

CURRICULUM VITAE - GWYN A. BEATTIE
ROBERT EARLE BUCHANAN DISTINGUISHED PROFESSOR OF
BACTERIOLOGY FOR RESEARCH AND NOMENCLATURE
DEPARTMENT OF PLANT PATHOLOGY & MICROBIOLOGY

AREAS OF INTEREST

My research examines the genomics and ecology of plant-associated microbes to better understand the factors driving successful plant colonization and the many impacts that microbes can have on plant health. Current projects are exploring the role of the rhizosphere microbiome in influencing the water use efficiency of plants, the roles of light-sensing and environmental stress in the virulence and ecological fitness of the foliar pathogen *Pseudomonas syringae* pv. *syringae* during both phyllosphere and spermosphere colonization, and the genetic factors that influence the host preference and pathogenicity of the vascular pathogen *Erwinia tracheiphila*. My research group utilizes a wide range of experimental tools, including functional genomics and transcriptomics of bacterial pathogens, replicon-based profiling of bacterial and fungal communities, and biochemical and molecular genetic tools to better understand the mechanisms by which individual genes, proteins and signaling pathways influence bacterial interactions with plants, other microbes, and the environment.

EDUCATION

Carleton College, Northfield, MN	BA in Chemistry	1985
University of Wisconsin-Madison	PhD in Molecular and Cellular Biology	1991
University of California-Berkeley	Postdoctoral Research in Microbial Ecology	1991-1995

APPOINTMENTS

2010-present	Professor, ISU, Dept of Plant Pathology & Microbiology
2003-2010	Associate Professor, ISU, Dept of Plant Pathology
2003-2006	Chair, Interdepartmental Microbiology Graduate Program
2002-2003	Assistant Professor, Dept of Plant Pathology, ISU
1995-2002	Assistant Professor, Dept of Microbiology (dept was terminated), ISU

AWARDS AND HONORS

2006-present	Robert Earle Buchanan Distinguished Professor of Bacteriology for Research and Nomenclature (Endowed Chair), ISU
2010	College of Agriculture and Life Sciences Outstanding Achievement in Teaching Award
2005	Wakonse Fellow

PROFESSIONAL SERVICE

Editorial Positions:

Senior Editor, *Molecular Plant-Microbe Interactions* (2010-2015)
Editorial Board, *Applied and Environmental Microbiology* (2003-2014)

Federal Grant Review Panels:

Panelist, NSF-IOS Symbiosis, Defense and Self-Recognition Program
Panel Manager, USDA-NRI Microbial Associations with Plants (2008)
Panelist, USDA-NRI Biology of Plant-Microbe Associations (3 times)
Panelist, NSF- Bread Program

Panelist, NSF-USDA Joint Program in Microbial Genome Sequencing

Service to Professional Societies in last 10 years:

Member, American Phytopathological Society (APS) Public Policy Board (2014-present)
Invited participant, APS Thought Leaders Meeting (2013)
Panel member, APS competition for “The Schroth Faces of the Future Symposium” (2012)
Invited participant, American Academy of Microbiology Colloquium on “How microbes can help feed the world”, Washington, D.C. (2012)
Chair, APS Phyllosphere Committee (2008-2009)
Chair, APS Bacteriology Committee (2003-2004)
Member, APS Bacteriology and Phyllosphere Committees (2007-2008)

Service at Professional Conferences in last 10 years:

Organizing Committee, 10th International Symposium on Phyllosphere Microbiology, Ascona, Switzerland, July 19-23, 2015
Steering Committee, Phytobiomes 2015: Designing a New Paradigm for Crop Improvement, Washington DC, June 29-July 2, 2015
Session Co-organizer on “Understanding Phytobiomes to Improve Agricultural Productivity”, APS meeting, Minneapolis, MN, August 9-13, 2014.
Session Organizer, 14th International Society for Microbial Ecology, Copenhagen, Denmark, August 19-24, 2012
Judge for the Graduate Student Oral Presentation Competition, North Central American Society for Microbiology Meeting, Des Moines, IA (2011)
Organizing Committee, 9th International Symposium on the Microbiology of Aerial Plant Surfaces, Corvallis, Oregon, August 14-18, 2010
Judge for the Graduate Student Oral Presentation Competition, North Central American Phytopathological Society Meeting, Ames, IA (2009)
Invited participant, APS 101: Early Career Professionals Informational Social, American Phytopathological Society Conference, San Diego, CA (2007)

TEACHING

Bacterial-Plant Interactions (Pl P 477/577, 3 cred, Alt Spr)
Biology of Microorganisms (Micro 302, 3 cred, Alt Fall)
Microbial Ecology and Environmental Monitoring (Micro 556, 1 cred, Spr)
Responsible Conduct of Research for Faculty, Postdocs and Staff (0 Cred, Alt Fall)

MENTORING

Advisor (current/career total): Post-doctoral researchers (1/6), Ph.D. students (3/7), M.S. (0/3), Undergraduate researchers and interns (37), High school teacher and student interns (9)
Mentor, ISU Preparing Future Faculty Program (4 graduate students and 2 post-docs since 2006)
Faculty co-mentor, Assistant Professor of Plant Pathology (2004-2010)
Peer Mentor Coordinator for new faculty, College of Agriculture and Life Science (since 2007)

PEER-REVIEWED PUBLICATIONS (38)

Saalau Rojas, E., J. C. Batzer, **G. A. Beattie**, S. J. Fleischer, L. R. Shapiro, M. A. Williams, R. Bessin, B. D. Bruton, T. J. Boucher, L. C. H. Jesse and M. L. Gleason. 2015. Bacterial wilt of cucurbits: Resurrecting a classic pathosystem. *Plant Disease (in revision)*.

- Yu, X., S. P. Lund, J. W. Greenwald, A. H. Records, R. A. Scott, D. Nettleton, S. E. Lindow, D. C. Gross and **G. A. Beattie**. 2014. Transcriptional analysis of the global regulatory networks active in *Pseudomonas syringae* during leaf colonization. *mBio* 5:e01683-14. doi: 0.1128/mBio01683-14
- Freeman, B. C., C. Chen, X. Yu, L. Nielsen, K. Peterson and **G. A. Beattie**. 2013. Physiological and transcriptional responses to osmotic stress of two *Pseudomonas syringae* strains that differ in epiphytic fitness and osmotolerance. *Journal of Bacteriology* 195:4742-4752. doi: 10.1128/JB.00787-13
- Chen, C., S. Li, D. R. McKeever and **G. A. Beattie**. 2013. The widespread plant-colonizing bacterial species *Pseudomonas syringae* detects and exploits an extracellular pool of choline in hosts. *The Plant Journal*. 75:891-901. doi: 10.1111/tpj.12262
- Wu, L, R. S. McGrane and **G. A. Beattie**. 2013. Light regulation of swarming motility in *Pseudomonas syringae* integrates signaling pathways mediated by a bacteriophytochrome and a LOV protein. *mBio* 3:e00334-13. doi: 10.1128/mBio.00334-13
- Li, S., X. Yu, **G. A. Beattie**. 2013. Glycine betaine catabolism contributes to *Pseudomonas syringae* tolerance to hyperosmotic stress by relieving betaine-mediated suppression of compatible solute synthesis. *Journal of Bacteriology* 10:2415-2423. doi: 10.1128/JB.00094-13
- Yu, X., S. P. Lund, R. A. Scott, J. W. Greenwald, A. H. Records, D. Nettleton, S. E. Lindow, D. C. Gross, and **G. A. Beattie**. 2013. Transcriptional responses of *Pseudomonas syringae* to growth in epiphytic versus apoplastic leaf sites. *Proc Natl Acad Sci USA*, 110:E425-E434. doi: 10.1073/pnas.1221892110
- Beattie, G. A.** 2011. Water relations in the interaction of foliar bacterial pathogens with plants. *Annu Rev Phytopathol* 49:533-555. doi: 10.1146/annurev-phyto-073009-114436
- Malek, A. A., C. Chen, M. J. Wargo, **G. A. Beattie**, and D. A. Hogan. 2011. Roles of three transporters, CbcXWV, BetT1 and BetT3, in *Pseudomonas aeruginosa* choline uptake for catabolism. *J Bacteriol*, 193:3033-3041. doi: 10.1128/JB.00160-11
- Freeman, B. F., C. Chen and **G. A. Beattie**. 2010. Identification of the trehalose biosynthetic loci of *Pseudomonas syringae* and their contribution to fitness in the phyllosphere. *Environ Microbiol*, 12:1486-1497 doi: 10.1111/j.1462-2920.2010.02171.x
- Chen, C., A. A. Malek, M. J. Wargo, D. A. Hogan, and **G. A. Beattie**. 2010. The ATP-binding cassette transporter Cbc (choline/betaine/carnitine) recruits multiple substrate-binding proteins with strong specificity for distinct quaternary ammonium compounds. *Mol Microbiol* 75:29-45. Doi: 10.1111/j.1365-2958.2009.06962.x
- Freeman, B. C. and **G. A. Beattie**. 2009. Bacterial growth restriction during host resistance to *Pseudomonas syringae* is associated with leaf water loss and localized cessation of vascular activity in *Arabidopsis thaliana*. *Mol Plant-Microbe Interact* 22:857-867. doi: 10.1094/MPMI-22-7-0857
- Sandhu, A., L. J. Halverson, and **G. A. Beattie**. 2009. Identification and genetic characterization of phenol-degrading bacteria from leaf microbial communities. *Microb Ecol* 57:276-285. doi: 10.1007/s00248-008-9473-9
- Chen, C. and **G. A. Beattie**. 2008. *Pseudomonas syringae* BetT is a low affinity choline transporter that is responsible for superior osmoprotection by choline over glycine betaine. *J Bacteriol* 190:2717-2725. doi: 10.1128/JB.01585-07
- Freeman, B. C. and **G. A. Beattie**. 2008. An overview of plant defenses against pathogens and herbivores. *The Plant Health Instructor*. doi: 10.1094/PHI-I-2008-0226-01.
- Chen, C. and **G. A. Beattie**. 2007. Characterization of the osmoprotectant transporter OpuC from *Pseudomonas syringae* and demonstration that cystathionine- β -synthase domains are required

- for its osmoregulatory function. *Journal of Bacteriology*, 189:6901-6912. doi: 10.1128/JB.00763-07
- Beattie, G. A.** and Seibel, J. S. 2007. Uptake and localization of gaseous phenol and *p*-cresol in plant leaves. *Chemosphere*, 68:528-536. doi: 10.1016/j.chemosphere.2006.12.070
- Carter, C., R. Healey, N. M. O'Tool, S. S. M. Naqvi, G. Ren, S. Park, **G. A. Beattie**, H. T. Horner, and R. W. Thornburg. 2007. Tobacco nectaries express a novel NADPH oxidase implicated in the defense of floral reproductive tissues against microorganisms. *Plant Physiology*, 143: 389-399. doi: 10.1104/pp.106.089326
- Sandhu, A., L. J. Halverson and **G. A. Beattie**. 2007. Bacterial degradation of airborne phenol in the phyllosphere. *Environmental Microbiology*, 9:383-392; Highlighted in *Nature Reviews in Microbiology* 4:880-881. doi: 10.1111/j.1462-2920.2006.01149.x
- Wright, C. A. and **G. A. Beattie**. 2005. Bacterial species specificity in *proU* osmoinducibility and *nptII* and *lacZ* expression. *Journal of Molecular Microbiology and Biotechnology* 8:201-208. doi: 10.1159/000086701
- Wright, C. A. and **G. A. Beattie**. 2004. *Pseudomonas syringae* pv. *tomato* cells encounter inhibitory levels of water stress during the hypersensitive response of *Arabidopsis thaliana*. *Proceedings of the National Academy of Sciences USA* 101:3269-3274. doi: 10.1073/pnas.0400461101
- Casavant, N. C., D. Thompson, **G. A. Beattie**, G. J. Phillips, and L. J. Halverson. 2003. Use of a site-specific recombination-based biosensor for detecting bioavailable toluene and related compounds on roots. *Environmental Microbiology* 5:238-249. doi: 10.1046/j.1462-2920.2003.00420.x
- Sabaratnam, S. and **G. A. Beattie**. 2003. Differences between *Pseudomonas syringae* pv. *syringae* and *Pantoea agglomerans* in epiphytic versus endophytic colonization of leaves. *Applied and Environmental Microbiology* 69:1220-1228. doi: 10.1128/AEM.69.2.1220-1228.2003
- Marcell, L. M. and **G. A. Beattie**. 2002. The effect of leaf surface waxes on leaf colonization by *Pantoea agglomerans* and *Clavibacter michiganensis*. *Molecular Plant-Microbe Interactions* 15:1236-1244. doi: 10.1094/MPMI.2002.15.12.1236
- Axtell, C. A. and **G. A. Beattie**. 2002. Construction and characterization of a *proU-gfp* transcriptional fusion that measures water availability in a microbial habitat. *Applied and Environmental Microbiology* 68:4604-4612. doi: 10.1128/AEM.68.9.4604-4612.2002
- Beattie, G. A.** and L. M. Marcell. 2002. Comparative dynamics of adherent and non-adherent bacterial populations on maize leaves. *Phytopathology* 92:1015-1023. doi: 10.1094/PHYTO.2002.92.9.1015
- Casavant, N. C., **G. A. Beattie**, G. Phillips, and L. J. Halverson. 2002. Site-specific recombination-based genetic system for reporting transient or low-level gene expression. *Applied and Environmental Microbiology* 68:3588-3596. doi: 10.1128/AEM.68.7.3588-3596.2002
- Beattie, G. A.** and L. M. Marcell. 2002. Effect of alterations in cuticular wax biosynthesis on the physicochemical properties and topography of maize leaf surfaces. *Plant Cell and Environment* 25:1-16. doi: 10.1046/j.0016-8025.2001.00804.x
- Beattie, G. A.** and S. E. Lindow. 1999. Bacterial colonization of leaves: a spectrum of strategies. *Phytopathology* 89:353-359. doi: 10.1094/PHYTO.1999.89.5.353
- Andersen, G. L., **G. A. Beattie** and S. E. Lindow. 1998. Molecular characterization and sequence of a methionine biosynthetic locus from *Pseudomonas syringae*. *Journal of Bacteriology* 180:4497-4507.
- Beattie, G. A.** and S. E. Lindow. 1995. The secret life of foliar bacterial pathogens on leaves. *Annual Review of Phytopathology* 33:145-172. doi: 10.1146/annurev.py.33.090195.001045

- Beattie, G. A.** and S. E. Lindow. 1994. Survival, growth and localization of epiphytic fitness mutants of *Pseudomonas syringae* on leaves. *Applied and Environmental Microbiology* 60:3790-3798.
- Beattie, G. A.** and S. E. Lindow. 1994. Comparison of the behavior of epiphytic fitness mutants of *Pseudomonas syringae* under controlled and field conditions. *Applied and Environmental Microbiology* 60:3799-3808.
- Lindow, S. E., G. Andersen and **G. A. Beattie**. 1993. Characteristics of insertional mutants of *Pseudomonas syringae* with reduced epiphytic fitness. *Applied and Environmental Microbiology* 59:1593-1601.
- Beattie, G. A.** and J. Handelsman. 1993. Evaluation of a strategy for identifying nodulation competitiveness genes in *Rhizobium leguminosarum* biovar *phaseoli*. *Journal of General Microbiology* 139:529-538.
- Beattie, G. A.** and J. Handelsman. 1989. Quantitative comparison of the laboratory and field competitiveness of *Rhizobium leguminosarum* biovar *phaseoli*. *Applied and Environmental Microbiology* 55:2755-2761.
- Beattie, G. A.** and J. Handelsman. 1989. A rapid method for the isolation and identification of *Rhizobium* from root nodules. *Journal of Microbiological Methods* 9:29-33.

PUBLISHED BOOK CHAPTERS

- Beattie, G. A.**, C. Chen, L. Nielsen and B. C. Freeman. 2015. Interstrain variation in the physiological and transcriptional responses of *Pseudomonas syringae* to osmotic stress. In: F. de Bruijn (ed), *Stress and Environmental Control of Gene Expression in Bacteria*, Wiley-Blackwell Publishers. (In press)
- Beattie, G. A.** 2006. Plant-associated bacteria: Survey, molecular phylogeny, genomics and recent advances, pp. 1-56. In S. S. Gananamanickan (ed), *Plant-Associated Bacteria*. Springer, The Netherlands.
- Beattie, G. A.** and C. A. Axtell. 2002. The use of a *proU-gfp* transcriptional fusion to quantify water stress on the leaf surface, pp. 235-240. In: S. A. Leong, C. Allen, and E. W. Triplett (eds.), *Biology of Plant-Microbe Interactions*, vol. 3. International Society for Plant-Microbe Interactions, St. Paul, MN.
- Beattie, G. A.** 2002. Leaf surface waxes and the process of leaf colonization by microorganisms, pp. 3-26. In: S. E. Lindow, E. I. Hecht-Poinar and V. J. Elliott (eds.), *Phyllosphere Microbiology*. American Phytopathological Society Press, MN.
- Beattie, G. A.** and S. E. Lindow. 1994. Epiphytic fitness of phytopathogenic bacteria: physiological adaptations for growth and survival, pp. 1-27. In: J. L. Dangel (ed.), *Bacterial Pathogenesis of Plants and Animals: Molecular and Cellular Mechanisms*. Springer-Verlag, NY.

NON-REFEREED PUBLICATIONS

- Beattie, G.A.**, D. Desveaux and S. Kang. 2015. Focus on The Good, the Bad and the Unknown: Genomics-Enabled Discovery of Plant-Associated Microbial Processes and Diversity. *Mol. Plant-Microb. Interact.* 28:211 (<http://dx.doi.org/10.1094/MPMI-28-03-0211>)
- Robertson, A. and **G. Beattie**. 2011. Survival of the Goss's Wilt Bacterium and Management Implications. Integrated Crop Management News. Pub 8-22-2011. <http://www.extension.iastate.edu/CropNews/2011/0822robertson.htm>
- Beattie, G. A.** 2003. Leaf cuticle, pp. 635-637. In: R. M. Goodman (ed.), *Encyclopedia of Plant and Crop Science*. Marcel Dekker, Inc., NY.

- Beattie, G. A.** 2003. Bacterial pathogens: Early interactions with host plants, pp. 89-91. *In:* R. M. Goodman (ed.), *Encyclopedia of Plant and Crop Science*. Marcel Dekker, Inc., NY.
- Kinkel, L. L. and **G. A. Beattie**. 2001. Epiphyte, pp. 417-419. *In:* O. C. Maloy and T. D. Murray (eds.), *Encyclopedia of Plant Pathology*. John Wiley & Sons, Inc., NY.
- Kinkel, L. L. and **G. A. Beattie**. 2001. Epiphytic bacteria, pp. 419-421. *In:* O. C. Maloy and T. D. Murray (eds.), *Encyclopedia of Plant Pathology*. John Wiley & Sons, Inc., NY.
- Halverson, L. J. and **G. A. Beattie**. 1995. Microbial diversity in terrestrial ecosystems: A technical report for the United States Environmental Protection Agency, 103 pp.