

# MARIO E. MUSCARELLA

Aquatic Ecology Research Group, Groupe de Recherche Interuniversitaire en Limnologie (GRIL)

Département des Sciences Biologiques, Université du Québec à Montréal

Phone: (438) 887-8669; E-mail: mario.e.muscarella@gmail.com

## EDUCATION

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<b>Indiana University</b> Biology, Ph.D.; Evolution, Ecology & Behavior Program	<i>Aug 2012 – Jun 2016</i>
<b>Michigan State University</b> Microbiology & Molecular Genetics Ecology and Evolutionary Biology	<i>June 2010 – Aug 2012</i>
<b>Armstrong State University</b> Biology, Summa Cum Laude, B.S.	<i>Aug 2004 – May 2008</i>

## EXPERIENCE

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<b>Assistant Professor</b> <i>University of Alaska Fairbanks</i> Institute of Arctic Biology: Boreal and Arctic Microbial Ecology, Microbial Metabolism Department of Biology and Wildlife: Microbiology	<i>August 2020 – Fairbanks, AK</i>
<b>Postdoctoral Fellow</b> <i>Université du Québec à Montréal</i> del Giorgio Lab: Aquatic Ecology Research Group, Aquatic Microbial Ecology, Microbial Metabolism	<i>July 2019 – Present Montréal, QC</i>
<b>Research Scientist II</b> <i>University of Alaska Fairbanks</i> Institute of Arctic Biology: Boreal and Arctic Microbial Ecology, Microbial Metabolism	<i>June 2019 – Present Fairbanks, AK</i>
<b>Postdoctoral Research Associate</b> <i>University of Illinois</i> O'Dwyer Lab: Theoretical Ecology, Microbial Ecology, Trait-Based Ecology, Phylogenetic Patterns	<i>August 2016 – June 2019 Urbana, IL</i>
<b>Instructor</b> <i>University of Illinois</i> Courses Taught: Evolution of Molecules and Cells (Integrative Biology Honors Program)	<i>August 2018 – June 2019 Urbana, IL</i>
<b>Graduate Research Assistant</b> <i>Indiana University</i> Lennon Lab: Aquatic Microbial Ecology, Molecular and Ecological Strategies of Resource Utilization; Interactions between Microbes and Molecules	<i>June 2010 – July 2016 Bloomington, IN</i>
<b>Graduate Teaching Assistant</b> <i>Michigan State University / Indiana University</i> Courses Taught (MSU): Microbial Metagenomics; Cells and Molecules Lab; Introductory Microbiology Lab Courses Taught (IU): Quantitative Biodiversity; Environmental Microbiology; Introductory Biology Lab	<i>June 2011 – May 2015 East Lansing, MI / Bloomington, IN</i>
<b>Research Technician</b> <i>University of Georgia Marine Institute</i> Booth Lab: Georgia Coastal Ecosystems LTER, & Sapelo Island Microbial Observatory	<i>June 2008 – June 2010 Sapelo Island, GA</i>

## PUBLICATIONS

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### *In Review, In Revision, and/or Preprint*

**Muscarella ME**, Howey XM, Lennon JT (In Review) Trait-based approach to bacterial growth efficiency. bioRxiv preprint available, DOI: <https://doi.org/10.1101/427161>

**Muscarella ME**, O'Dwyer JP (In Review) Species dynamics and interactions via metabolically informed consumer-resource models. bioRxiv preprint available, DOI: <https://doi.org/10.1101/518449>

Johnson WM, Alexander H, Bier RL, Miller DR, **Muscarella ME**, Pitz KJ, Smith H (In Review) Auxotrophic interactions: A stabilizing attribute of aquatic microbial communities?

**Muscarella ME**, O'Dwyer JP (In Revision) Ecological insights from the evolutionary history of microbial innovations. bioRxiv preprint available, DOI: <https://doi.org/10.1101/220939>

Vandegrift R, Fahimipour AK, **Muscarella ME**, Bateman AC, Van Den Wymelenberg K, Bohannan BJM (In Revision) Moving microbes: the dynamics of transient microbial residence on human skin. bioRxiv preprint available, DOI: <https://doi.org/10.1101/586008>

### *In Press and Published*

Locey KJ, **Muscarella ME**, Larsen ML, Bray SR, Jones SE, Lennon JT (2020) Dormancy dampens the microbial distance-decay relationship. *Phil. Trans. R. Soc.*, B37520190243

Wisnoski NI, **Muscarella ME**, Larsen ML, Peralta AL, Lennon JT (2020) Metabolic insight into bacterial community assembly across ecosystem boundaries *Ecology*, 00( 00):e02968

**Muscarella ME**, Boot CM, Broeckling CD, Lennon JT (2019) Resource heterogeneity structures aquatic bacterial communities. *The ISME Journal*, 13:2183–2195

Lennon JT, **Muscarella ME**, Placella SA, Lehmkuhl, BK (2018) How, When, and Where Relic DNA Affects Microbial Diversity. *mBio*, 9(3):e00637-18

Aanderud ZT, Saurey S, Ball BA, Wall DH, Barrett JE, **Muscarella ME**, Griffin NA, Virginia RA, Adams BJ (2018) Stoichiometric shifts in soil C:N:P promotes bacterial taxa dominance, maintains biodiversity, and deconstructs community assemblages. *Frontiers in Microbiology*, 9:1401

Long H, Sung W, Kucukyildirim S, Williams E, Miller S, Guo W, Patterson C, Gregory C, Strauss C, Stone C, Berne C, Kysela D, Shoemaker WR, **Muscarella ME**, Luo H, Lennon JT, Brun YV, Lynch M (2018) Evolutionary determinants of genome-wide nucleotide composition. *Nature Ecology & Evolution*, 2(2):237-240

Peralta AL, **Muscarella ME**, Mathews JW (2017) Lingering land use legacies after different wetland restoration strategies. *Elementa: Science of the Anthropocene*, 5:74

Kuo V, Shoemaker WR, **Muscarella ME**, Lennon JT (2017) Whole-genome sequence of the soil bacterium *Micrococcus* sp. KBS0714. *Genome announcements*, 5(32):e00697-17

Kelly PT, Bell T, Reisinger AJ, Spanbauer T, Bortolotti L, Brentrup J, Briseno-Avena C, Dong X, Flanagan A, Follett E, Grosse J, Guy-Haim T, Holgerson MA, Hovel R, Luo J, Millette N, Mine A, **Muscarella ME**, Oliver S, Smith H (2017) Ecological Dissertations in the Aquatic Sciences (Eco-DAS): An effective networking and professional development opportunity for early career aquatic scientists. *Limnology and Oceanography Bulletin*, 26(2):25-30

Guy-Haim T, Alexander H, Bell TW, Bier RL, Bortolotti LE, Briseno-Avena C, Dong X, Flanagan AM, Grosse J, Grossmann L, Hasnain S, Hovel R, Johnston CA, Miller DR, **Muscarella ME**, Noto AE, Reisinger AJ, Smith HJ, Stameszkin K (2017) What are the type, direction, and strength of species, community, and

ecosystem responses to warming in aquatic mesocosm studies and their dependency on experimental characteristics? A systematic review protocol. *Environmental Evidence*, 6(1):6

**Muscarella ME**, Jones SE, Lennon JT (2016) Species sorting along a subsidy gradient alters bacterial community stability. *Ecology*, 97(8):2034-2043

Shoemaker WR\*, **Muscarella ME\***, Lennon JT (2015) Genome sequence of the soil bacterium *Janthinobacterium* sp. KBS071. *Genome Announcements*, 3(3):e00689-15

**Muscarella ME**, Bird KC, Larsen ML, Placella SA, Lennon JT (2014) Phosphorus resource heterogeneity affects the structure and function of microbial food webs. *Aquatic Microbial Ecology*, 73(3):259-272

Lennon JT, Hamilton SK, **Muscarella ME**, Grandy AS, Wickings K, Jones SE (2013) A source of terrestrial organic carbon to investigate the browning of aquatic ecosystems. *PLoS ONE*, 8(10):e75771

Awong-Taylor J, Craven K, Griffiths L, Bass C, **Muscarella ME** (2008) Comparison of biochemical and molecular methods for the identification of bacterial isolates associated with failed loggerhead sea turtle eggs. *Journal of Applied Microbiology*, 104:1244-1251

Craven KS, Awong-Taylor J, Griffiths L, Bass C, **Muscarella ME** (2007) Identification of bacterial isolates from unhatched loggerhead (*Caretta caretta*) sea turtle eggs in Georgia, USA. *Marine Turtle Newsletter*, 115:9-11

(\* co-first authors)

## GRANTS

<b>NSF Doctoral Dissertation Improvement Grant \$19,004</b>	2015 – 2017
DISSERTATION RESEARCH: Metabolic Resource Partitioning: Scaling Microbial Physiology from Individual Activity to Ecosystem Function	
<b>Indiana Academy of Sciences Senior Research Grant \$2,200</b>	2014 – 2015
Metabolic Fate of Terrestrial Carbon Resources: Anabolic vs. Catabolic Processes	
<b>Huron Mountain Wildlife Foundation Grant Renewal \$3,299</b>	2012 – 2014
Browning of Freshwater Ecosystems: Will Terrestrial Carbon Loading Alter the Diversity and Function of Aquatic Microbial Communities?	
<b>Huron Mountain Wildlife Foundation Grant \$5,600</b>	2011 – 2012
Browning of Freshwater Ecosystems: Will Terrestrial Carbon Loading Alter the Diversity and Function of Aquatic Microbial Communities?	

## HONORS AND AWARDS

<b>Postdoctoral Recruitment Fellowship</b>	2019 – 2020
Université du Québec à Montréal, Montréal, QC	
<b>Teachers Ranked as Excellent</b>	2018
Integrative Biology, University of Illinois, Urbana, IL	
<b>Floyd Microbiology Summer Fellowship</b>	2013 – 2014
Department of Biology, Indiana University, Bloomington, IN	
<b>Floyd Microbiology Travel Award</b>	2012
Department of Biology, Indiana University, Bloomington, IN	
<b>University Distinguished Fellowship</b>	2010
Graduate School, Michigan State University, East Lansing, MI	

<b>Early Start Fellowship</b>	2010
College of Natural Sciences, Michigan State University, East Lansing, MI	
<b>Les Davenport Award</b>	2008
Biology Department, Armstrong State University. Savannah, GA	
<b>ASB Research Award in Microbiology</b>	2008
Presented at the 69th Annual Association of Southeastern Biologists Conference	
Best Paper Presentation in the Area of Microbiology	
<b>Faculty Recognition Award</b>	2007
Biology Department, Armstrong State University. Savannah, GA	

## SYMPOSIA AND WORKING GROUPS

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<b>2018</b>	Microorganisms and Organic Carbon in the Marine Subsurface Center for Dark Energy Biosphere Investigations, Knoxville, Tennessee
<b>2016</b>	Eco-DAS XII: Ecological Dissertations in the Aquatic Sciences, Honolulu, HI
<b>2016</b>	Predicting the Response of Host-associated Microbiomes to Disturbance Santa Fe Institute Working Group, Santa Fe, NM
<b>2016</b>	Ramon Margalef Summer Colloquia Microbes in a Changing World: Diversity and Biogeochemistry, Barcelona, Spain

## WORKSHOPS

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<b>2018</b>	JGI Microbial Genomics and Metagenomics, DOE Joint Genome Institute, Walnut Creek, CA
<b>2013</b>	Software Carpentry Workshop, Bloomington IN
<b>2012</b>	DOM Fluorescence Workshop, INSTAAR, Boulder CO
<b>2010</b>	Mothur Software Workshop, Detroit MI

## SERVICE

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### Reviewer

**Journals:** *Aquatic Ecology, Aquatic Microbial Ecology, Environmental Microbiology, Environmental Science & Technology, Limnology & Oceanography Letters, Microbial Ecology, Microbiome Nature Communications, Proceedings of the Royal Society B, Science of the Total Environment, The ISME Journal*

**Books:** *Processes in Microbial Ecology, Kirchman (2012)*

### Editorial Board Member

The ISME Journal (2020 – )

### Committee Member

University of Illinois: *Research Scientist Search Committee*

Indiana University: *IU Biology GRW Transportation*

Michigan State University: *MMG Grad Committee*

### Outreach

Jim Holland Summer Enrichment Program (Indiana University): *Stream Health & Micro-Invertebrate Assessment* (2012 – 2016)

Wonderlab Science Museum (Bloomington, IN): *Good Microbes Exhibit* (2012 – 2014)

Women in STEM (Indiana University): *Stream Micro-Invertebrate Assessment* (2012)

### **Professional Society Leadership**

Vice Chair, Microbial Ecology Section, Ecological Society of America (2018 – Present)  
Graduate Student Liaison for Microbial Ecology Section, ESA (2013 – 2015)

### **Symposium Moderator**

Turn and Face the Strain: Changing Signatures of Niche Processes in Disease and Community Diversity  
Ecological Society of America Annual Meeting. Portland, OR (2017)

### **Conference Co-Organizer**

2015 Midwest Ecology and Evolution Conference. Bloomington, IN

### **Course Development**

Evolution of Molecules and Cells (2018, University of Illinois)  
Quantitative Biodiversity (2015, Indiana University)  
repo: <https://github.com/quantitativebiodiversity>  
website: <http://documentup.com/QuantitativeBiodiversity/QuantitativeBiodiversity>

## **PROFESSIONAL AFFILIATIONS**

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*Ecological Society of America*  
*Association for the Sciences of Limnology and Oceanography*  
*Great Lakes Ecological Observatory Network*

## **INVITED SEMINARS**

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**2019** Department of Ecology & Evolutionary Biology, University of Arizona, AZ, USA  
**2019** Département des Sciences Biologiques, Université du Québec à Montréal, QC, CA  
**2019** Department of Biology & Wildlife, University of Alaska Fairbanks, AK, USA  
**2018** Gosnell School of Life Sciences, Rochester Institute of Technology, NY, USA  
**2018** Division of Biology, Kansas State University, KS, USA  
**2018** Department of Ecology & Evolutionary Biology, University of Kansas, KS, USA  
**2015** Program in Ecology, Evolution, and Conservation Biology, University of Illinois, IL, USA

## **INVITED LECTURES**

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**Muscarella ME** (2017) Stochastic Models in Evolutionary Ecology. Theoretical Biology & Models (IB 494), University of Illinois at Urbana-Champaign.

## **CONTRIBUTED PRESENTATIONS**

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**Muscarella ME**, Fahimipour, AK, O'Dwyer JP (2019) On sampling and sampling effort in microbial ecology  
Ecological Society of America Annual Meeting, Knoxville, TN.

Peralta AL, Bledsoe R, **Muscarella ME** (2019) Consequences and considerations of multiple stressors on urban wetland microbiomes  
Ecological Society of America Annual Meeting, Knoxville, TN.

Peralta AL, Stucky A, **Muscarella ME** (2018) Bacterial phylogeny-function relationships in freshwater ecosystems are particularly vulnerable to freshwater-brackish water intermediate environments. Annual Meeting of the North Carolina American Society for Microbiology Branch. Asheville, NC.

Wisnoski NI, **Muscarella ME**, Lennon JT (2018) Dispersal and dormancy across ecosystem boundaries: Bacterial diversity and function along a reservoir transect. Association for the Sciences of Limnology and Oceanography. Victoria, British Columbia.

**Muscarella ME**, O'Dwyer JP (2017) A Phylogenetic Framework for Trait Innovation and Selection in Microbial Communities. Ecological Society of America Annual Meeting, Portland OR.

Peralta AL, **Muscarella ME** (2017) How can we manage microbial functions to restore ecosystem services in human-dominated landscapes? Ecological Society of America Annual Meeting, Portland OR.

Locey KJ, Lennon JT, Larsen ML, **Muscarella ME**, Jones SE (2017) Spatiotemporal effects of microbial seed banks on community structure. Ecological Society of America Annual Meeting, Portland OR.

**Muscarella ME**, Lennon JT (2015) Bacterial growth efficiency: do consumer and resource diversity influence the fate of carbon in aquatic ecosystems? Ecological Society of America 100th Annual Meeting, Baltimore MD.

**Muscarella ME**, Locey KJ, Nevo E, Raz S, Lennon JT (2014) Microbial community assembly at Evolution Canyon: Does dormancy dilute the effects of dispersal and filtering? Ecological Society of America 99th Annual Meeting, Sacramento CA.

**Muscarella ME**, Bird KC, Larsen ML, Placella SA, Lennon JT (2014) Phosphorus resource heterogeneity affects the structure and function of microbial food webs. Association for the Sciences of Limnology and Oceanography, Portland OR.

**Muscarella ME**, Bird KC, Larsen ML, Placella SA, Lennon JT (2014) Phosphorus resource heterogeneity affects the structure and function of microbial food webs. Midwest Ecology and Evolution Conference, Dayton OH.

**Muscarella ME**, Jones SE, Lennon JT (2013) Species Sorting Along a Subsidy Gradient Affects Community Stability. Ecological Society of America 98th Annual Meeting, Minneapolis MN.

**Muscarella ME**, Jones SE, Lennon JT (2013) Life in brown waters: Aquatic bacteria respond to increased terrestrial carbon loading. Midwest Ecology and Evolution Conference, South Bend, IN.

Lennon JT, **Muscarella ME**, Jones SE (2013) Bacteria and browning: implications of terrestrial carbon subsidies for aquatic ecosystems. Association for the Sciences of Limnology and Oceanography, New Orleans, LA.

**Muscarella ME**, Jones SE, Lennon JT (2013) Life in brown waters: Aquatic bacterial responses to increased terrestrial carbon loading. Association for the Sciences of Limnology and Oceanography, New Orleans, LA

**Muscarella ME**, Jones SE, Lennon JT (2012) Life in brown waters: Aquatic bacteria respond to increased terrestrial carbon loading. LTER All Scientists Meeting, Estes Park, CO.

Booth MG, Gifford S, Doherty M, **Muscarella M**, and Moran MA (2010) Expression of two carbon metabolism genes identified thorough transcriptomic analysis of estuarine bacterial communities of Sapelo Island, GA, U.S.A. International Society of Microbial Ecology Conference, Seattle, WA.

Doherty M, Poretsky R, **Muscarella ME**, Moran MA, Booth MG (2009) Tracking Metabolism of an Important Terrestrial Carbon Source by Marine Bacterioplankton. Coastal and Estuarine Research Federation 20th Biennial Conference. Portland, OR.

**Muscarella M**, Awong-Taylor J, Zettler J (2009) The Inability of Pathogenic and Nonpathogenic Strains of *Escherichia coli* to Survive in Coastal Beach Sand. 2009 Annual Conference of the Southeastern Branch American Society for Microbiology. Savannah, GA.

**Muscarella M**, Awong-Taylor J (2008) Role of Curli Fibers in the Adhesion of *Escherichia coli* O157:H7 to Bean Sprouts. American Society for Microbiology 108th Annual Meeting. Boston, MA.

**Muscarella M**, Awong-Taylor J, Zettler J (2008) The Potential for Pathogenic and non-pathogenic *Escherichia coli* to Survive in Beach Sand from Tybee Island, GA. Association of Southeastern Biologists 69th Annual Meeting. Spartanburg, SC.

**Muscarella M**, Awong-Taylor J (2008) A Method to Compare the Effectiveness of Different Washes on Removal Rates of *E. coli* from Plant Roots. Southern Regional Honors Council 36th Annual Conference. Birmingham, AL.

Griffiths L, Bass C, **Muscarella M**, Awong-Taylor J, Craven K (2006) Using Traditional and Molecular Techniques to Determine if Microbial Contamination Plays a Role in Embryonic Death of Loggerhead Sea Turtle Eggs. Florida Academy of Sciences 70th Annual Meeting. Melbourne, FL

## ACADEMIC ADVISORS

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**Paul A. del Giorgio** Université du Québec à Montréal (Postdoc)

**James P. O'Dwyer** University of Illinois (Postdoc)

**Jay T. Lennon**, Indiana University (Ph.D.)

**Judy Awong-Taylor**, Armstrong State University (B.S.)

## MENTEES

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Charles Dean (*University of Illinois* 2018)

### ***Undergraduate Students:***

Belen Muniz (*University of Illinois* 2017)

Mollie Carrison (*Indiana University* 2015 – 2016)

Rachel Ferrill (*Transylvania University* 2015)

Xia Meng Howey (*Indiana University* 2012 – 2014)

### ***High School Students:***

Dakayla Calhoun (*Shortridge International Baccalaureate High School, Indianapolis, IN* 2015)

Nick Nelson (*Bishop Noll Institute, Hammond, IN* 2012)