

DR. MELISSA A. CREGGER

OAK RIDGE NATIONAL LABORATORY, BIOSCIENCES DIVISION

1 BETHEL VALLEY RD. OAK RIDGE, TN 37831

PH: (865)241-3776 EMAIL: CREGGERMA@ORNL.GOV

EDUCATION

- 2007-2012 PhD, University of Tennessee, Ecology and Evolutionary Biology.
(Advisor: Aimee T. Classen)
- 1999-2003 BS, University of Southern Indiana, Biology

PROFESSIONAL APPOINTMENTS

- 2019- Joint assistant professor, Ecology and Evolutionary Biology, University of Tennessee
- 2018- Staff Scientist, Biosciences, Oak Ridge National Laboratory
- 2015-2018 Staff Scientist/Distinguished Staff Fellow, Biosciences, Oak Ridge National Laboratory
- 2014-2015 Post-doctoral research associate, Oak Ridge National Laboratory
- 2012-2014 Post-doctoral research fellow, University of Illinois, Carl Woese Institute for Genomic Biology
- 2007-2012 Graduate teaching/research assistant, University of Tennessee
- 2006-2007 Research associate, HistoRx
- 2004-2006 Research assistant/lab manager, Yale University

GRANTS AND FELLOWSHIPS (selected)

- 2019-2021 **ORNL LDRD:** Secure biosystems design of plants and microbiomes. PI M. Cregger \$3.6M
- 2018- **DOE BER:** BIOgeochemical transformations at CRITICAL InterfaceS in a mercury Perturbed watershed (BIOCRISP) Scientific Focus Area. Task Lead M. Cregger. \$10.2M. \$300,000 to M. Cregger
- 2017- **DOE BER:** The Plant-Microbe Interfaces Scientific Focus Area. Task Lead M. Cregger. \$27M. \$1.1M to M. Cregger
- 2017- **DOE BER:** The center for bioenergy innovation. Task Lead M. Cregger. \$125M. \$425,000 to M. Cregger
- 2017-2019 **ORNL LDRD:** A quantitative, systems biology, multi-omic approach to diagnose and predict response to treatment for gynecologic cancers. PI M. Cregger. \$1.1M.
- 2016-2018 **ORNL LDRD:** Understanding the microbially driven mechanisms behind rapid responses of soils to short term disturbance events that result in large nitrous oxide emission pulses. Task Lead M. Cregger. \$1.08M. \$108,000 to M. Cregger
- 2015-2018 **ORNL LDRD:** Effects of tree mortality on belowground community structure, function, and carbon cycling. PI M. Cregger. \$647,000
- 2015-2015 **ORNL LDRD Seed:** Targeted metagenomic analysis of the novel bacterial

- phylum AD3 from Walker Branch Watershed shallow subsurface soils. Task Lead M. Cregger. \$30,000 to M. Cregger
- 2009-2012 **University of Tennessee research funding:** PI M. Cregger. \$5850
- 2009-2012 **DOE Graduate research environmental fellowship:** Microbial community structure and ecosystem function in a changing world. PI M. Cregger. \$85,500.
- 2009-2012 **DOD Science, mathematics, and research for transformation.** PI M.Cregger. \$105,000. Awarded and declined.

REFEREED PUBLICATIONS

- Cregger MA**, Jing X, Sanders N, Dunn R, Fields C, Newman G, Patterson C, White B, Classen AT (in prep) Warming alters ecosystem function, but the impact is contingent on location and season. Target journal: PNAS.
- Cregger MA, Carper D, Christel S, Doktycz M, Labbe J, Michener J, Morrell-Falvey J, Muchero W, Pelletier D, Retterer S, Tschaplinski T, Tuskan G, Weston D, Schadt CW (In revision) Plant-microbe interactions: from genes to ecosystems using *Populus* as a model system. Phytobiomes.
- Dove NC, Rogers TJ, Leppanen C, Simberloff D, Fordyce JA, Brown VA, LeBude AV, Ranney TG, **Cregger MA** (In press) Microbiome variation across two hemlock species with hemlock woolly adelgid infestation. *Frontiers in Microbiology*.
- Veach AM, Chen H, Yang ZK, Engle N, Tschaplinski T, Schadt CW, **Cregger MA** (In press) Plant presence stabilized soil microbial communities exposed to drought. *mSystems*.
- Braundmeier-Fleming A, Skenandore CS, Gil L, Jacobsen V, **Cregger MA**, Badger T, Karr M, Wu G, Smith SB, Newell-Fugate AE (2020) Dietary substitution of soybean oil with coconut oil in the absence of dietary antibiotics supports growth performance and immune function in nursery and grower pigs. *Journal of Animal Science and Biotechnology*.
- Miao R, Badger TC, Groesch K, Diaz-Sylvester P, Wilson T, Ghareeb A, Martin JA, **Cregger MA**, Welge M, Bushell C, Auvil L, Zhu R, Brard L, Braundmeier-Fleming A (2020) Assessment of peritoneal microbial features and tumor marker levels as potential diagnostic tools for ovarian cancer. *Plos One*.
- Chen H, Yang ZK, Yip D, Morris RH, Lebreux SJ, **Cregger MA**, Klingeman DM, Hettich RL, Wilhelm SW, Wang G, Loffler FE, Schadt CW (2019) One-time nitrogen fertilization shifts switchgrass soil microbiomes within a context of larger spatial and temporal variation. *Plos One*.
- Veach A, Morris R, Yip D, Yang Z, Engle N, **Cregger MA**, Tschaplinski T, Schadt CW (2019) Rhizosphere microbiomes diverge among *Populus trichocarpa* plant-host genotypes and chemotypes, but it depends on soil origin. *Microbiome*.
- Rogers TJ*, Leppanen C, Brown VA, LeBude A, Ranney T, Simberloff D, **Cregger MA** (2018) Implications of insect invasion on the stem microbiome. *Ecosphere*.
- Yip D, Veach A, Yang Z, **Cregger MA**, Schadt CW (2018) Methanogenic Archaea dominate mature *Populus deltoides* heartwood habitats. *New Phytologist*.

- Cregger MA**, Veach AM, Yang Z, Crouch MJ, Vilgalys R, Tuskan GA, Schadt CW (2018) The *Populus* holobiont: dissecting the effects of plant niches and genotype on the microbiome. *Microbiome*.
- Cregger MA**, Lenz K, Leary E, Leach R, Fazleabas A, White BA, Braundmeier A (2017) Reproductive microbiomes: using the microbiome as a novel diagnostic tool for endometriosis. *Reproductive Immunology*.
- Classen AT, Sundqvist M, Henning JA, Newman GS, Moore JAM, **Cregger MA**, Moorhead L (2015) Direct and indirect effects of climate change on soil microbial and soil microbial-plant interactions: What lies ahead? *Ecosphere* 6:1-21.
- Cregger MA**, McDowell NG, Pockman W, Classen AT (2014) The impact of precipitation change on nitrogen cycling in a semi-arid ecosystem. *Functional Ecology* 28:1534-1544.
- Cregger MA**, Sanders NJ, Dunn RR, Classen AT (2014) Microbial communities respond to experimental warming, but site matters. *PeerJ* 2:e358.
- Wright P*, **Cregger MA**, Souza L, Sanders N, Classen AT (2014) Interactive effects of herbivory, nitrogen fertilization, and plant invasion on above and belowground community structure and function. *Ecology and Evolution* 6:732-742.
- McCord A, Chapman CA, Weny G, Tumukunde A, Hyeroba D, Klotz K, Koblings A, Mbora D, **Cregger MA**, White B, Leigh S, Goldberg TL (2014) Fecal microbiomes of non-human primates in western Uganda reveal species-specific communities largely resistant to habitat perturbation. *American Journal of Primatology* 76:347-354.
- Yeoman CJ, Thomas SM, Berg Miller ME, Ulanov AV, Torralba M, Lucas S, Gillis M, **Cregger MA**, Gomez A, Ho M, Leigh SR, Stumpf R, Creedon DJ, Smith MA, Weisbaum JS, Nelson KE, Wilson BA, White BA (2013) A multi-omic systems-based approach reveals metabolic markers of bacterial vaginosis and insight into the disease. *Plos One* 8:e56111.
- Cregger MA**, Schadt CW, McDowell NG, Pockman WT, Classen AT (2012) Soil microbial community response to precipitation change in a semi-arid ecosystem. *Applied and Environmental Microbiology* 78:8587-8594.
- Lessard JP, Reynolds WN, Bunn WA, Genung MA, **Cregger MA**, Felker-Quinn E, Barrios-Garcia MN, Stevenson ML, Lawton M, Brown CB, Patrick M, Rock JH, Jenkins MA, Bailey JK, Schweitzer JA (2012) Equivalence in the strength of deer herbivory on above and below ground communities. *Basic and Applied Ecology* 13:59-66.
- Genung MA, Lessard JP, Brown C, Bunn W, **Cregger MA**, Reynolds W, Felker-Quinn E, Stevenson M, Hartley A, Crutsinger G, Schweitzer J, and Bailey J (2010) Non-additive effects of genotypic diversity increase pollinator visitation. *Plos One* 5(1): e8711.
- Kardol P, **Cregger MA**, Company C, and Classen AT (2010) Soil ecosystem functioning under climate change: plant species and community effects. *Ecology* 91:767-781.
- Gustavson MD, Bourke-Martin B, Reilly D, **Cregger M**, Williams C, Mayotte J, Zerkowski M, Tedeschi G, Pinard R, and Christiansen J (2009) Standardization of HER2

Immunohistochemistry in breast cancer by automated quantitative analysis (AQUA).
Archives of Pathology and Laboratory Medicine 133:1413-1419.

Gustavson MD, Bourke-Martin B, Reilly DM, **Cregger M**, Williams C, Tedeschi G, Pinard R, Christiansen J (2009) Development of an Unsupervised Pixel-based Clustering Algorithm for Compartmentalization of Immunohistochemical Expression Using Automated QUantitative Analysis. Applied Immunohistochemistry & Molecular Morphology 17:329-337.

Giltane JM, Ryden L, **Cregger M**, Bendahl P.O, Jirstrom K, Rimm DL (2007) Quantitative measurement of epidermal growth factor receptor is a negative predictive factor for tamoxifen response in hormone receptor - Positive premenopausal breast cancer. Journal of Clinical Oncology 25:3007-3014.

Pozner-Moulis S, **Cregger M**, Camp RL, Rimm DL (2007) Antibody validation by quantitative analysis of protein expression using expression of Met in breast cancer as a model. Laboratory Investigation 87:251-260.

Shields JM, Thomas NE, **Cregger M**, Berger AJ, Leslie M, Torrice C, Hao HL, Penland S, Arbiser J, Scott G, Zhou T, Bar-Eli M, Bear JE, Der CJ, Kaufmann WK, Rimm DL, Sharpless NE (2007) Lack of extracellular signal-regulated kinase mitogen-activated protein kinase signaling shows a new type of melanoma. Cancer Research 67:1502-1512.

Cregger M, Berger AJ, Rimm DL (2006) Immunohistochemistry and quantitative analysis of protein expression. Archives of Pathology & Laboratory Medicine 130:1026-1030.

Dolled-Filhart M, McCabe A, Giltane J, **Cregger M**, Camp RL, Rimm DL (2006a) Quantitative in situ analysis of beta-catenin expression in breast cancer shows decreased expression is associated with poor outcome. Cancer Research 66:5487-5494.

Dolled-Filhart M, Ryden L, **Cregger M**, Jirstrom K, Harigopal M, Camp RL, Rimm DL (2006b) Classification of breast cancer using genetic algorithms and tissue microarrays. Clinical Cancer Research 12:6459-6468.

PRESENTATIONS (selected)

Cregger MA (2020) Growing up in a national laboratory. University of Vermont. Burlington, VT. *Invited Talk*

Cregger MA, Veach AM, Schadt CW (2019) Exploring spatial and temporal variation in plant-microbe interactions within *Populus* trees. Ecological Society of America. Louisville, KY. *Talk*

Cregger MA (2019) Exploring microbial biomarkers to diagnose disease. Southern Illinois University – School of Medicine. Springfield, IL. *Invited Talk*

Cregger MA (2019) Host-microbe interactions: exploring microbial dynamics in humans and plants. University of Tennessee. Knoxville, TN. *Invited Talk*

Cregger MA (2019) Exploring microbial biomarkers to diagnose disease. 21st Century Cures Conference. Knoxville, TN. *Invited Talk*

- Rogers T*, Leppanen C, Brown VA, LeBude A, Ranney T, Simberloff D, **Cregger MA** (2018) Variation in above and below ground microbial communities across four hemlock species. Ecological Society of America. New Orleans, LA. *Talk*
- Cregger MA**, Lyon T*, Klingeman D, Yang Z (2017) Consequences of plant stress on belowground microbial community structure, function, and ecosystem carbon cycling. Ecological Society of America. Portland, OR. *Talk*
- Cregger MA**, Crouch M*, Yang Z, Schadt CW (2016) The *Populus* microbiome atlas project – dissecting the microbiome landscape of an important economic and ecological model tree. IS-MPMI. Portland, OR. *Poster*
- Lyon T*, **Cregger MA** (2016) Short term effects of hemlock mortality on soil respiration on the Cumberland Plateau, Tennessee. 2016 summer student symposium. Oak Ridge, TN. *Poster*
- Cregger MA**, Crouch M*, Yang Z, Schadt CW (2015) Plant microbe interactions: The *Populus* Atlas. Oak Ridge National Laboratory, Argonne National Laboratory Soils Workshop. Argonne, Illinois. *Poster*
- Cregger MA**, Crouch M*, Yang Z, Schadt CW (2015) Plant microbe interactions: The *Populus* Atlas. Oak Ridge National Laboratory, 3rd annual Post-doctoral Symposium. Oak Ridge, TN. *Poster*
- Cregger MA**, McCord A, Chapman C, Weny G, Tumukunde A, Hyeroba D, Klotz K, Koblings A, Mbora D, Leigh S, Goldberg T, White B (2014) Digestive physiology structures gut bacterial communities across taxa. University of Illinois, Institute for Genomic Biology Fellows Symposium. Urbana, Illinois. *Poster*
- Cregger MA**, McCord A, Chapman C, Weny G, Tumukunde A, Hyeroba D, Klotz K, Koblings A, Mbora D, Leigh S, Goldberg T, White B (2014) From humans to livestock: digestive physiology structures gut microbial communities across a wide range of taxa. Gut microbiology: From sequence to function. Aberdeen, Scotland. *Poster*
- Classen AT, **Cregger MA** (2012) Soil microbial response to precipitation change. American Geophysical Union meeting. San Francisco, California. *Talk*
- Cregger MA**, McDowell NG, Schadt CW, Classen AT (2011) Microbial structure and function in a changing ecosystem. Department of Energy Global Change Education Program Summer Workshop. Knoxville, Tennessee. *Marvin L. Wesely Award. Talk*
- Cregger MA**, McDowell NG, Classen AT (2011) Precipitation change alters soil microbial communities in a pinyon-juniper woodland. Boreal Forest Ecology Course. Umea, Sweden. *Talk*
- Cregger MA**, McDowell NG, Pockman W, Classen AT (2010) Indirect effects of precipitation change alter soil microbial community structure in a Pinon-Juniper woodland. Argonne National Laboratory Soils Workshop. Argonne, Illinois. Travel grant (MAC) *Poster*
- Cregger MA**, McDowell NG, Pockman W, Classen AT (2010) Drought induced shifts in plant composition alter nitrogen cycling in a pinyon-juniper woodland. Bulletin of the Ecological Society of America. Pittsburg, Pennsylvania. *Talk*

- Cregger MA**, McDowell NG, Pockman W, Classen AT (2010) Indirect effects of precipitation change drive nitrogen cycling in a pinyon-juniper woodland. Association of Southeastern Biologists meeting. Asheville, North Carolina. *Talk*
- Wright P*, **Cregger MA**, Sanders NJ, Classen AT (2010) Interactions among insect herbivory, invasive plants, and soil nutrients alters soil microbial function. Association of Southeastern Biologists meeting. Asheville, North Carolina. *Talk*
- Cregger MA**, McDowell NG, Pockman WT, Yeppez EA, Classen AT (2009) Precipitation change shapes nitrogen cycling in a pinyon-juniper woodland. Bulletin of the Ecological Society of America. Albuquerque, New Mexico. *Talk*
- Kardol P, **Cregger MA**, Company CE, Classen AT (2009) Changes in plant community composition affect multifactor climate change effects on soil ecosystem functioning. Soil Ecology Society 12th Biennial International Conference. Brattleboro, Vermont. *Talk*
- Kardol P, **Cregger MA**, Company CE, Classen AT (2008) Multi-factor climate change effects on soil ecosystem functioning depend on changes in plant species composition. Dissertations Initiative for the Advancement of Climate Change Research (DISCCRS) IV Symposium, Saguaro Lake Ranch, Arizona. *Invited talk*
- Cregger MA**, Company C, Classen AT (2008) Effect of climate change on soil enzymatic activity in an old field community. Bulletin of the Ecological Society of America. Milwaukee, Wisconsin. *FESIN & UTK travel award (MAC). Poster*

TEACHING EXPERIENCE AND ADVISING

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| 2019- | Post-doctoral mentor – Jessica Moore, ORNL |
| 2019- | Undergraduate mentor – Rachel Andrews, ORNL |
| 2019- | Post-doctoral mentor – Nicholas Dove, ORNL |
| 2018- | Post-doctoral mentor – Eric Johnston, ORNL |
| 2016-2019 | Post-doctoral mentor – Allison Veach, ORNL |
| 2019 | Undergraduate mentor – Emilie Sidelinger, ORNL |
| 2018-2019 | Post-bachelor mentor – Toni Wahl, ORNL |
| 2019 | Graduate GEM mentor – Brittany Hicks, ORNL |
| 2017-2018 | Undergraduate mentor – TJ Rogers, ORNL |
| 2016 | Graduate GEM mentor – Francisco Fields, ORNL |
| 2015-2016 | Undergraduate mentor – Taylor Lyon and Miranda Crouch, ORNL |
| 2013-2014 | Undergraduate mentor – Shunzhe Yao, Annette Merkel, Jim Bruce, Deba Imafidon, University of Illinois |
| 2009-2011 | Undergraduate mentor – Phoebe Wright, University of Tennessee |
| 2009 | Ecology laboratory instructor |

- 2009 Ecology guest lecturer
2008 Biology laboratory instructor

PROFESSIONAL/HONORARY ASSOCIATIONS

American Society for Microbiology
Ecological Society of America
American Association for the Advancement of Science

PROFESSIONAL SERVICE AND OUTREACH

- 2020 Initiative lead for Quantitative Biology and Genome Security, Laboratory Directed Research and Development. Oak Ridge National Laboratory
- 2018 Leadership and planning committee member: Women in Science and Engineering. Oak Ridge National Laboratory
- 2018 NSF review panelist
- 2017 Committee member: Science advisory workshop. Oak Ridge National Laboratory
- 2017 Committee member: Big Science Ideas competition. Oak Ridge National Laboratory
- 2013 Organizing chair: Career development seminar “*Careers outside of academia*”. Institute for Genomic Biology
- 2013 Organizing co-chair: Institute for Genomic Biology Fellows Symposium
- 2012 Organizing committee: Genome Day
- 2012 Organizing chair: IGB theme hopping, Host-Microbe Systems
- Manuscript reviewer: *Ecosystems, Functional Ecology, Journal of Plant Ecology, Microbial Ecology, Plant Ecology, Plos One, Soil Biology & Biogeochemistry, Soil Science Society of America Journal*

INVITED COURSES AND WORKSHOPS

- 2019 Developing leadership potential, Oak Ridge National Laboratory
- 2017 Covey’s seven habits of highly effective people course, Oak Ridge National Laboratory
- 2017 Shipley proposal writing workshop, Oak Ridge National Laboratory
- 2013 BGI metagenomics workshop, ShenZhen China
- 2011 Microbial diversity course, Marine Biological Laboratory
- 2011 Boreal forest ecology course, Umea University, Sweden

* = undergraduate collaborator