MARION L. BRODHAGEN, PH.D.

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BACKGROUND

EDUCATION

2003 - Ph.D. Molecular and Cellular Biology Program, Oregon State University
1998 - M.S. Botany and Plant Pathology Department, Oregon State University
1992 - B.S. (cum laude), Biology Department, University of Wisconsin - Oshkosh

EMPLOYMENT

2019 – present. Professor, Western Washington University, Bellingham, WA.
2013 – 2019. Associate Professor, Western Washington University, Bellingham, WA.
2011 –2013. Assistant Professor, Western Washington University, Bellingham, WA.
2010 – 2011. Research Microbiologist, USDA-ARS Forage Seed and Cereal Research Unit, Corvallis, OR.
2006 –2010. Assistant Professor, Western Washington University, Bellingham, WA.
2004 – 2006. Postdoctoral Fellow, Department of Plant Pathology, University of Wisconsin - Madison. Dr. N. P. Keller, mentor.
2003 – 2004. Postdoctoral Fellow, Department of Microbiology, University of Washington. Dr. E. W. Nester, mentor.
1998 – 2003. Graduate Research Associate, Molecular and Cellular Biology Program, OSU. Dr. J. E. Loper, advisor.
1995 – 1998. Graduate Research Associate, Botany and Plant Pathology Department, OSU. Dr. R. G. Kelsey and Dr. K. Lajtha, co-advisors.
1994 – 1998. Graduate Teaching Assistant, Botany and Plant Pathology Department, OSU.
1992 – 1994. Research Specialist, Horticulture Department, University of Wisconsin-Madison. Dr. D. D. Ellis, supervisor.

SELECTED HONORS AND AWARDS

2016. Foundational Annual Scholarship, WWU, honored by recent graduate by a donation to the Senior Giving Campaign
2015. Academy Award, Teaching-Learning Academy, WWU, in recognition of contribution to reducing barriers to life-long learning across disciplines and communities.
2013. USDA NIFA Partnership Innovative Projects and Programs Team Award, in recognition of the contributions of the research team for our USDA Specialty Crops Research Initiative Standard Research and Extension Projects grant, "Biodegradable Mulches for Specialty Crops Produced Under Protective Covers."
2006. USDA-NRI Postdoctoral Fellowship, Biology of Plant-Microbe Associations program. (Declined offer to accept tenure-track position at WWU.)
2004 – 2006. Postdoctoral Traineeship, NIH National Research Service Award
2003 – 2004. Postdoctoral Fellowship, NIH National Research Service Award
2002. Scholarship to attend **Advances in Genome Technology and Bioinformatics** course at Marine Biological Laboratory, Woods Hole, MA
2001. Scholarship to attend **Protein Purification and Characterization** course at Cold Spring Harbor Laboratory, Cold Spring Harbor, NY
2000 – 2003. Graduate Research Fellowship, EPA Science to Achieve Results program

TEACHING

COURSES TAUGHT – WWU

BIOL 205, Intro. to Cellular and Molecular Biology
BIOL 324, Methods in Molecular Biology
BIOL 345, Fundamentals of Microbiology
BIOL 346, Microbiology Laboratory
BIOL 445/545, Host-Microbe Interactions
BIOL 395, 400, 494, 495, 498, 690, mentoring independent researchers, interns, and teaching assistants
BIOL 405/545, Microbial Ecology
BIOL 445P/545P, Chemical Ecology

MENTORING - WWU

I have mentored 46 undergraduate researchers **(27 since receiving tenure),** seven interns, and numerous undergraduate TAs at WWU. I have mentored four graduate students **(four since receiving tenure)** and been a committee member on seven graduate committees **(three since receiving tenure).** In addition, I informally co-mentor student researchers on collaborative projects with Jeff Young, Mark Peyron, and David Rider.

AWARDS AND HONORS TO RESEARCH STUDENTS, EXTERNAL

2018. Invited talk, 9th International Symbiosis Society Congress (C. Hutchinson)
2017. Audubon Society Student Scholarship: $772 (C. Hutchinson)
2008. American Phytopathological Society Frank L. Howard Undergraduate Fellowship Award: $1,000. One of **two awards nationwide** was given to R. Blumhagen for her research project.
2008. American Society for Microbiology Undergraduate Research Fellowship: $2,500. One of **~30 awards nationwid**e was given to R. Blumhagen for her research project.
2007. American Society for Microbiology Undergraduate Research Fellowship: $5,000. One of **34 awards nationwide** to K. Fowler for his research project.

AWARDS AND HONORS TO RESEARCH STUDENTS, INTERNAL

2019. WWU Research and Creative Opportunities for Undergraduates grant: $1000 (B. Loper)
2019. WWU Research and Sponsored Programs graduate research funds: $2,000 (T. Cofer**)**
2018. WWU Research and Creative Opportunities for Undergraduates grant: $492.56 (S. Riley)
2017. WWU Research and Creative Opportunities for Undergraduates grant: $489 (F. Carpenter)
2017. WWU Research and Creative Opportunities for Undergraduates grant: $500 (K. Russell)
2017. WWU Research and Sponsored Programs graduate research funds: $1,002 (C. Hutchinson**)**
2015. WWU Biology Outstanding Senior (J. Levy)
2015. WWU Research and Creative Opportunities for Undergraduates grant: $250 (J. Levy)
2015. WWU Biology Chair Research Award: $200 (A. Batson)
2014. WWU Research and Creative Opportunities for Undergraduates grant: $494 (A. Batson)
2013. WWU Research and Creative Opportunities for Undergraduates grant: $353 (M. Harris)
2013. WWU Advanced Materials Science and Engineering Center: $4500 (M. Harris and K. Healy; co-mentored by Mark Peyron, Chemistry)

2013. WWU Research and Creative Opportunities for Undergraduates grant: $350 (K. Kinloch)
2013. WWU Research and Creative Opportunities for Undergraduates grant: $350 (M. McSharry)
2013. WWU Research and Creative Opportunities for Undergraduates grant: $350 (J. McCollum)
2013. WWU Biology Chair Research Award: $200 (M. McSharry)
2007 – 2008. WWU Foundation Program in Support of Undergraduate Research and Scholarship Excellence: $1,000 (K. Fowler) and $2,000 (self).

RECENT WWU SCHOLARS WEEK POSTERS:

2019. Potential relationship between the prevalence of sea star wasting disease and *Vibrio* species in Birch Bay. S. Riley, B. Loper, and M. Brodhagen.
2018. Sea star wasting disease: potential role of sea star microbiome. C. McHugh, S. Riley, E. Kooyman, B. Loper, N. Hannah, C. Hutchinson, and M. Brodhagen.
2017. Sea star wasting disease in *Pisaster ochraceus*: investigating potential pathogens in a keystone species. F. Carpenter, T. Grimm, C. Hutchinson, K. Russell, B. Miner, and M. Brodhagen.
2016. Effects of photosensitizers methylene blue and chlorin e6 on *Pseudomonas aeruginosa* PAO1. A. Saba, L. Kooiman, B. Selover, T. Haverkamp, T. Grimm,T. Vannelli, and M. Brodhagen
2015. Seed extracts induce a volatile signal that inhibits fungal growth. A. Batson, J. Levy, T. DeSitter, T. Hill, A. Marsh, J. Young, and M. Brodhagen.
2014. Elucidating the endophyte community of PNW plants. A. Batson, J. Levy, J. McCollum, and M. Brodhagen.
2014. Assessing fungal breakdown of pure plastic films. M. Harris, K. Healy, M. Brodhagen, and M. Peyron.
2013. Identification of fungi that grow on biodegradable plastic mulches. K. Kinloch, M. McSharry, J. McCollum, B. Kinash, and M. Brodhagen.
2013. Identification of *Aspergillus* resistance factors in a model plant system. S. Anderson, Z. Cranny, M. Lahman, R. Doucette, T. DeSitter, S. Velluci, M. Brodhagen, and J. Young.

PROFESSIONAL DEVELOPMENT

2013 – 2016 Member, Change at the Core (C-CORE): Attended weekend workshops and two week-long summer institutes focused around the implementation of student-centered learning and practices fostering equity and inclusion in teaching. Was part of a professional learning community for those teaching BIOL 205 at WWU and WCC; helped develop, implement, and evaluate active learning exercises across our courses.
2020 - Invited participant, Network Improvement Community (NIC), NSF Values-based Academic Leadership Trajectories for Women in STEM (VAuLTS) Northwest Regional Partnership.

SCHOLARSHIP

RESEARCH GRANTS, INTERNAL

2020. WWU AMSEC Seed Grant: $1,000 + $5,400 stipend for undergraduate research stipend. "Evaluating impacts of nanopesticides and microplastics in agricultural rhizospheres." PI: Manuel Montaño; co-PIs: Marion Brodhagen, Mark Peyron, and Rebecca Bunn.
2017. WWU Research and Sponsored Programs Mini Grant, $1,157. "Quartz crystal microbalance for use in quantifying adsorption of VOCs to plastic surfaces". Co-PIs: David Rider and Mark Peyron.

2017. WWU AMSEC Seed Grant for Interdisciplinary Research in Materials Science, $1,000 + $4,400 stipend for undergraduate research stipend. "Plastic films for solid phase extraction of volatile biological signals." Co-PIs: David Rider and Mark Peyron.
2016. Fraser Endowment Fund award: $3,000. "Effect of volatile plant metabolites on *Aspergillus*."
2016. WWU Research and Sponsored Programs Pilot Project Award: $4,000. "Testing alternative hypotheses for the cause of sea star wasting disease." Co-PI, Benjamin Miner.
2015. Fraser Endowment Fund award: $7,000. "Effect of volatile plant metabolites on *Aspergillus*."
2014. WWU Research and Sponsored Programs Pilot Project Award: $3992. "Pyoverdine as a Trojan Horse: ironing out antimicrobial photodynamic therapy." Co-PI, Tommaso Vannelli**.**
2013. WWU AMSEC Seed Grant for Interdisciplinary Research in Materials Science: $4500. "Mycotoxin production during fungal breakdown of pure biodegradable plastic polymers." Co-PI, Mark Peyron.
2011 – 2012. WWU Research and Sponsored Programs Pilot Project Award: $4,000. "Characterization of aflatoxin-inhibiting plant natural products."
2007 – 2008. WWU Research and Sponsored Programs Project Development Award: $43,904. "Development of rapid, affordable aflatoxin screening."
2007 – 2008. WWU Foundation's Mentoring Undergraduates grant: $4,000. Program in Support of Undergraduate Research and Scholarship Excellence.

RESEARCH GRANTS, EXTERNAL

2017-2018. NSF EAGER: $70,391. "Biodegradable plastic mulch films in agriculture as a potential source of contaminated plastic pollution." Co-PI, Mark Peyron.
2014-2016. Washington Research Foundation: $25,857. **"**Predictive aflatoxin testing via loop-mediated isothermal amplification."
2009 – 2012. Co-PI. USDA Specialty Crops Research Initiative (SCRI) Standard Research and Extension Projects grant: $1,999,002 *($57,566 to Brodhagen/WWU*). "Biodegradable Mulches for Specialty Crops Produced Under Protective Covers."
2008 – 2009. Co-PI. USDA SCRI planning grant: $100,000 *($9,808 to Brodhagen/WWU*). "Project Planning for Specialty Crop Covers that Use Degradable Materials."
2007 – 2009. USDA-NRI AREA Award: $100,000. "A tool to characterize fungal receptors of plant signals that affect mycotoxin production during *Aspergillus*/seed interactions."
2007. NSF Major Research Instrumentation Award: $208,067. "MRI: Acquisition of instrumentation supporting quantitative spectral and image analysis." Co-PIs
2007-2010. NSF (unpaid collaborator): $738,577. Funded summer internship for WWU student R. Blumhagen. Sequencing and comparative analysis of seven *Pseudomonas* spp.

PEER-REVIEWED PUBLICATIONS

WWU undergraduate student authors underlined
[1]Joint first authorship

2017. Brodhagen, M., Goldberger, J.R., Hayes, D.G., Inglis, D.A., Marsh, T.L., and Miles, C. Policy considerations for limiting unintended residual plastic in agricultural soils. Environmental Science and Policy **69:** 81-84.
2015. Brodhagen, M., Peyron, M., Miles, C., and Inglis, D.A. Biodegradable plastic agricultural mulches and key features of microbial degradation. Applied Microbiology and Biotechnology **99**(3): 1039-1056. DOI 10.1007/s00253-014-6267-5

2014. Moore-Kucera, J., Cox, S.B., Peyron, M., Bailes, G., Kinloch, K., Karich, K., Miles, C., Inglis, D.A., and **Brodhagen, M**. Native soil fungi associated with compostable plastics in three contrasting agricultural settings. Applied Microbiology and Biotechnology **98**(14): 6467-6485. DOI: 10.1007/s00253-014-5711-x

2014. Li, C.H., Moore-Kucera, J., Lee, J., Corbin, A., **Brodhagen, M**., Miles, C., and Inglis, D. Effects of Biodegradable Mulch on Soil Quality. Applied Soil Ecology **79**: 59-69.

2013. Bailes, G[1]., Lind, M[1]., Ely, A[1]., Powell, M[1]., Moore-Kucera, J., Miles, C., Inglis, D., and **M. Brodhagen**. Isolation of native soil microorganisms with potential for breaking down biodegradable plastic films used in agriculture. Journal of Visualized Experiments, http://www.jove.com/video/50373

2012. Affeldt, K.J., **Brodhagen, M.**, and Keller, N.P. *Aspergillus* oxylipin signaling and quorum sensing pathways depend on G protein-coupled receptors. Toxins **4**(9): 695-717.

2009. Gao, X**[1]**., **Brodhagen, M[1]**., Isakeit, T., Horowitz Brown, S., Göbel, C., Betran, J., Feussner, I., Keller, N.P., and Kolomiets, M. Inactivation of the lipoxygenase *ZmLOX3* increases susceptibility of maize to *Aspergillus* spp. Molecular Plant-Microbe Interactions **22**(2): 222-231.

2007. Brodhagen, M[1]., Tsitsigiannis, D.I**[1]**. , Hornung, E., Goebel, C., Feussner, I., and N.P. Keller. Reciprocal oxylipin-mediated cross-talk in the *Aspergillus* - seed pathosystem. Molecular Microbiology **67**(2): 378–391.

2006. Brodhagen, M., and N.P. Keller. Signaling pathways connecting mycotoxin production and sporulation. Molecular Plant Pathology, **7**(4): 285-301.

2005. Brodhagen, M., Paulsen, I., and Loper, J.E. Reciprocal regulation of pyoluteorin production with membrane transporter gene expression in *Pseudomonas fluorescens* Pf-5. Applied and Environmental Microbiology **71**(11): 6900-6909.

2004. Brodhagen, M., Henkels, M. and Loper, J.E. Positive autoregulation and signaling properties of pyoluteorin, an antibiotic produced by the biological control organism *Pseudomonas fluorescens* Pf-5. Applied and Environmental Microbiology **70**(3): 1758-1766.

2001. Loper, J.E., Whistler, C.A., Henkels, M.D., Stockwell, V.O., **Brodhagen, M**., and N. Chaney. Molecular approaches for elucidating the *in situ* activities of bacterial biological control agents. *In:* S.H. De Boer (ed.). Plant Pathogenic Bacteria. Kluwer Academic Publishers. The Netherlands. pp. 56-59.

1996. Ellis, D., Zeldin, E., **Brodhagen, M**., Russin, W., and B. McCown. Taxol production induced in *Taxus* spp. nodule cultures. Journal of Natural Products **59**(3): 246-250.

1995. Russin, W., Ellis, D., Gottwald, J., Zeldin, E., **Brodhagen, M**., and R. Evert. Immunocytochemical localization of taxol in *Taxus cuspidata*. International Journal of Plant Science **156**(5): 668-678.

1993. Ellis, D., Zeldin, E., Russin, W., **Brodhagen, M**., and B. McCown. Immunological localization and taxane production in shoot cultures of *Taxus* spp. *In*: Proceedings of the International Yew Resources Conference.

PEER-REVIEWED PUBLICATIONS IN PROGRESS

Graduate student authors marked with asterisk

2021. Cofer, T.*, Peyron, M., Zinkgraf, M., **Brodhagen, M.** Bioactivity of breakdown products of a biodegradable plastic, polybutylene adipate terephthalate.

2021. Hutchinson, C.*, Miner, B., Schaefer, A., **Brodhagen, M.** Epidermal bacteria from *Pisaster ochraceus* with and without sea star wasting disease: roles for tissue degradation and quorum sensing?

BOOK CHAPTERS AND OTHER PUBLICATIONS

2013. Miles, C., **Brodhagen, M.,** Hayes, D., Inglis, D., and Wszelaki, A. Comments to the USDA regarding AMS-NOP-13-011; NOP-13-01PR; RIN 0581-AD32; Section 205.2 and 205.601 NOP Proposed Amendments to the National List of Allowed and Prohibited Substances (Crops and Processing)

2011. Miles, C., Hayes, D., **Brodhagen, M.**, Lee, J., Wszelaki, A., Moore-Kucera, J., Wallace, R., Marsh, T., and D. Inglis. Plastic mulches, biodegradeable alternatives, China and US *In:* Steenbergen, F. van, Tuinhof A., and L. Knoop (*eds.*) Transforming Landscapes, Transforming Lives: The Business of Sustainable Water Buffer Management. Wageningen, The Netherlands: 3R Water Secretariat

INVITED PROFESSIONAL TALKS

WWU students underlined.

2020. Brodhagen, M. Biodegradable Plastics in Soils: Implications for *Aspergillus* and Food Safety. Invited speaker and panelist. International Association for Food Protection annual meeting, Cleveland, OH.

2019. Brodhagen, M. Biodegradable plastics in soils: solution or pollution? Invited speaker and panelist. International Association for Food Protection annual meeting, Louisville, KY.

2018. Hutchinson, C**.,** Miner, B., and Schaefer, A., and **Brodhagen, M**. Characterization of potential bacterial pathogens and quorum sensing activity in *Pisaster ochraceus* sea stars suffering from sea star wasting disease. 9th International Symbiosis Society Congress, Corvallis, OR.

2015. Brodhagen, M. and Peyron, P. (co-presenters) Biodegradable mulch films in agriculture as a potential source of terrestrial microplastic. 17th International Symposium on Toxicity Assessment, Bellingham, WA

2014. Brodhagen, M. Predictive aflatoxin testing via loop-mediated isothermal amplification. PATH, Seattle, WA.

2013. Brodhagen, M. Native soil fungi associated with compostable plastics. American Society for Microbiology Northwest Division meeting, Seattle, WA.

2012. Brodhagen, M. Espionage and counter-intelligence in *Aspergillus* and aflatoxin. American Society for Microbiology Northwest Division meeting, Seattle, WA.

2011. Brodhagen, M. *Aspergillus*, aflatoxins, and oxylipins: adventures of a cereal killer. Guest lecture in graduate course "Plant-Microbe Interactions, College of Forest Resources, UW, Seattle, WA.

2011. Brodhagen, M. *Aspergillus*, aflatoxins, and oxylipins: adventures of a cereal killer. Biology Department, University of Puget Sound, Tacoma, WA.

2011. Brodhagen, M. *Aspergillus,* aflatoxin, and oxylipins. Invited seminar, Department of Botany and Plant Pathology, Oregon State University, Corvallis, OR.

2010. Brodhagen, M. *Aspergillus*, aflatoxins, and oxylipins. American Society for Microbiology Northwest Division meeting, Seattle, WA.

2010. Brodhagen, M. Host-pathogen crosstalk: *Aspergillus,* aflatoxin, and oxylipins. Invited seminar, Texas A&M University, Department of Plant Pathology, College Station, TX.

2008. K. Fowler, C. Lappala, N. P. Keller, and **M. L. Brodhagen**. Characterization of Oxylipin Perception in *Aspergillus flavus.* American Society for Microbiology 108th General Meeting, June 1-4, Boston, MA. ***(Invited student talk)***

2007. Brodhagen, M. Oxylipins act as signaling molecules and mediate the *Aspergillus*-seed dialogue. 2007 NCCC-173 meeting: "Genetics and Biochemistry of Plant-Fungal Interactions," Friday Harbor, WA.

2007. Brodhagen, M. Oxylipin signals mediate cross talk in the *Aspergillus*-seed pathosystem. Department of Plant Pathology, Washington State University.

2007. Brodhagen, M. and N.P. Keller. Oxylipin signals mediate cross talk in the *Aspergillus*-seed pathosystem. 107th General Meeting of the American Society for Microbiology, Toronto, Ontario

2005. Brodhagen, M., Tsitsigiannis, D., and N.P. Keller. Eavesdropping on the conversation: *Aspergillus*-seed cross talk mediated by oxylipins. American Phytopathological Society Annual Meeting, Austin, Texas.

2004. Brodhagen, M., Tsitsigiannis, D., and N.P. Keller. Role of dioxygenases in fungal sporulation. 2nd International Symposium on Fusarium Head Blight, Orlando, FL.

CONFERENCE PROCEEDINGS (POSTERS)

WWU undergraduate students underlined; graduate student denoted with asterisk.

2016. DeSitter, T.*, **Brodhagen,** M., and J.C. Young. Phenylalanine ammonia lyase pathway components contribute to resistance of *Arabidopsis thaliana* seeds to *Aspergillus* infection. American Society for Phytopathology Pacific Division Meeting, La Conner, WA.

2016. Brodhagen, M., Young, J.C., Kelsey, R., Batson, A., Levy, J., McCollum, J, and Kinash, B. Volatile signals from non-host plants deter growth and aflatoxin production by the fungus *Aspergillus*. XVII International Congress for Molecular Plant-Microbe Interactions, Portland, OR.

2015. Brodhagen, M., DeSitter, T.*, Batson, A., Levy, J., Cranny, Z., Lahman, M., and J.C. Young. Phenylalanine ammonia lyase pathway components contribute to resistance of *Arabidopsis thaliana* seeds to *Aspergillus* infection. American Society for Phytopathology Annual Meeting, Pasadena, CA.

2014. Brodhagen, M. Native soil fungi associated with compostable plastics. American Society for Microbiology Annual Meeting, Boston, MA.

2012. Peterson, E., Kelsey, R., Shaw, D., Manter, D., and **M. Brodhagen**. Moisturin and plant extracts reduce infection and sporulation of *Phytophthora ramorum* on rhododendron. 2012 Western International Forest Disease Work Conference, Tahoe City, CA.

2012. Schmitt, K.J., **Brodhagen, M**., and N.P. Keller. An *Aspergillus nidulans* GPCR, GprD, responds to oxylipin signals. Keystone Symposia meeting on Fungal Pathogens: From Basic Biology to Drug Discovery, Santa Fe, NM.

2011. Moore-Kucera, J., Davinic, M., Fultz, L., Lee, J., Miles, C.A., **Brodhagen, M.,** Cowan, J., Wallace, R.W., Wszelaki, A., Martin, J., Roozen, J., Gundersen B., and D.A. Inglis. Biodegradable Mulches: Short-term degradability and impacts on soil health. HortScience 46(10):S68.

2010. Griffith, S.M., Whittaker, G.W., Mueller-Warrant, G.W., Banowetz, G.M., and **M. Brodhagen**. An integrated landscape approach to resolving land management decisions. The Fourth Interagency Conference on Research in the Watersheds, Fairbanks, AK.

2010. Inglis, D., Miles, C., Belasco, E., **Brodhagen, M**., Corbin, A., Espinola-Arredondo, A., Hayes, D., Jones, R., Lee, R., Leonas, K., Liu, H., Marsh, T., Moore-Kucera, K., Wadsworth, L., Wallace, R., Walters, T., and A. Wszelaki. Biodegradable mulches for specialty crops produced under protective covers. HortScience 45(8):S208-S209.

2009. Stevenson M.J., Mosher M.J., Schanfield M.S., and **Brodhagen M.** The evolutionary ecology of seed and nut allergies. American Journal of Human Biology 21(2): 270.

2009. Miles, C., Beus, C., Corbin, A., Wallace, R., Wszelaki, A., Saez, H., Walters, T., Leonas, K., **Brodhagen, M.**, Hayes, D. and D. Inglis. Research and extension priorities to ensure adaptation of high tunnels and biodegradable plastic mulch in the U.S. Proc. Agric. Plastics Congress, College Station, PA.

2007. Kolomiets, M., Gao, X., Christensen, S., Park, Y.-S., Isakeit, T., Betran, J., Mayfield, K., Shim, W.-B., Engelberth, J., Göbel, C., **Brodhagen, M**., Feussner, I., and N.P. Keller. Maize lipoxygenases govern production of conidia and mycotoxins by *Aspergillus flavus* and *Fusarium verticillioides*. Multi Crop Aflatoxin/Fumonisin Elimination and Fungal Genomics Workshop, Atlanta, GA.

2007. Tsitsigiannis, D.I., **Brodhagen, M.,** and N.P. Keller. Oxylipins act as signaling molecules and mediate the *Aspergillus*-seed dialogue. XIII International Congress for Molecular Plant-Microbe Interactions, Sorrento, Italy.

2006. Gao, X., Isakeit, T., Betrán, J., Ni, X., Starr, J., Göbel, C., **Brodhagen, M**., Feussner, I., Keller, N., Engelberth, J., Tumlinson, J., and M. Kolomiets. A maize 9-lipoxygenase is required for resistance to aflatoxin contamination, insects, and nematodes. 6th Annual Fungal Genomics Workshop; 7th Annual Fumonisin Elimination Workshop, and 19th Annual Aflatoxin Elimination Workshop. Fort Worth, TX.

2003. Brodhagen, M., Henkels, M.D., and J.E. Loper. Regulation of the antibiotic pyoluteorin in *Pseudomonas fluorescens* Pf-5 includes positive autoregulation, and repression by 2,4-diacetylphloroglucinol and pyrrolnitrin. American Phytopathological Society Annual Meeting, Charlotte, NC.

2002. Press, C., Adair, N., **Brodhagen, M**., and J.E. Loper. Comparison of gene expression profiles in the *Pseudomonas fluorescens* antibiotic biosynthetic region using an oligonucleotide macroarray. Oregon State University Center for Gene Research and Biotechnology Annual Fall Retreat, Corvallis, OR.

2001. Brodhagen, M., and J.E. Loper. Positive autoregulation of pyoluteorin production by *Pseudomonas fluorescens* Pf-5. *In:* Abstracts of the *Pseudomonas* Meeting, Brussels, Belgium, p. PS18.

2000. Brodhagen, M., Chaney, N., Taormina, C., and J.E. Loper. Pyoluteorin Production by *Pseudomonas fluorescens* Pf-5 Requires PltH, a TetR/AcrR Homolog Linked to the Antibiotic Biosynthetic Gene Cluster. Annual Meeting of the American Society for Microbiology, Los Angeles, CA.

PROFESSIONAL AFFILIATIONS

2018-present. International Symbiosis Society.
2015-2017. International Society for Molecular Plant-Microbe Interactions.
2012-present. Advanced Materials Science and Engineering Center (AMSEC), WWU
1998-present. American Society for Microbiology
1998-present. American Phytopathological Society
1994-present. American Association for the Advancement of Science

SERVICE

DEPARTMENTAL (BIOLOGY DEPARTMENT, WWU)

Chairships:

2019-2020	**Chair,** mentoring committee (Matt Zinkgraf)
2018 – present	**Chair,** Curriculum committee
2014-2016	**Chair,** Limited Term Lecturers committee

Mentoring:

2019 – present	Mentoring committee (Shawn Arellano)
2018 – present	Mentoring committee (Matt Zinkgraf)
2015-2019; 2020-21	Mentoring committee (Suzanne Lee)
2014-2016	Mentoring committee (Lina Dahlberg)

Search committees:

2016-2017	Molecular Evolutionary Biologist/Ecologist
2016	Biology Instructional Lab Technician
2016	Instructor, limited term
2013	Office assistant
2008	Cell/Molecular Biologist
2007	Biology Technician WWU

Other:

2018-2020	Fraser Fund faculty research proposal review committee
2019 – present	Executive committee
2018-2019	Space committee
2014-2016	Assessment committee
2014-2015	Research Associate Review committee
2013-2016	Biology club co-advisor
2013-2016	Various focus groups for BIOL 205 and 204/5/6: core competencies, learning progressions, professional learning community
2013 – 2015; 2018	Transitions Advisor, WWU.
2011-2014	Limited Term Lecturers committee
2011-2014	Scholarship committee
2007 – present	Curriculum committee (except for 2010-12)
2006-present	Seminar host (13 speakers)
2006-2013	Seminar committee
2006-2010	Library committee

COLLEGE and UNIVERSITY (COLLEGE OF SCIENCE & ENGINEERING, WWU)

2017 – present	Scientific Technology Services Advisory Council
2015-present	Kaiser-Borsari Scholarship Selection Committee, AMSEC, WWU.
2018	Task force to select replacement SEM for Tescan
2017 – 2018	Comprehensive Laboratory Inspection Program volunteer
2015 – 2017	Scientific Technology Services Strategic Planning committee. CSE, WWU.
2015	Promotion and Tenure dossier review for Huxley College of the Environment
2014 – 2016	Committee for Undergraduate Education**,** WWU.
2012-13	CAP committee, CSE, WWU
2008-2016	Scholars Week Committee, WWU
2008-2010	Ad hoc Chemistry/Biology committee to improve shared curricula
2006-2007	Faculty Fellow (Center for Service Learning), WWU
1998-2002	Convocations and Lectures Committee, OSU.

PROFESSIONAL

Science policy / service to US and Canadian governments:

2015	Consultant to the PSL Crops Working Group, Canadian Organic Standards, on national policies for the use of biodegradable mulches in organic agriculture
2013	Co-author, recommendation to the USDA National Organic Program regarding the use of biodegradable mulches in organic agriculture**.**
2012-2017	Consultant for a five-year US Department of Agriculture CRIS project

Science communication:

2017	Expert advisor for Newsweek writer Doug Main http://www.newsweek.com/scientists-accidentally-discover-caterpillars-can-eat-plastic-588878

Grant review panels:

2020	Ad hoc reviewer for National Environment Research Council (United Kingdom) Highlight Topic: Biodegradable Plastics as Emerging Environmental Pollutants.
2020	NSF 1440/Environmental Engineering program Panel P201418; review of unsolicited proposals submitted to core program as well as proposals in response to Dear Colleague Letter NSF 20-050: Critical Aspects of Sustainability Micro- and Nano-Plastics
2018	Ad hoc reviewer for National Institute of Food and Agriculture's Exploratory Research program of the Agriculture and Food Research Initiative.
2018	Scientific Merit Review Panel for 2018 US Department of Agriculture Specialty Crops Research Initiative/Emergency Citrus Disease Research and Extension project applications
2015	External reviewer for grants submitted to the New Zealand Ministry of Business, Innovation and Employment Investment Round.

External reviews for personnel:

Peer reviewer for two senior colleagues in my discipline – one for a lifetime achievement award (National Research Foundation, South Africa), and one for promotion (US Forest Service).

Peer review, manuscripts:

2020	Editor for special issue of Frontiers in Environmental Science (topic: Synergies between microplastics and pesticides in the terrestrial environment)
2013-2018	Peer reviewer for manuscripts spanning seventeen different journals since arriving at WWU. These include, in the past five years: Science of the Total Environment, The Biological Bulletin, Environmental Pollution, PLOS Genetics, Frontiers in Microbiology, Sustainability, Applied Soil Ecology, Environmental Science and Technology, Journal of Applied Microbiology, Plant Science, Plant Disease, Letters in Applied Microbiology, Fungal Biology, and Fungal Genetics and Biology.

Peer review, textbooks:

2019	Peer reviewer for cell biology textbook (Essential Cell Biology, 5th Ed., Alberts et al. Garland Science.)
2014	Peer reviewer for cell biology textbook (Essential Cell Biology, 4th Ed., Alberts et al. Garland Science.)
2011	Peer reviewer for microbiology textbook (Microbiology: An evolving science, 2nd Ed., Slonczewski, JL and Foster. JW. WW Norton and Company, Inc. New York.)**Other:**

Professional Committees:

2003-2006	Bacteriology Committee, American Phytopathological Society

COMMUNITY

Invited public talks:

2013. Brodhagen, M. The (chemical) language of plants: the sequel. October monthly meeting, Master Gardeners Association of British Columbia, Vancouver, BC, Canada.

2013. Brodhagen, M. The (chemical) language of plants. Spring Seminar, Master Gardeners Association of British Columbia, Burnaby, BC, Canada.

2013. Brodhagen, M. Tainted food: the story of aflatoxin. Science and the UniverCity community science lecture series, College of Science and Technology, Western Washington University. City Hall, Bellingham, WA.

2012. Brodhagen, M. The chemical language of plants. Whatcom County 18th Annual Master Gardener Advanced Training, Bellingham, WA.

Public outreach:

2015, 2018, 2019. Symbiosis symposium. Organized poster sessions in which BIOL 497F and BIOL 597F students presented their work to local high school students, interested WWU Biology students, friends, and family.