

ANTHONY G. VECCHIARELLI

Assistant Professor
Department of Molecular, Cellular, and Developmental Biology
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EDUCATION

- 2010 **Ph.D.** in Molecular Genetics
Department of Molecular Genetics, **University of Toronto**, Ontario, Canada
- 2003 **Honors B.Sc., with High Distinction**, in Molecular Genetics and Microbiology
Department of Molecular Genetics, **University of Toronto**, Ontario, Canada

RESEARCH EXPERIENCE

- 2017-present **Assistant Professor**
Department of Molecular, Cellular, and Developmental Biology, **University of Michigan**, Ann Arbor, MI
Adjunct Professor
Department of Microbiology and Immunology, **University of Michigan**, Ann Arbor, MI
- 2010-2016 **Postdoctoral Fellow**
Laboratory of Molecular Biology, **National Institutes of Health**
Advisor - **Dr. Kiyoshi Mizuuchi**
Project – Cell-free reconstitution of bacterial DNA segregation and cell-division positioning systems
- 2003-2010 **Graduate Student**
Department of Molecular Genetics, University of Toronto
Advisor - **Dr. Barbara Funnell**
Thesis Project - Analysis of the Nucleoprotein Complexes Essential for Plasmid Partition
- 2001-2003 **Undergraduate Independent Research**
Department of Molecular Genetics, University of Toronto
Advisor - **Dr. Barbara Funnell**
Project – Characterization of the kinetochore protein required for bacterial mitosis

HONOURS AND AWARDS

- 2014 Cozzarelli Prize, Division of Biological Sciences, National Academy of Sciences
- 2013-2014 Earl Stadtman Investigator Semifinalist, NIH
- 2013-2014 Fellows Award for Research Excellence, NIH
- 2012 Best Oral Presentation - NIDDK Postdoctoral Conference, NIH
- 2010 Barbara Vivash Award - Best PhD Thesis, University of Toronto (\$6,000)

INTERNAL SUPPORT TO A.G. VECCHIARELLI

- 2017-present Research Initiation Funds from the University of Michigan

EXTERNAL SUPPORT TO A.G. VECCHIARELLI

University of Michigan – Pending
None

University of Michigan – Ongoing

2018 - 2021 **NSF/BIO - MCB Cluster** (PI: Vecchiarelli)
 “Organelle trafficking, inheritance, and homeostasis in bacteria”
 The goal for this project is to determine the molecular mechanisms of carboxysome trafficking

University of Michigan – Completed

None

National Institutes of Health (Postdoc)

2010-2016 Nancy Nossal Postdoctoral Fellowship, National Institutes of Health (\$10,000 total)

University of Toronto (Graduate Student)

2004-2009 Open Fellowship, University of Toronto (\$25,000 total)
2007 L.W. Macpherson Microbiology Fellowship, University of Toronto (\$2,500)
2005 Eric Hani Microbiology Fellowship, University of Toronto (\$4,000)

INTERNAL SUPPORT TO VECCHIARELLI LAB MEMBERS

2017 Rackham Candidate Research Fellowship: Pusparanee Hakim
2018 Michigan Life Sciences Fellowship: Joshua S. MacCready

EXTERNAL SUPPORT TO VECCHIARELLI LAB MEMBERS

None

PUBLICATIONS

Annotation Key:

Underline = corresponding author(s)

^a = Equal contribution

Research Articles

MacCready JS, Hakim P, Young EJ, Hu L, Liu J, Osteryoung KW, **Vecchiarelli AG** & Ducat DC (2018). Protein Gradients on the Nucleoid Position the Carbon-fixing Organelles of Cyanobacteria. *BioRxiv* doi: <https://doi.org/10.1101/334813>

Sundararajan K, **Vecchiarelli AG**, Mizuuchi K & Goley ED (2018). Species- and C-terminal linker-dependent variations in the dynamic behavior of FtsZ on membranes in vitro. *Molecular Microbiology* doi: 10.1111/mmi.14081

Hu L, **Vecchiarelli AG**, Mizuuchi K, Neuman KC & Liu J (2017). Brownian ratchet mechanisms of ParA-mediated partitioning. *Plasmid* 92, 12.

Hu L, **Vecchiarelli AG**, Mizuuchi K, Neuman KC & Liu J (2017). Brownian ratchet mechanism for faithful segregation of low-copy-number plasmids. *Biophysical Journal* 112, 1489

Vecchiarelli AG, Li M, Mizuuchi M, Hwang LC, Seol Y, Neuman KC & Mizuuchi K (2016). Membrane-bound MinDE complex acts as a toggle switch that drives Min oscillation coupled to cytoplasmic depletion of MinD. *PNAS* 113, E1479
**Commentary highlight – Sherratt DJ (2016). Oscillation helps get division right. PNAS 113, 2803*

Longhua Hu, **Vecchiarelli AG**, Mizuuchi K, Neuman KC & Liu J (2015). Directed and persistent movement arises from mechanochemistry of the ParA/ParB system. *PNAS* 112, E7055

Vecchiarelli AG, Seol Y, Neuman KC & Mizuuchi K (2015). A moving ParA gradient on the nucleoid directs subcellular cargo transport via a chemophoresis force. *BioArchitecture* 4, 154

- Vecchiarelli AG, Li M, Mizuuchi M & Mizuuchi K (2014). Differential affinities of MinD and MinE to anionic phospholipid influence Min patterning dynamics in vitro. *Molecular Microbiology* 93, 453
- Vecchiarelli AG, Neuman KC & Mizuuchi K (2014). A propagating ATPase gradient drives transport of surface-confined cellular cargo. *PNAS* 111, 4880
**Winner of the 2014 Cozzarelli Prize at PNAS*
**PNAS Science Sessions Podcast*
**Commentary highlight – Kiebusch D and Thanbichler M (2014). Plasmid segregation by a moving ATPase gradient. PNAS 111, 4741*
- Vecchiarelli AG, Havey JC, Ing L, Wong E, Waples W & Funnell BE (2013). Dissection of the ATPase active site of P1 ParA reveals multiple active forms essential for plasmid partition. *Journal Biological Chemistry* 288, 17823
- Vecchiarelli AG, Hwang LC & Mizuuchi K (2013). Cell-free study of F plasmid partition provides evidence for cargo transport by a diffusion-ratchet mechanism. *PNAS* 110, E1390
- Hwang LC^a, Vecchiarelli AG^a, Han YW, Mizuuchi M, Harada Y, Funnell BE & Mizuuchi K (2013). ParA-mediated plasmid partition driven by protein pattern self-organization. *EMBO Journal* 32, 1238
**Commentary highlight - Sherratt DJ (2013). Plasmid partition: sisters drifting apart. EMBO 32,1208*
- Vecchiarelli AG & Funnell BE (2013). Probing the N-terminus of ParB using cysteine-scanning mutagenesis and thiol modification. *Plasmid* 70, 86
- Havey JC, Vecchiarelli AG & Funnell BE (2012). ATP-regulated interactions between P1 ParA, ParB & non-specific DNA that are stabilized by the plasmid partition site. *Nucleic Acids Research* 40, 801
- Vecchiarelli AG, Han YW, Tan X, Mizuuchi M, Ghirlando R, Biertümpfel C, Funnell BE & Mizuuchi K (2010). ATP control of dynamic P1 ParA-DNA interactions: a key role for the nucleoid in plasmid partition. *Molecular Microbiology* 78, 78
**Commentary highlight - Howard M & Gerdes K (2010). What is the mechanism of ParA-mediated DNA movement? Molecular Microbiology 78, 9*
**2010 highlight from the ASM blog "Small Things Considered"*
- Vecchiarelli AG, Schumacher MA & Funnell BE (2007). P1 partition complex assembly involves several modes of protein-DNA recognition. *Journal Biological Chemistry* 282, 10944
- Review Articles, News and Views, and Book Chapters**
- MacCready JS & Vecchiarelli AG (2018). In long bacterial cells, the Min system can act off-center. *Molecular Microbiology* doi: 10.1111/mmi.13995
- Mizuuchi K & Vecchiarelli AG (2017). Mechanistic insight of the Min oscillator via cell-free reconstitution and imaging. *Physical Biology*. doi: 10.1088/1478-3975/aa9e5e
**Invited Review Article for a special issue on Bottom-up Synthetic Biology*
- Hu L, Vecchiarelli AG, Mizuuchi K, Neuman KC & Liu J (2017). Brownian Ratchet Mechanisms of ParA-mediated partitioning. *Plasmid* 92, 12
- Vecchiarelli AG, Taylor JA & Mizuuchi K. ParAB motility reconstitution (2015). Building a Cell from its Component Parts. *Methods in Cell Biology* 128, Chapter 13
- Vecchiarelli AG, Mizuuchi K & Funnell BE (2012). Surfing biological surfaces: exploiting the nucleoid for partition and transport in bacteria. *Molecular Microbiology* 86, 513
**Rated a "Must Read" by the Faculty of 1000*

A.G. VECCHIARELLI - INVITED EXTERNAL RESEARCH TALKS AND SEMINARS

June 2018	American Society for Microbiology Annual Meeting. Atlanta, GA Symposium Moderator and Speaker – Trafficking, Inheritance, and Homeostasis of Bacterial Organelles Track-Hub Moderator and Speaker – What’s in a Name: Organelles and the Cytoskeleton in Bacteria
Mar 2018	Molecular Biology Seminar Series, University of Wyoming, Laramie, WY
Sept 2017	Biochemistry Department Seminar Series, Duke University, Durham, NC
Sept 2017	Lambda Lunch, NIH, Bethesda, MD
June 2017	American Society for Microbiology Annual Meeting. New Orleans, LA
Dec. 2016	American Society for Cell Biology Annual Meeting. San Francisco, CA
Aug. 2016	Molecular Genetics of Bacteria and Phages Meeting, University of Wisconsin-Madison, Madison, WI
Feb. 2016	Department of Biology, Indiana University Bloomington, Bloomington, IN
Dec. 2015	Molecular, Cellular and Developmental Biology, University of Michigan, Ann Arbor, MI
Dec. 2015	American Society for Cell Biology Annual Meeting. San Diego, CA
June 2015	Nucleic Acids Gordon Research Conference. Biddeford, ME
Dec. 2015	Earl Stadtman Symposium. NIH, Bethesda, MD
June 2015	Prokaryotic Cell Biology, American Society for Microbiology. Washington, DC
Mar. 2015	Department of Biology, Queens University, Kingston, ON, Canada
Dec. 2014	Earl Stadtman Symposium. NIH, Bethesda, MD
Dec. 2014	Microbiology Department, UC Davis, Davis, CA
Apr. 2014	Department of Biochemistry, Microbiology and Immunology, University of Ottawa, Ottawa, ON, Canada
Mar. 2014	American Physical Society Annual Meeting. Denver, CO
June 2013	American Society for Microbiology Annual Meeting. Denver, CO
May 2013	Chromosome Dynamics Gordon Research Conference. Barga, Italy
Mar. 2013	The Bauer Forum. Harvard University

A.G. VECCHIARELLI - RESEARCH TALKS AND SEMINARS AT THE UNIVERSITY OF MICHIGAN

Sept. 2017	Microbiology Super Group
Nov. 2017	Department of Microbiology and Immunology Seminar Series
Oct. 2017	Quantitative Biology Seminar Series
Oct. 2016	Molecular, Cellular, and Developmental Biology Departmental Retreat

PRESS COVERAGE OF THE VECCHIARELLI LAB

Aug. 2018	Vecchiarelli Lab art selected for the 2017 BioArtography Collection https://bioartography.myshopify.com/collections/2018-juried-collection/products/Bactilluminati-1
Aug. 2017	Vecchiarelli Lab art selected for the 2017 BioArtography Collection https://bioartography.myshopify.com/collections/2017-juried-collection/products/catch-me-if-you-can-1
Mar. 2017	NIH Director’s Blog: “Cool Videos: Making Multicolored Waves in Cell Biology” https://directorsblog.nih.gov/2017/03/16/cool-videos-making-multicolored-waves-in-cell-biology/
Sept. 2016	FASEB 2016 BioArt Winner – Best Video http://www.faseb.org/Resources-for-the-Public/Scientific-Contests/BioArt/Past-Winners/2016-BioArt-Winners.aspx
Dec. 2016	Nikon Small World in Motion Competition – Honorable Mention http://www.nikonsmallworld.com/galleries/entry/2016-small-world-in-motion-competition/19
Jun. 2016	Image of the Day, Scientist Magazine http://www.the-scientist.com/?articles.view/articleNo/47696/title/Image-of-the-Day--Protein-Hypnosis/

RESEARCH PRESENTATIONS BY VECCHIARELLI LAB MEMBERS

Aug. 2018	Joshua MacCready: <u>Talk</u> – Plant and Microbial Cytoskeleton Conference, GRC. Andover, NH
Aug. 2018	Pusparanee Hakim: <u>Poster</u> – Plant and Microbial Cytoskeleton Conference, GRC. Andover, NH
June 2018	Pusparanee Hakim: <u>Talk</u> and <u>Poster</u> - American Society for Microbiology Annual Meeting. Atlanta, GA

Mar. 2018 **Pusparanee Hakim:** Talk - Microbiology Super Group, UofM
Oct. 2017 **Pusparanee Hakim:** Talk and Poster - Molecular Cellular and Developmental Biology Dept Retreat
Mar. 2017 **Pusparanee Hakim:** Poster - American Society for Microbiology Regional Meeting, East Lansing, MI
Mar. 2017 **Ce Wang:** Poster - American Society for Microbiology Regional Meeting, East Lansing, MI

POSTER ABSTRACTS

Dec. 2016 **American Society for Cell Biology Annual Meeting.** San Francisco, CA, USA
Feb. 2016 **Biophysical Society Annual Meeting.** Baltimore, MD, USA
Dec. 2015 **American Society for Cell Biology Annual Meeting.** San Diego, CA, USA
June 2015 **Boston Bacterial Meeting.** Boston, MA, USA
May 2015 **Chromosome Dynamics Gordon Research Conference.** Waterville Valley, NH, USA
Feb. 2014 **Biophysical Society Annual Meeting.** San Francisco, CA, USA
May 2013 **Chromosome Dynamics Gordon Research Conference.** Barga, Italy
Apr. 2012 **Chromosome Dynamics Workshop.** Woods Hole, MA, USA
Feb. 2012 **Biophysical Society Meeting Annual Meeting.** San Diego, CA, USA
May 2009 **Chromosome Dynamics Gordon Research Conference.** Barga, Italy
Aug. 2007 **International Symposium on Plasmid Biology.** Lake Tahoe, CA, USA

TEACHING EXPERIENCE, MENTORING, and EDUCATIONAL SERVICE

University of Michigan

- Fall 2018 **MCDB 401: Building a Synthetic Cell**
- This course aims to address one of the grand scientific challenges of this century: building a synthetic cell from its molecular building blocks.
 - The objective of this course is for students to develop an understanding of how we define a cell as “living”, and where the transition from chemistry to biology lies.
- Winter 2018 **BIO 207: Introductory Microbiology**
- Taught half of the lectures for this introductory microbiology course aimed at sophomores and junior biology Majors
 - Lecturing on topics including microbial growth, cell biology, and molecular biology
 - The objective of this course is for students to develop a general understanding and appreciation for microbes.
- Fall 2017 **MCDB 614: Experimental Models in Molecular, Cellular and Developmental Biology**
- Graduate-level course designed to introduce students to research approaches and model organisms represented in the Department of Molecular, Cellular and Developmental Biology
 - The course has two objectives: 1) to introduce beginning graduate students to the basics of experimental design in the life sciences, and 2) to prepare students to critically evaluate the primary scientific literature in molecular, cellular and developmental biology.
 - Checkpoint #1 exam preparation, office hours, and grading

Vecchiarelli Lab members supervised in research:

Current:

Lisa Tran (Graduate student, PIBS – Micro/Immunology Dept), Feb. 2018-present
Joshua MacCready (Michigan Life Science Fellow, MCDB), May 2018-present
Pusparanee (Anne) Hakim (Graduate student, MCDB), Apr. 2017-present

Former:

Undergraduates:

Avery Liu (work/study), Feb. 2017 - June 2018
Jessica Zhang (3rd year t/esis), Sept. 2017 - June 2018

Brice Calco (4th year Honors thesis), Sept. 2017 - June 2018

Ian Lemersal (UROP, sophomore), Sept. 2017 - June 2018

Rotation Students:

Lotte Van den Goor (MCDB), Winter 2018

Ritvija Agrawal (MCDB), Winter 2018

Candiliane Serrano Zayas (PIBS, CMB), Winter 2018

Ce Wang (MCDB), Winter 2017

National Institutes of Health (postdoc)

Winter 2016 **Management Bootcamp**
Supervised four research projects in a variety of disciplines

2014 **Attendee and Speaker**, Synthetic Biology Workshop, University of Toronto
A one-week course focused on the current state of synthetic biology

Winter 2013 **Lecturer**, Foundation for Advanced Education in the Sciences (FAES)
Molecular Biology & Genetics - Introductory course

Winter 2012 **Lecturer**, Foundation for Advanced Education in the Sciences (FAES)
Molecular Biology & Genetics - Introductory course

Fall 2012 **Mentor Training Certificate**, Office of Intramural Training and Education, NIH

Students and Staff supervised in research:

Mengli Cai (Staff Scientist), 2014-2016
Michiyo Mizuuchi (Staff scientist), 2013-2016
Min Li (Staff Scientist), 2013-2016
James Taylor (Postdoc), 2013-2016
Grace Cheung (High-school summer research student)

University of Toronto

Winter 2009 **Teaching Fundamentals Certificate**, Training Program, University of Toronto

2005-2009 **Laboratory Demonstrator and Teaching Assistant**, University of Toronto
Principles of Genetic Analysis under the coordination of Dr. B.E. Funnell

2001-2002 **Science Outreach Instructor**, Faculty of Engineering, University of Toronto
Focused on getting students excited about S.T.E.M.

OUTREACH

Winter 2018 **Hands-on activity presentations at The Young Scientists Expo**, held by the Association for Women in Science (AWIS). Presented an activity related to the research in my lab entitled "How Green Bacteria Clean the Air" to hundreds of middle-school students and their families.

Fall 2017 **Hands-on activity presentations at the UM Museum of Natural History**, presented an activity related to the research in my lab entitled "How Green Bacteria Clean the Air" to museum visitors for the following events: Scientists Spotlights and Discovery Days.

Fall 2017 **Participant in the Science Communication Fellows Program at the UM Museum of Natural History**, participated in two professional development workshops focused on building the skills to effectively engage public audiences and developing an inquiry-based hands-on activity to showcase the research in my lab to Museum visitors.

PRESENTER FOR PROFESSIONAL DEVELOPMENT TALKS / PANELS

May 2018 **Panelist: "The Faculty Search Process: The Interview" NextProfScience Future Faculty Workshop**, University of Michigan LSA

Mar. 2018 **Panelist: Diversity, Equity and Inclusion – Science Branding with Social Media**
University of Michigan LSA

May 2017 **Panelist: "The Faculty Search Process: The Interview" NextProfScience Future Faculty Workshop**, University of Michigan LSA

Mar. 2017 **Mentoring Table Discussion Leader: “The Academic Job Search”**, Career Symposium, Molecular Genetics Department, University of Toronto, ON, Canada

EXTERNAL SERVICE and LEADERSHIP

2013 – Present **Ad-Hoc Reviewer for journals:** *Cell, Nature Scientific Reports, Applied and Environmental Microbiology, Journal of Bacteriology, Molecular Microbiology, JoVE*

2011-2014 **Judge**, Montgomery County Science Fairs, MD, USA

2004-2005 **Member**, Varsity Blues Men’s Volleyball Team, University of Toronto

2003-2004 **1st Year Representative**, Graduate Student Association, University of Toronto

INTERNAL SERVICE

Molecular, Cellular, and Developmental Biology Department:

2018-present Microbiology Major Curriculum Steering Committee

2017-present MCDB Graduate Admissions Committee

Microbiology and Immunology Department:

2018 Checkpoint #1 Exam Committee

Ph.D. Thesis Committee Member (in addition to my own students’ Thesis Committees) Current:

Katherine Wozniak, Dr. Lyle Simmons Lab, MCDB

Sujeet Bhoite, Dr. Matthew Chapman Lab, MCDB