - EEB Dept., University of Colorado. Spring 2007
- Teaching Assistant - Ecology - EEB Dept., University of Colorado, Fall 2006
- Teaching Assistant - Conservation Biology - EEB Dept., University of Colorado. Fall 2005
- Teaching Assistant - Genetics - EEB Dept., University of Colorado. Fall 2004

ANALYTICAL CHEMISTRY EXPERIENCE

- Extensive experience with isolation, purification, and characterization of plant secondary metabolites
- High and ultra-high performance liquid chromatography (HPLC and UHPLC) with UV, single quadrapole (SQ), time-of-flight (TOF) and tandem (MS-MS) mass spectrometry detectors
- Gas chromatography (GC) with both flame ionization (FID) and mass spectrometry (MS) detectors
- High performance thin layer chromatography (HPTLC)
- One- and two-dimensional (^{1}H and ^{13}C) nuclear magnetic resonance (NMR) spectroscopy

RESEARCH PRESENTATIONS

Invited talks

- *Presumed resistant: using current constitutive chemistry to predict historic resistance to insect outbreak* - **Ken Keefover-Ring** - Invited speaker for webinar on Plant Defense and Biotic & Abiotic Stress for the International Union of Forest Research Organizations (IUFRO) - January 21, 2021
- *Presumed resistant: phloem chemistry characteristics of white spruce susceptible or resistant to spruce beetle outbreaks* - **Ken Keefover-Ring** - Invited speaker for the U.S. Forest Service Forest Health Protection Technical Meeting - January 15, 2020 - Juneau, AK
- *Sexual dimorphism and the evolution of dioecy in the Salicaceae* - **Ken Keefover-Ring** - Invited speaker for the Wisconsin Ecology 2019 Fall Symposium - October 15, 2019 - UW-Madison
- *Secondary chemistry variation in the Salicaceae and its implications for forest insect herbivores* - **Ken Keefover-Ring**, Muhammad Azeem, Samantha Harrow, Craig Carlson, Sandy Simon, Larry Smart, Steve DeFazio, and Matt Olson – ESA, ESC, and ESBC Joint Meeting - November 14, 2018 - Vancouver, Canada
- *It's about time: applying variable and changing temperatures to the management of two naturalized invasive pests, oak wilt fungus and gypsy moth* - **Kenneth F. Raffa**, Michael A. Falk, Stephanie M. Jagemann, Jennifer Juzwik, Ken Keefover-Ring, Richard L. Lindroth, and Patrick C. Tobin. 29th USDA Interagency Research Forum on Invasive Species. January 9-12, 2018. Annapolis, Maryland
- *Chemical variation and ecology in the Salicaceae* - **Ken Keefover-Ring** - NSF Dimensions of Biodiversity collaborators meetings - Nanjing, Lanzhou, and Chengdu, China – July-Aug 2017
- *Temperature and herbivory interact to increase volatile organic compound emission in* Populus tremuloides - **Ken Keefover-Ring**, Mary A. Jamieson, Heather Smaby, Kenneth F. Raffa, Richard L. Lindroth, and Peter B. Reich - Ecological Society of America 102th Annual Meeting - August 7, 2017 - Portland, OR
- *Causes and Consequences of Plant Secondary Chemical Variation* - **Ken Keefover-Ring** - University of Missouri-St. Louis. October 18, 2016, St. Louis, MO
- *Scents and Sensibilities: The Role of Pollination in Thyme Essential Oil Polymorphism* - University of Hawaii at Manoa - **Ken Keefover-Ring** - November 12, 2010, Honolulu, HI
- *Scents and Sensibilities: The Role of Pollination in Thyme Essential Oil Polymorphism* - University of California at Irvine - **Ken Keefover-Ring** - April 30, 2010, Irvine, CA
- *One Chemistry, Two Continents: Maintenance and Function of Chemical Polymorphism in the Mint Family* - **Ken Keefover-Ring** - Evolution Seminar Series - University of Wisconsin-Madison. October 16, 2008, Madison, WI

- *Chemical Warfare in Colorado: Beetles versus Bergamot* - Invited talk to the Colorado Native Plant Society 2007 annual conference - **Ken Keefover-Ring** - September 8, 2008 - Boulder, CO
- *A Chemical Polymorphism in Thyme and Space* - University of Colorado Biology Club - **Ken Keefover-Ring -** Boulder, CO, December 7, 2006

Oral presentations (boldface name denotes speaker and underlined denotes student at time work done. Underlined and asterisk denotes my student)

- *Presumed resistant: phloem chemistry characteristics of white spruce susceptible or resistant to spruce beetle outbreaks* - **Ken Keefover-Ring,** Stephen Burr, Rebecca Kressuk, Madelyn Waloway, and Tricia Wurtz - Ecological Society of America 105th Annual Meeting - August 3-6, 2020 - Virtual
- Drought thwarts ponderosa pine regeneration pulse. **Thomas Kolb**, Ken Keefover-Ring, Stephen Burr, Richard Hofstetter, Monica Gaylord, and Kenneth Raffa - 12th North American Forest Ecology Workshop - June 22-27, 2019 - Flagstaff, Arizona
- How are conifer constitutive and induced defenses related? A multiscalar approach to testing for tradeoffs. **Michael Howe**, Claudio Gratton, Ken Keefover-Ring, Jun Zhu, and Kenneth Raffa, Charles Mason, Kimberly Wallin, and Alvin Yanchuk - Western Forest Insect Work Conference - April 22-25, 2019 - Anchorage, Alaska
- *Do conifers exhibit tradeoffs between their constitutive and induced chemical defenses against tree-killing bark beetles?* **Michael Howe**, Claudio Gratton, Ken Keefover-Ring, Charles Mason, Kimberly Wallin, Alvin D. Yanchuk, Jun Zhu, and Kenneth Raffa - ESA, ESC, and ESBC Joint Meeting - November 13, 2018 - Vancouver, Canada
- *Genetic variation in aspen phytochemical patterns mediates herbivore responses to phenological shifts* - **Michael Falk**, Richard L. Lindroth, Ken Keefover-Ring, and Kenneth Raffa - ESA, ESC, and ESBC Joint Meeting - November 13, 2018 - Vancouver, Canada
- *Intraspecific competition shapes evolutionary trajectories of resistance to insect defoliation in forest stands* - **Olivia Cope**, Ken Keefover-Ring, Eric Kruger, and Richard L. Lindroth - ESA, ESC, and ESBC Joint Meeting - November 12, 2018 - Vancouver, Canada
- *It's about time: applying variable and changing temperatures to the management of two naturalized invasive pests, oak wilt fungus and gypsy moth* - **Kenneth F. Raffa**, Michael A. Falk, Stephanie M. Jagemann, Jennifer Juzwik, Ken Keefover-Ring, Richard L. Lindroth, and Patrick C. Tobin. 29th USDA Interagency Research Forum on Invasive Species. January 9-12, 2018. Annapolis, Maryland
- *Rapid induction of multiple terpenoid groups by ponderosa pine in response to bark beetle-associated fungi* - **Ken Keefover-Ring**, Amy Trowbridge, Charles Mason, and Kenneth Raffa - Ecological Society of America 100th Annual Meeting - August 13, 2015 - Baltimore, MD
- *Following frass: use of Populus tremula host chemistry by Chrysomelid beetles* - **Ken Keefover-Ring** - International Society of Chemical Ecology/Chemical Signals in Vertebrates - July 8–12, 2014 - University of Illinois, Urbana-Champaign, IL
- *Diurnal changes in leaf UV-absorbing compounds and epidermal UV-transmittance* – **Paul W. Barnes**, Mark A. Tobler, Ken Keefover-Ring, Stephan D. Flint, Anne E. Barkley, Ronald J. Ryel, and Richard L. Lindroth - Ecological Society of America 98th Annual Meeting - August 8, 2013 - Minneapolis, MN
- *Beetle versus bergamot: evidence for intraspecific chemical specialization* - **Ken Keefover-Ring** - Ecological Society of America 97th Annual Meeting - August 7, 2012 – Portland, OR

- *Phenolic glycoside diversity in the Salicaceae* - **Ken Keefover-Ring** and B. R. Albrectsen - International Society of Chemical Ecology - July 22–26 2012 - Vilnius, Lithuania
- *Responses of trembling aspen to simulated browsing and application of ungulate saliva* - **Ken Keefover-Ring**, Kennedy Rubert-Nason, Alison Bennett, and Richard L. Lindroth - Ecological Society of America 96th Annual Meeting - August 9, 2011 - Austin, TX
- *Flaunting fragrant frass: Physonota unipunctata (Chrysomelidae) fecal shield and host plant chemistry* - **Ken Keefover-Ring** - Guild of Rocky Mountain Ecology and Evolutionary Biologists (GREEBS) - September 18, 2005 - CU Mountain Research Station, CO
- *Variation in plant secondary chemistry* - **Ken Keefover-Ring** - University of Colorado EEB Dept. Brown Bag Series - September 16, 2005, CU-Boulder
- *Quest for the holy geraniol* - **Ken Keefover-Ring** - University of Colorado EEB Dept. Brown Bag Series - November 17, 2004, CU-Boulder
- *Plants making scents: labiate volatile emissions and pollination* - **Ken Keefover-Ring** - GREEBS - September 2004 - University of Colorado Mountain Research Station, CO, USA
- *Terpene polymorphisms in mints* - **Ken Keefover-Ring** - EBIO 2070 Genetics - Fall 2004 – CU-Boulder
- *Monoterpene chemistry of* Monarda *in Colorado* - **Ken Keefover-Ring** - University of Colorado EEB Dept. Brown Bag Series - November 10, 2003, CU-Boulder
- *Chemotype distribution of* Monarda fistulosa *in Colorado* - **Ken Keefover-Ring** - Guild of Rocky Mountain Population Biologists (GRMBPS) - September 20, 2003 - University of Colorado Mountain Research Station, CO
- *Variation in chemistry and herbivory of ponderosa pine seed cones in Colorado* - **Ken Keefover-Ring** - Ecological Society of America 87th annual meeting - August 7, 2002 - Tucson, AZ
- *Monoterpene polymorphism in* Monarda fistulosa - **Ken Keefover-Ring** - Plant Animal Interaction group - November 25, 2002 - CU-Boulder

Posters (boldface name denotes presenter and underlined denotes student at time work done)

- *Sexual dimorphism in willow secondary chemistry: implications for herbivores, pollinators, and dioecy* - **Ken Keefover-Ring**, Craig Carlson, Muhammad Azeem, Brennan Hyden, and Lawrence Smart- Gordon Conference on Plant-Herbivore Interaction - February 24 - March 1, 2019 - Ventura, CA
- *Fortifying foliage: fate and use of host chemistry in leaf beetles* - **Ken Keefover-Ring** - Gordon Conference on Plant-Herbivore Interaction - February 12-17, 2017 - Ventura, CA
- *Following frass: fate and use of host chemistry in leaf beetles* - **Ken Keefover-Ring** - Gordon Conference on Plant-Herbivore Interaction - February 24 to March 1, 2013 - Ventura, CA
- *Salicinoids in Populus tremula and herbivore resistance* - Swedish Foundation for Strategic Research (SSF) Programme conference: Strategic areas in the life sciences - **Ken Keefover-Ring** - October 4-5, 2011 - Johannesbergs Castle near Stockholm, Sweden
- *Identity and natural variation of secondary compounds in yellow monkeyflower,* Mimulus guttatus - **Ken Keefover-Ring**, L. M. Holeski, M. D. Bowers, A. D. Clauss, and R. L. Lindroth - Gordon Conference on Plant-Herbivore Interaction - February 21-26, 2010 - Galveston, TX

- *Flaunting fragrant frass: the chemical ecology of Physonota unipunctata and its host plant* Monarda fistulosa - **Ken Keefover-Ring** - Gordon Conference on Plant-Herbivore Interaction - February 18-23, 2007 - Ventura, CA
- *Geographic, temporal and anatomic variation in monoterpene chemistry of* Monarda fistulosa *in Colorado* - **Ken Keefover-Ring** - Gordon Conference on Plant-Herbivore Interaction - February 29 to March 5, 2004 - Ventura, CA

Guest Lectures

- *The terpenes* - Invited talk to graduate seminar in Chemical Ecology - September 19, 2005 - CU-Boulder
- *The other chemicals: plant secondary compounds* - Invited talk to Nutritional Ecology - April 13, 2007 - CU-Boulder
- *Plants terpenes: the spice of life* - Invited talk to EBIO 2590 Plants and Society - September 29, 2004 - CU-Boulder
- *Evolution of terpene synthases* - Evolutionary biology course - April 23, 2002 - CU-Boulder

RESEARCH AND FIELD EXPERIENCE

- Chemical ecology of dioecy in the Salicaceae. 2015 to present
- Chemical ecology of *Populus tremuloides* and yellow monkeyflower, *Mimulus guttatus*. July 2008 to present
- Phenolic glycoside chemistry of *Populus tremula* and *Salix sp.* in Sweden. Oct 2010 to present
- Floral volatiles of Colorado columbine, *Aquilegia caerulea*. July 2010 to Aug 2010
- Compound isolation. Development of HPLC and GC-MS methods for iridoid glycosides. January 2008 to June 2008
- Curation and databasing of large grasshopper collection. August to December 2006
- Herbivory and competition in common thyme, *Thymus vulgaris* in Montpellier, France and Boulder, CO. November 2001 to August 2005
- Chemical ecology of *Thymus vulgaris* in southern France and *Monarda fistulosa* and *M. pectinata* in Colorado. June 2002 to May 2008
- Terpenoid chemistry of ponderosa pine cones and a suite of specialist herbivores. August 1998 to May 2001

SYNERGISTIC ACTIVITIES AND OUTREACH

- Submitted a proposal for an organized oral session (OOS) for the 2020 (delayed and resubmitted and accepted for the 2021 meeting) Ecological Society of America (ESA) annual meeting, entitled *How phytochemical variation enhances our understanding of patterns and processes from the leaf to the ecosystem*, that has been accepted - Co-organized with Prof. Amy Trowbridge
- Invited talk to Blue Mounds Area Project - The Path to Allelopathy - January 30, 2020
- Invited talk to Madison Optimist Club - Plants make scents: the chemical ecology of plant essential oils - December 17, 2019
- Plants Make Sense - Community outreach booth at Family Gardening Day, May 4, 2019 - participants matched pure scents to pictures of their plant source
- Reviewer for: Annals of Botany, AOB Plants, Canadian Journal of Forest Research, Chemoecology, Functional Ecology, Insect Biochemistry and Molecular Biology, International Journal of Molecular Sciences, Journal of Chemical Ecology, Methods in Ecology and Evolution, Molecules, New Phytologist, Oecologia, Phytochemistry, Plant and Soil, PLOS ONE, Plant Foods for Human Nutrition, Scientific Reports, Trees

- Grant Reviewer: National Science Foundation
- Chemical warfare in Colorado: Beetles versus bergamot - Invited talk to Café Botanique at the Denver Botanical Gardens - July 5, 2007 - Denver, CO, USA
- Invited talk to City of Boulder Open Space and Mountain Parks. The chemical ecology of *Monarda* on Open Space and Mountain Parks (OSMP) Lands and Beyond - December 15, 2004 - Boulder, CO
- July 2005 to October 2009 - Board of Directors member for Prairie Preservation Alliance - A Broomfield, CO based non-profit advocating for prairie protection in Colorado.
- November 1994 to January 2004 - Served on the Board of Directors for Sinapu - a Boulder, CO based non-profit dedicated to the protection and restoration of native carnivores in the Southern Rockies.

PROFESSIONAL AFFILIATIONS

- International Society of Chemical Ecology
- Ecological Society of America
- Entomological Society of America