

Michael Stephen Wollenberg

Associate Professor of microBiology

Kalamazoo College | Department of Biology | 1200 Academy St. | Kalamazoo, MI 49006



EDUCATION

Postdoctoral Fellow

The Forsyth Institute and Harvard School of Dental Medicine, Cambridge, MA.
Advisor: *Katherine P. Lemon, M.D. Ph.D.*

Fall 2011-2013

Ph.D. Microbiology

Department of Medical Microbiology and Immunology, University of Wisconsin, WI.
Advisor: *Edward G. Ruby, Ph.D.*

Fall 2004 - Spring 2011

Research Technician

Laboratory of Cellular Biophysics, The Rockefeller University, Manhattan, NY.
Mentor: *Sanford M. Simon, Ph.D.*

Spring 2002-2004

Bachelor of Arts: Biochemistry Special Major

Swarthmore College, Swarthmore, PA.
Summer Research Internships: *Mayo Clinic, DuPont Pharmaceuticals*

Fall 1997 - Spring 2002

TEACHING AND MENTORING

Teaching

Kalamazoo College

(Assistant Professor)

COURSE	# STUDENTS / TERM	TERMS TAUGHT
Biol 112 Evolution and Genetics with lab	~50 - 100 / Fall ~50 / Winter	Fall 2014, 2015, 2016, 2017, 2018 Winter 2014, 2015, 2017
Biol 295 Computational Tools for Biologists with lab	~10	Winter 2016, 2018
Biol 322 General and Medical Microbiology with lab	~20	Spring 2014, 2015, 2016, 2018
Biol 488 Topics in Biology: Symbiosis	~10	Winter 2014, 2019
Biol 490 Senior Seminar	~50	2017-2018

University of Wisconsin, Madison

(Teaching Assistant and Team Teacher)

COURSE	# STUDENTS / TERM	TERMS TAUGHT
Bact 526 Bacterial Physiology	~60	Fall 2005, 2006
Med. Microbiol. 351 Parasitology Laboratory	~30	Spring 2006
Microbiol. 100 The Microbial World (non-majors)	~60	Spring 2010

Research Mentoring

Wollenberg Lab, Kalamazoo College, Kalamazoo, MI

1X *Senior Individualized Project (SIP – senior thesis) biology research student*

7X *Independent study students during the academic term and summer*

1X *Independent study student author on peer-reviewed, published article*

Spring 2014-Present

Summer 2016

Spring 2014-Present

Spring 2016

Lemon Lab, The Forsyth Institute, Cambridge, MA

Summer 2012, 2013

1X Summer **student author** on peer-reviewed, published article

Spring 2014

PUBLICATIONS and SCIENTIFIC COMMUNICATIONS**Peer-Reviewed, Published Papers (*_* surround undergraduate mentees' names)**

Rotman, E.R., Bultman, K.M., Brooks II, J.F., Gyllborg, M.C., Burgos, H.L., **Wollenberg, M.S.**, and M.J. Mandel. (2019) Natural strain variation reveals diverse biofilm regulation in squid-colonizing *Vibrio fischeri*. *J. Bacteriol.* 201(9): e00033-19.

Speare, L., Cecere, A., Guckes, K.R., Smith, S., **Wollenberg, M.S.**, Mandel, M.J., Miyashiro, T. and A.N. Septer. (2018) Bacterial symbionts use a type VI secretion system to eliminate competitors in their natural host. *Proc. Natl. Acad. Sci. U.S.A.* 115(36): E8528-E8537.

Lentz, T.B., Ott, L.E., Robertson, S.D., Windsor, S.C., Kelly, J.B., **Wollenberg, M.S.**, Dunn, R.R., and C.C. Goller. (2017) Unique down to our microbes: assessment of an inquiry-based metagenomics activity. *J. Microbiol. Biol. Educ.* 18(2): 18.2.23. PMID: 28861131. – Named one of JMBE's "most-viewed articles of 2017" by the JMBE editors.

Wollenberg, A.C., *Jagdish, T.*, Slough, G., *Hoinville, M.* and **M.S. Wollenberg**. (2016) Death Becomes Them: Bacterial community dynamics and stilbene antibiotic production in *Galleria mellonella* cadavers killed by *Heterorhabditis/Photorhabdus*. *Appl. Environ. Microbiol.* 82(19): 5824-5837. PMID: 27451445.

Sun, Y., LaSota, E.D., Cecere, A.G., LaPenna, K.B., Larios-Valencia, J., **Wollenberg, M.S.** and T. Miyashiro. (2016) Intraspecific competition impacts *Vibrio fischeri* strain diversity during initial colonization of the squid light organ. *Appl. Environ. Microbiol.* 82(10): 3082-91. PMID 27016564.

Wollenberg M.S., Claesen J, Escapa I.F., *Aldridge K.L.*, Fischbach M.A. and K.P. Lemon. (2014) Propionibacterium-produced coproporphyrin III induces *Staphylococcus aureus* aggregation and biofilm formation. *mBio.* Jul 22; 5(4): e01286-14. PMID 25053784.

Wollenberg, M.S., Preheim, S.P., Polz, M.P. and E.G. Ruby. (2012) Polyphyly of non-bioluminescent *Vibrio fischeri* sharing a *lux*-locus deletion. *Environ. Micro.* 14: 655-668. PMID 21980988.

Wollenberg, M.S. and E.G. Ruby. (2012) Phylogeny and fitness of *Vibrio fischeri* from the light organs of *Euprymna scolopes* in two Oahu, Hawaii populations. *ISME J.* 6: 352-362. PMID 21776028.

Bose, J.L., **Wollenberg, M.S.**, Colton, D.M., Mandel, M.J., Septer, A.N., Dunn, A.K. and E.V Stabb. (2011) Contribution of rapid evolution of the *luxR-luxI* intergenic region to the diverse bioluminescence outputs of *Vibrio fischeri* strains isolated from different environments. *Appl. Environ. Microbiol.* 77: 2445-2457. PMID 21317265.

Miyashiro, T.M., **Wollenberg M.S.**, Cao X., Oehlert D. and E.G. Ruby. (2010) A single *qrr* gene is necessary and sufficient for LuxO-mediated regulation in *Vibrio fischeri*. *Mol. Micro.* 77: 1556-1567. PMID 20662783.

Pollack-Berti, A.G., **Wollenberg M.S.** and E.G. Ruby. (2010) Natural transformation of *Vibrio fischeri* requires *tfoX* and *tfoY*. *Environ. Micro.* 12: 2302-2311. PMID 21966921.

Wollenberg, M.S. and E.G. Ruby. (2009) Population structure of *Vibrio fischeri* within the light organs of *Euprymna scolopes* from two Oahu populations. *Appl. Environ. Microbiol.* 75: 193-202. PMID 18997024.

Mandel, M.J., **Wollenberg M.S.**, Stabb E.V., Visick K.L. and E.G. Ruby. (2009) A single regulatory gene is sufficient to alter symbiosis host range. *Nature.* 458: 215-218. PMID 19182778.

Wollenberg, M.S. and S.M. Simon. (2004) Signal sequence cleavage of peptidyl-tRNA prior to release from the ribosome and translocon. *J. Biol. Chem.* 279: 24919-24922. PMID 15082722.

Selected Lectures/Abstracts/Posters (≤ 5 years old) | ** denotes educational research

Poster: A novel screen and identification of potential bioluminescence regulatory mutants in *P. luminescens* TT01.

ASM Conference on Beneficial Microbes. Madison, WI. (July 2018)

Invited Talk: Photorhabdus: who rocks the bodies that rot the body!?
Wayne State University. Detroit, MI. (Nov. 2016)

Poster: Bacterial community dynamics in Galleria mellonella cadavers killed by Heterorhabditis/Photorhabdus are influenced by a bacterially-produced stilbene antibiotic.
ASM Conference on Beneficial Microbes. Seattle, WA. (Sept. 2016)

***Interior co-author for Poster: Development of an inquiry-based approach to investigate strain diversity within the squid-Vibrio symbiosis*
ASM Conference on Beneficial Microbes. Seattle, WA. (Sept. 2016)

***Interior co-author for Poster: "Unique down to our microbes" Assessment of an inquiry-based metagenomics activity*
ASM Conference for Undergraduate Educators. Bethesda, MD. (July 2016)

Invited Talk: "Pick yer nose!?!? Sticky Staphylococcus aureus interactions are modulated by nasal Propionibacterium species."
University of Wisconsin, Parkside Biology Dept. Parkside, WI. (Dec 2014)

Invited Talk: Murder by the Pale Green Light: A blood-curdling tale of a bacterial pathogen and its deadly friends.
Western Michigan University Biology Dept. Kalamazoo, MI. (Oct 2014)

Poster: Microbial Community Dynamics During Pathogenesis - Studies with Galleria mellonella infected by Photorhabdus/Heterorhabditis.
ASM Conference on Beneficial Microbes. Washington DC. (Sept 2014)

FELLOWSHIPS and AWARDS

Funded Scientific Awards/Grants

Amount/Award(s)	Grantor	Name	Date(s)
\$399,156 Co-PI with A. Wollenberg	NSF - IOS	Mechanisms of specificity and tolerance in a nematode-bacterial symbiosis.	Summer 2018-2022
<i>Participant</i>	HHMI (U. of Minnesota)	National Academies Education Fellowship in the Life Sciences	Summer 2015
<i>Participant</i>	Alpha Lambda Delta (Kalamazoo College)	Favorite Professor Award	Fall 2014, 2015
\$800, \$1,400, \$1,100	Kalamazoo College	Faculty/Student Summer Research Grant	Summer 2014-2016
\$1,800, \$1,800	Kalamazoo College	Professional Development Grant	Fall 2014, 2016
\$34,000 salary \$6,000/yr materials	NIH (Forsyth Institute)	T32 Oral Health Traineeship	2012 and 2013
\$24,000 salary \$3,000/yr materials	NIH (UW Dept. MMI)	T32 Microbes in Health and Disease Traineeship	Spring 2010-2011
<i>Participant</i>	HHMI (UW-Madison Dept. Bacteriol.)	HHMI Teaching Fellowship	Fall 2009-2010
\$1,500	UW-Madison	Vilas Research Travel Grant	Summer 2010
\$5,000 stipend \$2,500 living/travel to NZ	NSF	East Asia and Pacific Summer Institute Fellowship	Summer 2008
\$1,000	International Society for Microbial Ecology	Travel Award to ISME 2008	Summer 2008
\$30,000/yr fellowship	NSF	Graduate Research Fellowship	Summer 2005-2008
\$22,000 salary \$1500/yr travel+materials	NIH	Molecular Biosciences Traineeship	Summer 2004-2005, Summer 2008-2010

PROFESSIONAL ACTIVITIES

Workshops, Courses, and Retreats

<i>Workshop, Ending Racism and Creating/Celebrating Equity</i>	(June 2019)
<i>Retreat, Posse Plus Retreat @ Kalamazoo College, MI</i>	(Feb 2016 and 2017)
<i>Think Tank, Science and Social Justice Leadership @ Kalamazoo College, MI</i>	(April 2016)
<i>Workshop, National Academies/HHMI Summer Institute @ University of Minnesota, Minneapolis, MN</i>	(June 2015)
<i>Course, Applied Biostatistics @ Harvard University Catalyst, Cambridge, MA</i>	(May 2013)
<i>Workshop, Science Case Network @ ASM Conference for Undergraduate Educators, Denver, CO</i>	(May 2013)
<i>Course, Hopkins Microbial Diversity Summer Course @ Stanford University, CA</i>	(Summer 2007)

Sabbaticals and Field Work

<i>Research Sabbatical, University College Cork, Ireland – Dr. David Clarke’s Lab</i>	(April-August 2017)
<i>Visiting Scientist, Hawaiian Institute of Marine Biology, University of Hawaii, Oahu</i>	(August 2010)
<i>Visiting Fellow, Institute for Advanced Study, Massey University, New Zealand</i>	(Summer 2008)

Society Memberships

<i>American Society of Microbiology</i>	(2004-Present)
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Invited ad hoc Journal Reviews

<i>Environmental Microbiology, FEMS Microbiology Ecology, eLife, the ISME Journal</i>	(2012-Present)
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COMPUTATIONAL EXPERIENCE

HARDWARE

- Use of Arduino and Raspberry Pi microcontroller/minicomputer platforms, as well as associated shields/hardware.
- Built a wireless, remote sensing thermometer for temperature sensing/alerting of the department’s -80°C freezers.
- Familiar with low-level, simple electrical engineering (e.g. simple circuit prototyping/assembly via breadboards and soldering).
- Two, different desktop computer builds from component parts; home server build and networking/software configuration for encrypted access at work/home in ~2012/2014.

OPERATING SYSTEMS and LANGUAGES

- Mac OS, Windows, Linux (Ubuntu)
- Perl (including BioPerl), Python (including Biopython), Java, C and C++, HTML

SOFTWARE

- *Next-Generation Sequence Analysis*: FastQC, QIIME, mothur
- *Genome Assembly*: SPADES, Velvet, Mauve, RAST
- *Molecular Biology*: PlasmaDNA, Geneious, Clustal, MEGA, DNASTAR/Lasergene package, ApE, BLAST
- *Phylogenetics*: PAUP*, MrBayes, PHYLIP package, RAxML, SplitsTree, FigTree, 4peaks, FinchTV
- *Teaching*: Moodle, Evernote, TurningPoint (‘clicker’ software)
- *Statistics*: MatLab, R (including GUIs like RStudio and Shiny), Stata
- *Image Processing*: Adobe Photoshop, GIMP, Inkscape

KALAMAZOO COLLEGE COURSE DESCRIPTIONS

COURSE	# STUDENTS / TERM	TERMS TAUGHT
Biol 112 Evolution and Genetics with lab	~ 50-100 Fall ~ 50 Winter	Winter 2014, 2015, 2017 Fall 2014, 2015, 2016, 2017, 2018
<ul style="list-style-type: none"> • Mandatory, first biology class in the Biology core at Kalamazoo College. One of the largest classes on campus. • Taught solo in Winter 2015, 2017 and Fall 2017; co-taught with Dr. Jim Langeland in all other quarters. • Developed three separate labs for this course on topics of human population genetics, replica plating, and evolution of antibiotic resistance. Wrote a section of the lab manual on the Student's t-test. • Transcribed, edited, and digitized the 150 page lab manual into .docx and .pdf formats. • Added language on result/discussion section formatting with novel figure and table style examples for the lab manual. • Developed active-learning activities and new lectures for all topics covered by the course. 		
Biol 295 Computational Tools for Biologists with lab	~ 10	Winter 2016, 2018
<ul style="list-style-type: none"> • Conception, development, and teaching of this new course within the Kalamazoo College curriculum. • Course emphasizes building a cross-platform/OS computer-based skillset with command-line activities (e.g. bash) and script-based languages (e.g. Python; Arduino's version of C++, MySQL) via real-world datasets (e.g. Kalamazoo College Arboretum weather station data; next-generation sequencing data from MSW's personal research). • Lab challenges small groups to build a micro controller-based, biological data collection project using the Arduino platform. 		
Biol 322 General and Medical Microbiology with lab	~ 20	Spring 2014, 2015, 2016, 2018
<ul style="list-style-type: none"> • Design, development, and solo teaching of this course since arrival on campus. • Course emphasizes the process of scientific knowledge creation through a cycle of observation, hypothesis-generation, experimental design, data collection, and hypothesis-testing via both lecture activities and laboratory experimentation. • Integrates my own primary research system (entomopathogenic nematodes/bacteria) into an inquiry-based laboratory module about experimental design and hypothesis testing with Koch's Postulates. • In 2016, introduced a next-generation 16S data analysis module in collaboration with teachers/researchers at North Carolina State University (see Lentz et al. publication/poster above). 		
Biol 488 Topics in Biology: Symbiosis	~ 10	Winter 2014, 2019
<ul style="list-style-type: none"> • Co-design, development, and teaching of this new course within the Kalamazoo College curriculum. • Course is an upper-level literature review of mainly eukaryote-bacterial symbiosis topics using Dr. A. Douglas's book "The Symbiotic Habit" as a textual reference. • Students prepare oral presentations and a Nature "News and Views" style written piece. 		

KALAMAZOO COLLEGE ACTIVITIES

SENIOR INDIVIDUALIZED PROJECTS (SIPs)

- Faculty Reviewer for Biology Oral and Poster SIPs** (2014-Present)
Yearly review of all senior biology majors' SIP oral and poster presentations (typically 40-60 individual SIPs) during an annual spring departmental conference; collaborative grading of these presentations during department meetings.
- Moderator for SIP Peer Review Groups** (2015-Present)
Yearly moderator and organizer of a peer-review group that includes 6-8 senior biology majors and their associated biology SIPs. This group reads all participants' biology SIPs, discusses these SIPs, and suggests improvements for these SIPs. As the moderator, I not only organize and schedule the group's meetings, but also edit and critique all the SIP drafts of all biology SIPs from students in the group and meet with all students at least once one-on-one over the course of the peer-review process.
- Research Mentor for Biology SIP Research** (Feb. - June 2016)

Advisor for one biology junior who completed his SIP in my research lab during the summer of 2016. Conception and implementation of Senior thesis molecular biology project in my lab. Basic instruction on scientific process and scientific writing with more specialized instruction on cloning, gene expression technologies, small regulatory RNAs, prokaryotic genomics, and molecular biology.

ADVISING

Academic Advisor (Winter 2014-Present)
Meet with, advise, and mentor ~15-20 students each trimester. Facilitate communication between these students and their programs of interest, college administrators, and faculty. Attend administrative advising lunches/meetings in order to learn about advising and become a better-informed advisor.

STANDING COMMITTEES

Health Sciences Advisory Committee (Spring 2019)
Socially Responsible Investment Advisory Committee (Fall 2015-Present)
Faculty Development Committee (Fall 2014-Winter 2017)

AD-HOC COMMITTEES

Biology Visiting Assistant Prof. Search Committee Chair (Spring 2019)
Sherman-Fairchild Application Review Committee Member (Spring 2018, 2019)
Chemistry Tenure-Track Faculty Search Committee Member – *Organic Chemistry* (Fall 2017, Winter 2018)
Chemistry and Biology Office Manager Search Committee Member (Summer 2015)
Biology Tenure-Track Faculty Search Committee Member – *Physiology* (Fall 2014)
Chemistry and Biology Office Manager Search Committee Member (Fall 2014)
Biology Department Stockroom Manager Search Committee Member (Spring 2014)
Biology Visiting Instructor Search Committee Member (Spring 2014)

OTHER BIOLOGY DEPARTMENT SERVICE

Biology class of 2018 “Shepherd” (*responsible for communicating with the class as a whole as they moved through the declaration of major, junior year study-abroad, and SIP presentation/senior thesis process.*) (Winter 2016-Spring 2018)
Member of Pierce Cedar Creek Biological Field Station Advisory Board (Summer 2016-Present)
Author of 2017-2018 Biology Assessment Report (with Departmental Input) (Winter 2014-Present)
Contributor to Sherman-Fairchild grant reports (*an institutional grant at K College*)
Attend 3-4 Natural Science Divisional meetings per year
Attend and Review campus interviews for leave replacement Biology faculty
Represent Biology department at fall department fair
Develop departmental core curriculum
Participate in annual department assessment, SIP awards, and general Biology major awards
Maintain microbial stocks for teaching labs
Attend “Visit the Zoo” lunch recruitment for incoming students

HOBBIES...

LONG-DISTANCE BACKPACKING

- Solo thru-hike of the 2100 mile-long Appalachian Trail in 2000.
- Co-leader and co-organizer of outdoor orientation program at Swarthmore College in fall of 2001 (50 mile hike with 20 incoming first-years along the Appalachian Trail).
- Solo hike of ~300 miles of the Continental Divide Trail in Colorado in 2004.
- Partner thru-hike of the California portion of the Pacific Crest Trail (~1500 miles) in 2011.
- Partner hike of ~250 miles of the Washington Pacific Crest Trail in 2013 and 2016.

FERMENTATION

- (Home)Brewing experience (don't ask about the exploding Rockefeller stout :)...)

- I love to experiment with recipes from Sandor Katz's *The Art of Fermentation*.

MUSIC

- I have played clarinet and guitar for over 20 years, both solo and in different ensembles.