

CURRICULUM VITAE

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Education

Ph.D.	Cell and Molecular Biology	State University of New York at Buffalo, NY	1985
M.S.	Cell and Molecular Biology	State University of New York at Buffalo, NY	1982
B.S.	Biology	State University of New York at Fredonia, NY	1979

Professional Experience

08/2008-present	Director, Introductory Multicultural Summer Undergraduate Research Experience for Students (IM-SURE) Program; a National Science Foundation Research Experience for Undergraduates (NSF-REU) Program.
06/2006-present	Director, Montana Integrative Learning Experience for Students (MILES) Program; A Howard Hughes Medical Institute Undergraduate Science Education Program.
09/2005-present	Director, Montana-Ecology of Infectious Diseases (M-EID) Program; a National Science Foundation Integrative Graduate Education and Research Traineeship (NSF-IGERT) Program.
05/2001-present	Professor, Microbial Ecology Program, Division of Biological Sciences, The University of Montana, Missoula, MT.
09/1995-04/2001	Associate Professor, Microbial Ecology Program, Division of Biological Sciences, The University of Montana, Missoula, MT.
08/1993-08/1995	Research Scientist, Department of Environmental Microbiology, The Agouron Institute, La Jolla, CA.
12/1988-08/1993	Research Assistant Professor, Center for Microbial Ecology (CME) & Department of Crop and Soil Sciences, Michigan State University; and Group Leader for the CME-JRDC (Japanese Research Development Corporation) Joint Research Project on Molecular Evolution of Catabolic Pathways.
11/1985-12/1988	Post-doctoral Fellow, Michigan State University, Department of Crop and Soil Sciences and DOE Plant Research Laboratory, East Lansing, MI.

Research Interests

Microbiome structure and function in animals, plants and insects; interactions between microbial communities, natural environments, and human systems; exploring the role of the microbial community in the success of invasive weeds; fate and transport of microbes in the environment; microbial biomarkers for human, plant and animal studies; microbial community roles and responses in climate change scenarios.

Honors, Services, & Synergistic Activities

- Director, Montana-Ecology of Infectious Diseases (M-EID) Program; a National Science Foundation Integrative Graduate Education and Research Traineeship Program.
- Director, Montana Integrative Learning Experience for Students (MILES) Program; A Howard Hughes Medical Institute Undergraduate Science Education Program.
- Director, NSF-REU Site Grant Program: Undergraduate Research in Environmental Biology at The University of Montana, 2008-present.
- Director, Office of Research and Educational Opportunities for Students (OREOS) at The University of Montana, 2006-present.
- Review Panel Member-National Institute of Environmental Health Sciences. April 25-27, Research Triangle Park, NC.
- Local Organizing Committee Member, 13th International Symposium on Microbial Ecology (ISME); August 2010, Seattle, WA.
- Co-Instructor for HHMI-SEA Phage Genome Research Initiative course for undergraduates.
- Editorial Board Member, Microbial Ecology Journal, 1997-2006.
- Editorial Board Member, Applied and Environmental Microbiology, 2002-2006.
- Director—Inland Northwest Research Alliance (DOE) Subsurface Science Graduate Program, 2006; Co-Instructor in full-year Core Course, 2004-2006.
- Session Chair: 5th International Symposium on Subsurface Microbiology, Copenhagen, Denmark, 2002.
- Review Panel Manager, U.S.D.A. Soils and Soil Biology Program, 2000.
- Review Panel Member, DOE Natural and Accelerated Bioremediation Program, 1998.
- Review Panel Member, NSF Ecological & Evolutionary Physiology Program, 1997.
- Review Panel Member, U.S.D.A. Soils and Soil Biology Program, 1995 & 1996.
- AIST Guest Researcher, Nat'l Inst. for Resources and the Environment, Tsukuba, Japan, 1995.
- Review Panel Member, EPA-Biological Control Agent Risk Assessment Program, 1994.
- Department of Energy Director's Certificate of Appreciation, 1994.
- Co-mentor several Ph.D. students in interdisciplinary projects.
- Co-developer of new graduate and undergraduate degree options in Microbial Ecology at UM.
- Chair of Biological Sciences Curriculum Committee, 10 years.
- Instructor in international collaborative workshops for multi-national research training and collaboration: Egypt 1995 & 2001, Spain 2003, Denmark 2010 & 2012.
- Multi-national research collaborations with the Geological Survey of Denmark and Greenland; Chuo University, Japan; and a commercial microbial research company, Alimetrics, in Helsinki, Finland.

Professional Society Memberships

International Society for Microbial Ecology
American Society for Microbiology
American Association for the Advancement of Science

Publications

See, W., W.H. Edwards, S. Dauwalter, C. Almendra, M.D. Kardos, J.L. Lowell, R. Wallen, S.L. Cain, W.E. Holben, and G. Luikart. 2012. *Yersinia enterocolitica*: An unlikely cause of positive Brucellosis tests in Greater Yellowstone Ecosystem bison (*Bison bison*). *J. Wildl. Dis.* 48:537-541.

- Stibal, M., A. Jensen, J. Bælum, S.R. Sørensen, W.E. Holben, C.S. Jacobsen. 2012. Microbial degradation of 2,4-dichlorophenoxyacetic acid on the Greenland ice sheet. *Appl. Environ. Microbiol.* 78:5070-5076; doi: 10.1128/AEM.00400-12
- Pollock, J.L., L.A. Kogan, A.S. Thorpe and W.E. Holben. 2011. (±)-Catechin, a root exudate of the invasive *Centaurea stoebe* Lam. (spotted knapweed) exhibits bacteriostatic activity against multiple soil bacterial populations. *J. Chem. Ecol.* 37:1044-1053. DOI 10.1007/s10886-011-0005-6.
- Holben, W.E. 2011. GC fractionation allows comparative total microbial community analysis, enhances diversity assessment, and facilitates detection of minority populations of bacteria. Chapter 23 *in* de Bruijn, F.J. (ed.) *Handbook of Molecular Microbial Ecology I: Metagenomics and Complementary Approaches*. John Wiley & Sons. ISBN: 978-0-470-64479-9.
- Morales, S.E. and W.E. Holben. 2011. Empirical testing of 16S PCR primer pairs reveals variance in target specificity and efficacy not suggested by *in silico* analysis. Chapter 17 *in* de Bruijn, F.J. (ed.) *Handbook of Molecular Microbial Ecology I: Metagenomics and Complementary Approaches*. John Wiley & Sons. ISBN: 978-0-470-64479-9.
- Morales, S.E. and W.E. Holben. 2011. Extensive phylogenetic analysis of a soil bacterial community illustrates extreme taxon evenness and the effects of amplicon length, degree of coverage, and DNA fractionation on classification and ecological parameters. Chapter 16 *in* de Bruijn, F.J. (ed.) *Handbook of Molecular Microbial Ecology II: Metagenomics in Different Habitats*. ISBN: 978-0-470-64719-6.
- Morales S.E. and W.E. Holben. 2011. Linking bacterial identities and ecosystem processes: Can ‘omic’ analyses be more than the sum of their parts? *FEMS Microbiol. Ecol.* 75:2-16.
- Ball, P.N., M.D. MacKenzie, T.H. DeLuca, and W.E. Holben. 2010. Wildfire and charcoal enhance nitrification and ammonium-oxidizing bacterial abundance in dry montane forest soils. *J. Environ. Qual.* 39:1243-1253 doi:10.2134/jeq2009.0082.
- Morales, S.E., T. Cosart, and W.E. Holben. 2010. Bacterial gene abundances as indicators of greenhouse gas emission in soils. *ISME J.* 4, 799–808; doi:10.1038/ismej.2010.8.
- Bælum, J; C.S. Jacobsen, and W.E. Holben. 2010. Comparison of 16S rRNA gene phylogeny and functional *tfdA* gene distribution in thirty-one different 2,4-dichlorophenoxyacetic acid and 4-chloro-2-methylphenoxyacetic acid degraders. *System. Appl. Microbiol.* 10.1016/j.syapm.2010.01.001.
- Lowell, J.L., N. Gordon, D. Engstrom, J.A. Stanford, W.E. Holben and J.E. Gannon. 2009. Habitat heterogeneity and associated microbial community structure in a small-scale floodplain hyporheic flow path. *Microb. Ecol.* 58:611–620.
- Kinnersley MA, W.E. Holben, and F. Rosenzweig 2009. E Unibus Plurum: genomic analysis of an experimentally evolved polymorphism in *Escherichia coli*. *PLoS Genet.* 5(11): e1000713. doi:10.1371/journal.pgen.1000713
- Pollock, J.L., R.M. Callaway, G.C. Thelen, and W.E. Holben. 2009. Catechin–metal interactions as a mechanism for conditional allelopathy by the invasive plant *Centaurea maculosa*. *J. Ecol.* 97:1234–1242. DOI: 9710.1111/j.1365-2745.2009.01553.x
- Feris, K.P., P.W. Ramsey, S.M. Gibbons, M.C. Rillig, J.N. Moore, J.E. Gannon, and W.E. Holben. 2009. Hyporheic microbial community development is a sensitive indicator of metal contamination. *Environ. Sci. Technol.* 43: 6158–6163.
- Adams, S.M., A.S. Adams, and W.E. Holben. 2009. Tri-Trophic Linkages in Disease: Pathogen Transmission to Rainbow Trout Through Stonefly Prey. *Environ. Entomol.* 38:1022-1027.
- Gordon, N. S., A. Valenzuela, S.M. Adams, P.W. Ramsey, J.L. Pollock, W.E. Holben, & J.E. Gannon. 2009. *Pedobacter nyackensis* sp. nov., *Pedobacter alluvionis* sp. nov. and *Pedobacter*

- borealis* sp. nov., isolated from Montana floodplain sediment and forest soil. *Int J Syst. Evol. Microbiol.* 59:1720-1726.
- Morales, S.E., and W.E. Holben. 2009. Empirical testing of 16S PCR primer pairs reveals variance in target specificity and efficacy not suggested by *in silico* analysis. *Appl. Environ. Microbiol.* 75:2677-2683.
- Morales, S.E., T.F. Cosart, J.V. Johnson and W.E. Holben. 2009. Extensive phylogenetic analysis of a soil bacterial community illustrates extreme taxon evenness and the effects of amplicon length, degree of coverage, and DNA fractionation on classification and ecological parameters. *Appl. Environ. Microbiol.* 75: 668-675.
- Ramamoorthy S., J.S. Piotrowski, H.W. Langner, W.E. Holben, M.J. Morra, and R.F. Rosenzweig. 2009. Ecology of sulfate-reducing bacteria in an iron-dominated, mining-impacted freshwater sediment. *J. Environ. Qual.* 38:675-84.
- Morales, S.E., T. Cosart, J.V. Johnson, and W.E. Holben. 2008. Supplemental programs for enhanced recovery of data from the DOTUR application. *J. Microbiol. Methods* 75:572-575.
- Inderjit, J.L. Pollock, R.M. Callaway, and W.E. Holben. 2008. Phytotoxic Effects of (\pm)-catechin *in vitro*, *in soil*, and *in the field*. *PLoS ONE* 3(7):e2536.
- Adams, A.S., D.L. Six, S.A. Adams, and W.E. Holben. 2008. *In vitro* interactions between yeasts and bacteria and the fungal symbionts of the mountain pine beetle (*Dendroctonus ponderosae*). *Microb. Ecol.* 56:460-466.
- Bælum, J. M.H. Nicolaisen, W.E. Holben, B.W. Strobel, J. Sørensen and C.S. Jacobsen. 2008. Direct analysis of *tfdA* gene expression by indigenous bacteria in phenoxy acid amended agricultural soil. *ISME J.* 2:677-687.
- Jacobsen, C.S., and W.E. Holben. 2007. Quantification of mRNA in *Salmonella* sp. seeded soil and chicken manure using magnetic capture hybridization RT-PCR. *J. Microbiol. Methods.* 69:315-321.
- Bender, M., W.E. Holben, S.J. Sørensen, and C.S. Jacobsen. 2007. Use of a PNA probe to block DNA-mediated PCR product formation in prokaryotic RT-PCR. *BioTechniques* 42:609-614.
- Mummey, D., W. Holben, J. Six, and P. Stahl. 2006. Spatial stratification of soil bacterial populations in aggregates of diverse soils. *Microb. Ecol.* 51:404-411.
- Ramsey, P.W., K.P. Feris, M.C. Rillig, W.E. Holben, and J.E. Gannon. 2006. Choice of methods for soil microbial community analysis: PLFA maximizes power compared to CLPP and PCR-based approaches. *Pedobiologia.* 50:275-280.
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- Ramsey, P.W., M.C. Rillig, K.P. Feris, N.S. Gordon, J. N. Moore, W.E. Holben, and J.E. Gannon. 2005. Relationship between communities and processes; New insights from a field study of a contaminated ecosystem. *Ecology Letters* 8: 1201-1210.
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- Feris, K.P., P.W. Ramsey, M. Rillig, J.N. Moore, J.E. Gannon, and W.E. Holben. 2004a. Determining rates of change and evaluating group-level resiliency differences in hyporheic microbial communities in response to fluvial heavy metal deposition. *Appl. Environ. Microbiol.* 70:4756-4765.
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- Feris, K.P., P.W. Ramsey, C. Frazar, M.C. Rillig, J.E. Gannon, and W.E. Holben. 2003b. Structure and seasonal dynamics of hyporheic zone microbial communities in free-stone rivers of the western United States. *Microb. Ecol.* 46:200-215.
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- Apajalahti, J.H., H. Kettunen, A. Kettunen, W.E. Holben, P.H. Nurminen, N. Rautonen, M. Mutanen. 2002. Culture-independent microbial community analysis reveals that inulin in the diet primarily affects previously unknown bacteria in the mouse cecum. *Appl Environ. Microbiol.* 68:4986-4995.
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- Holben, W.E. and P.H. Ostrom. 2000. Monitoring bacterial transport by stable isotope enrichment of cells. *Appl. Environ. Microbiol.* 66:4935-4939.

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- Apajalahti, J.H.A., L.K. Särkilahti, B.R.E. Mäki, J.P. Heikkinen, P.H. Nurminen, and W.E. Holben. 1998. Effective recovery of bacterial DNA and %G+C based analysis of community structure in the gastrointestinal tract of broiler chickens. *Appl. Environ. Microbiol.* 64:4084-4088.
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- Santo Domingo, J.W., M.G. Kaufman, M.J. Klug, W.E. Holben, D. Harris and J.M. Tiedje. 1998. Influence of diet on the structure and function of the bacterial hindgut community of crickets. *Molec. Ecol.* 7:761-767.
- Holben, W.E., K. Noto, T. Sumino and Y. Suwa. 1998. Molecular analysis of bacterial communities in a three-compartment granular activated sludge system indicates community-level control by incompatible nitrification processes. *Appl. Environ. Microbiol.* 1998 64: 2528-2532.
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Abstracts (Last 10 years)

- Sergio E. Morales and William E. Holben. 2012. Simulated underground CO₂ storage leak reduces bacterial richness and alters community functional and phylogenetic structure in surface soils. 14th International Symposium on Microbial Ecology, Copenhagen, Denmark, August 19-24.
- Yoo, S. and W.E. Holben. 2012. Investigating Effects of Elevated CO₂ on Soil Microbial Communities Using Metagenomic Analysis. 4th OREOS Undergraduate Research Symposium, August 9th, Missoula, MT.
- Rout, M.E., T.H. Chrzanowski, R.M. Callaway, and W.E. Holben. 2012. What makes a plant invasive? It might be a matter of microbes. ASM 107th Annual Meeting June 16 – 19, San Francisco.
- Lark, E. and W.E. Holben. 2012. Mouse colon luminal microbiome varies by location. Keystone Symposia—The Microbiome, March 4 - 9, Keystone, CO, USA.
- Rout, M.E., T.H. Chrzanowski, R.M. Callaway, and W.E. Holben. 2011. What makes a plant invasive? It might be a matter of microbes. BAGECO—11th Conference on Bacterial Genetics and Ecology, May 29 – June 2, Corfu, Greece.
- Morales, S.E. and W.E. Holben. 2011. Surface soil microbial community dynamics in response to elevated CO₂ exposure from a simulated geological storage leak. BAGECO—11th Conference of Bacterial Genetics and Ecology, May 29 – June 2, Corfu, Greece.
- Morales, S.E. and W.E. Holben. 2011. Effect of CO₂ seepage on soil microbial communities: Ecosystem effects and suitability of microbes as sentinels for elevated CO₂. Keystone Symposium: Microbial Communities as Drivers of Ecosystem Complexity, March 25 - 30, Breckenridge, Colorado.
- Jacobsen, C.S., A. Jensen, J. Bælum, A.R. Johnsen, S.R. Sørensen, L. Whyte, E. Willerslev & W.E. Holben. 2010. Arctic POP contamination and microbial activity at and below zero °C. 13th International Symposium on Microbial Ecology, Seattle, Washington, USA, August 22- 26.
- Pollock, J & W. Holben. 2010. Catechin, a root exudate of *Centaurea maculosa* (spotted knapweed) interferes with cell growth, sporulation, and germination in gram-positive bacteria. 13th International Symposium on Microbial Ecology, Seattle, Washington, USA, August, 2010.
- Rout, M. T. Chrzanowski, R. Callaway, & W. Holben. 2010. Plant-microbe interactions: synergistic effects of bacterial endophytes promoting plant invasions. 13th International Symposium on Microbial Ecology, Seattle, Washington, USA, August, 2010.

- Morales, S.E., T. Cosart, and W.E. Holben. 2009. Bacterial gene abundances as indicators of greenhouse gas emission in soils. BAGECO 10 Bacterial Genetics and Ecology – Coexisting on a Changing Planet 15–19 June 2009, Uppsala, Sweden.
- Morales, S., and W. Holben. 2008. qPCR analysis with 16S and functional primers shows that cultivation practices and soil successional stage are drivers of microbial community structure. 12th International Symposium on Microbial Ecology, Cairns Australia, August, 2008.
- Ramsey, P., K. Feris, W. Holben, M. Rillig, and J. Gannon. 2008. Ecosystem processes and microbial community structure along a heavy metal contamination gradient in river sediment. 12th International Symposium on Microbial Ecology, Cairns Australia, August, 2008.
- Lowell, J., N. Gordon, D. Engstrom, J. Stanford, W. Holben and J. Gannon. 2008. Habitat heterogeneity and associated microbial community structure in a small-scale flood plain hyporheic flow path. 12th International Symposium on Microbial Ecology, Cairns Australia, August, 2008.
- Bender, M., Holben, W.E., Sørensen, S.J. & Jacobsen, C.S. 2007: PNA inhibitory probes can replace DNase in RT-PCR. Cambridge Healttech Institutes Third Annual Quantitative PCR. 19-21 March, 2007. San Diego, California, U.S.A., Cambridge Healttech Institutes. CD-Rom only, 1 p.
- Bælum, J., Nicolaisen, M.H., Holben, W.E. & Jacobsen, C.S. 2007: Analysing Transcripts of the functional gene *tfdA* in natural soil microbial populations involved in the degradation of MCPA and 2,4-D through quantitative RT-PCR of directly extracted mRNA. ASM 107th annual meeting. 21-25 May, 2007. Toronto, Canada. American Society of Microbiology. Abstract book (CD-Rom), 1 p.
- Calov, G., Holben, W.E., Callaway, R.M. & Jacobsen, C.S. 2007: Microbial communities in autoclaved recolonized and natural soils influenced by *Centaurea maculosa* and two north american natives. 9th International Conference on the Ecology and Management of Alien Plant Invasions. 17 -21 September, 2007. Perth, Western Australia. Abstract volume, 1 p.
- Bælum, J., M. Haubjerg Nicolaisen, W.E. Holben and C.S. Jacobsen. 2007. Studying functional diversity and specific activity of microbial phenoxy acid degraders through *tfdA*-mRNA extracted from natural soil environment. ASM 107th Annual Meeting.
- Morales, S. and W.E. Holben. 2007. A long look at soil microbial community diversity: Combined analysis using GC fractionation and extensive cloning of 16S rRNA gene sequences establishes broad diversity and evenness. Bacterial Genetics and Ecology 9th Symposium (BAGECO-8), Wernigerode, Germany, June 2007
- Holben, W.E. 2006. Phylogenetic analysis of intestinal microflora indicates a novel *Mycoplasma* phylotype in farmed and wild salmon. ASM 106th Annual Meeting.
- Adams, S., N. Gordon, A. Valenzuela, J.E. Gannon and W.E. Holben. 2006. *Paraperla spp.*: A novel vector for transmission of the fish pathogen *Aeromonas salmonicida*. Graduate Student and Faculty Research Conference. The University of Montana, April 2006.
- DeLuca, T.H., M.D. MacKenzie, A.Sala, P.N. Ball, and W.E. Holben. 2005. Nitrification and Fire Intervals in Ponderosa Pine Forests. 2005 ASA-CSSA-SSSA International Annual Meetings, Salt Lake City, UT - November 2005
- Adams, S., N. Gordon, J.E. Gannon and W.E. Holben. 2005. Plecoptertan nymphs: A potential transmission vector for the fish pathogen *Aeromonas salmonicida*. Annual Meeting of the Entomological Society of America. Fort Lauderdale, FL, November 2005. Winner of President's Award for Student Presentations.
- Holben, W.E. 2005. Hyporheic Zone Microbial Communities: Examination of Microbial Community Structure and Function in a Pristine Freestone River in the Northwest United States. Bacterial Genetics and Ecology 8th Symposium (BAGECO-8), Lyon, France, June 2005.

- Jacobsen, C.S. and Holben, W.E. 2005. Quantification of *Salmonella* sp. *invA* mRNA in soil and chicken manure using magnetic capture hybridization RT-PCR Bageco 8 Lyon 26-29 June 2005
- Adams, S., N. Gordon, A. Valenzuela, J.E. Gannon and W.E. Holben. 2005. The microbe-stonefly-fish connection—Exploring trophic linkages and fish pathogen transfer through microbial community analysis in the Nyack Floodplain. Clark Fork Symposium, Missoula, MT, April, 2005.
- Jacobsen, C.S. and Holben, W.E. 2005. Quantification of *Salmonella* sp. *invA* mRNA in soil and chicken manure using magnetic capture hybridization RT-PCR American Society for Microbiology 103 General Meeting, Atlanta 5-9. June 2005
- Holben, W.E., E.D. Inkley, and L.S. Mills. 2004. Microbial Tools for Wildlife Studies: Biogeographical Analysis of Snowshoe Hares Based on Fecal Pellet Microflora. ASM 104th Annual Meeting.
- Mummey, D.L., W.E. Holben and J. Six. 2004. Small-scale spatial stratification of soil microbial populations: an exploration of the inner-microaggregate. ASA-CSSA-SSSA International Annual Meeting, Seattle, WA
- Ramamoorthy, S., L. Winoweicki, H. Langner, W. Holben, M. Morra, and R.F. Rosenzweig. 2004. Influence of Microbial Sulfidogenesis on Trace Element Stability In a Mining-Impacted Freshwater Sediment. ASM 104th Annual Meeting.
- Jacobsen, C.S., M. Bender, S.J. Sørensen, and W. E. Holben. 2004. Use of a PNA Probe to Block DNA Mediated PCR Product Formation in RT-PCR. ASM 104th Annual Meeting.
- Gsell, T.C., and W.E. Holben. 2004. Characterizing bacterial diversity and ammonia oxidizer phylogeny in aquifer sediments along a northwestern Montana river floodplain. ASM 104th Annual Meeting.
- Bender, M.; Holben, W.E.; Sørensen, S.J. and Jacobsen, C.S. 2004. Use of a PNA probe to block DNA mediated PCR product formation in RT-PCR. American Society for Microbiology 102 General Meeting, New Orleans 23-27. May 2004
- Ramsey, P.W., Feris, K.P., Rosier, C.L., Rillig, M.C., Moore, J.N., Holben, W.E., Gannon, J.E. 2004. Biological and Geochemical Change Along a Steep Functional Gradient in Mine Waste Contaminated Soil. Tenth International Symposium on Microbial Ecology, Cancun, Mexico. August, 2004.
- Ramsey, P.W., M.C. Rillig, K. Feris, J.N. Moore, W.E. Holben, and J.E. Gannon. 2004. Long-Term Effects of Toxins on Ecosystems: Microbial Community Structural and Functional Change along an Alluvial Mine Waste Contamination Gradient. ASM 104th Annual Meeting.
- Ball, P.N. and W.E. Holben. 2004. Microbial community analysis of the snake river aquifer: Microbial potential for TCE degradation. Tenth International Symposium on Microbial Ecology, Cancun, Mexico. August, 2004.
- Bender, M., W.E. Holben, S.J. Sorenson, and C.S. Jacobsen. 2004. PNA inhibitory probes sort the wheat from the chaff in RT-PCR. Tenth International Symposium on Microbial Ecology, Cancun, Mexico. August, 2004.
- Holben, W.E., K.P. Feris, A. Kettunen, and J.H.A. Apajalahti. 2003. GC Fractionation enhances microbial community diversity assessment and detection of minority populations of bacteria. Gordon Research Conference on Applied and Environmental Microbiology. New London, CT, July 2003.
- Feris, K.P., P.W. Ramsey, M. Rillig, J.N. Moore, J.E. Gannon, and W.E. Holben. 2003. Determining rates of change in hyporheic microbial communities and evaluating group-level resiliency differences in response to fluvial heavy metal deposition. Gordon Research Conference on Applied and Environmental Microbiology, New London, CT, July 2003.

- Holben, W.E., M.F. DeFlaun, H. Dong, M.E. Fuller, M. Green, S.S. Hubbard, W.P. Kovacik, B.J. Mailloux, E.L. Majer, C.J. Murray, T.C. Onstott, T.D. Scheibe, S.H. Streger, D.J.P. Swift, Y. Xie. 2002. Bacterial Transport: Integrating Aqueous and Solid Phase qPCR Measurement of Bacterial Numbers with Physicochemical Parameters by Multivariate Analysis. Fifth International Symposium on Subsurface Microbiology, Copenhagen, Denmark, Sept., 2002.
- Holben, W.E., and J.H.A. Apajalahti. 2002. Percent G+C Profiling Reveals Differences in the Total Microbial Community of the Chicken GI Tract Based on Compartment, Diet, and Inoculation. Bacterial Genetics and Ecology 7th Symposium (BAGECO-7), Bergen, Norway, June 2002.
- Feris, K.P. and W.E. Holben. 2002. A Molecular Analysis of Hyporheic Microbial Communities in Three Free-Stone Rivers of Western Montana. 102nd Annual Congress for the American Society for Microbiology. Salt Lake City, UT, USA. May 19-23, 2002.
- P. N. Ball, K. P. Feris, P.W. Ramsey, C.D. Frazer, J. E. Gannon, J. N. Moore, W. E. Holben. 2002. Life in the Pit: Microbial Community Structure of a Mining Pit Lake. 102nd Annual Congress for the American Society for Microbiology. Salt Lake City, UT. May 19-23, 2002.

Special Presentations (Since 2000)

- Invited Marsico Speaker at Denver University, April 10, 2012. Present unit seminar "Microbial Connections to Environmental Concerns- From Weed Invasion to Greenhouse Gas Emissions" and hosted undergraduate, lower-division, lunch and roundtable discussion.
- Invited participant/presenter: "Two decades of molecular analysis of soil communities: What have we learned, where are we going?" Soil Metagenomics—Implications of Next-Generation Sequencing Technologies on Microbial Diversity Research and Soil Ecology; Braunschweig, Germany, Dec. 2010.
- Invited participant/presenter: Integrating biological (qPCR) data with physicochemical parameters by multivariate analysis to assess factors controlling bacterial transport in a sandy aquifer. At PATHOS; Pathogens in the Environment Annual Meeting. Copenhagen, Denmark, June 15, 2010.
- Invited presentation: Comparing phylogenetic- and functional-based primers for monitoring of microbial populations in soil. BAGECO 10 Bacterial Genetics and Ecology – Coexisting on a Changing Planet 15–19 June 2009, Uppsala, Sweden.
- Environmental Nucleotide Workshop, Copenhagen, Denmark, June 8, 2009 : “Comparing and contrasting phylogenetic- and functional-based monitoring of microbial populations in soil”.
- Invited speaker; Gastrointestinal Microbial Ecology Workshop, Helsinki, Finland, June 11, 2009: “Comparing and contrasting phylogenetic- and functional-based primers for measuring bacterial diversity and population dynamics in complex communities”.
- Invited lecture: Oregon State University Subsurface Biosphere Interdisciplinary Doctoral Program IGERT Seminar Series. “A Tale From the Nyack Floodplain: The Deadly Meal; Pathogen Transmission to Rainbow Trout Via Stonefly Prey”. March 8, 2007.
- Invited participant/presenter: NorFA Workshop on Microbial Ecology and Bioremediation in Cold Climate: Molecular Microbial Ecology”. Geological Survey of Denmark, Copenhagen, 11/9/04.
- Invited lecture: “Molecular approaches for studying microbial populations and communities in environmental samples: The synergism of combined approaches”. Colorado State University, Department of Horticulture. 10/26/04.
- Keynote lecture: American Society for Microbiology Northwest Branch Meeting. August 8, 2003. Vancouver, B.C. “GC fractionation enhances microbial community diversity assessment and facilitates systematic detection of minority populations of bacteria”

Invited lecture: UA Superfund Basic Research Program, Tucson, AZ, Nov 6, 2002. "Integrating biological RT-qPCR data with physicochemical parameters by multivariate analysis to assess factors controlling bacterial transport"

Invited lecture: University of Arizona Dept. of Soil, Water and Environmental Science "Effects of a heavy metal contamination gradient on microbial community structure and function in the Clark Fork River drainage in western Montana". November 2002.

Invited lecture: American Society for Microbiology 102nd Annual Meeting, Salt Lake City, UT, May 2002. "Molecular Methods for Monitoring Microbes in Saturated Porous Media".

Invited Lecturer/Discussion Leader: US-Egypt Workshop in Microbial Ecology, Cairo Egypt, May 6-11, 2001.

Invited lecture: American Society for Microbiology 101st Annual Meeting, Orlando FL, May 2001. "Tracking microorganisms via stable isotope enrichment and quantitative PCR".

Invited lecture: Oklahoma State University, Department of Microbiology and Molecular Genetics. April 9, 2001, "Molecular tools for studying microbial community structure and gene transfer in nature".

Grants (Funded proposals, last 5 years):

NSF-REU Site: REU Site: Undergraduate Research in Environmental Biology at the University of Montana in Collaboration with La Universidad Autonoma de Chihuahua, Mexico (PI Holben). 04/2012-03/2014. \$392,311.

DOE-EPSCoR program. Effects of elevated CO₂ on soil microbial structure and function. (PI Cunningham {MSU}; Holben co-PI and leader of UM portion). 09/2008-08/2011. \$505,182 (UM/Holben portion).

NSF-REU Site: Undergraduate Research in Environmental Biology at the University of Montana. (PI Holben; co-PI Kukuk). 08/2008-07/2012. \$264,322.

NSF-IGERT: Montana-Ecology of Infectious Disease: Integrative Graduate Training on Multi-Scalar Computational, Mathematical and Empirical Approaches to Complex Biological Problems (PI Holben, 8%; co-PIs: Breuner, Graham, Johnson, Luikart. 09/2005-09/2013. \$3,047,969.

Howard Hughes Medical Institute Undergraduate Science Education Program: MILES—Montana Integrative Learning Experience for Students at The University of Montana. Holben PI (30%) with Brewer, Graham, Greene, Johnson co-PIs. 09/2006-08/2012. \$1,477,875.

USDA Soils and Soil Biology Program: Towards a comprehensive survey of soil bacterial fractions through analysis of fractionated community DNA. (PI, 8%) 08/2004-08/2008. \$390,900.

NSF Microbial Observatories Program: Nyack Microbial Observatory Project. (Co-PI (8%) with Gannon (PI), Woessner, Stanford). 05/2004-04/2009. \$1,307,312.

NSF Ecosystems Program: Soil charcoal and nitrogen cycling in *Pinus ponderosa* ecosystems of western Montana. (Co-PI (8%) with DeLuca). 10/2003-09/2007. \$481,360.

USDA Soils & Soil Biology Program: *Centaurea* invasion: From molecules and microbes to plant communities. (Co-PI with Callaway and Vivanco. 06/2003-08/2005. \$220,000.

USDA Soils and Soil Biology Program: Analysis of bacterial communities associated with aggregate aggregate size fractions of native vegetation, no-tillage, and conventional tillage systems. (Co-PI with Mummey) 06/2003-01/2005. \$180,000.

INRA (Inland Northwest Research Alliance): Mapping the Distribution, Abundance, Diversity, and Activity of Methanotrophic Bacteria at the INEEL. (PI) 09/2002-03/2005. \$202,130.