Marc G Chevrette

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Education & Training

University of Wisconsin-Madison DOCTOR OF PHILOSOPHY (PHD) – GENETICS

Madison, WI

expected 04/2019

10/2017

MASTER OF SCIENCE (MS) - GENETICS

• Advisor: Cameron R Currie, PhD

- Research Focus: Evolution of Microbial Metabolic Diversity, Chemically-mediated Microbiome Interactions, & Antibiotic Discovery
- Ira L Baldwin Distinguished Predoctoral Fellow (2018-2019)
- NIH Chemistry-Biology Interface Predoctoral Fellow (2016-2018)

Institut Pasteur

Annecy, France

DIPLOMA - INTERNATIONAL COURSE ON ANTIBIOTICS AND RESISTANCE

11/2017

Harvard University Extension

Cambridge, MA

MASTER OF LIBERAL ARTS (ALM) - BIOTECHNOLOGY (BIOENGINEERING & NANOTECHNOLOGY)

03/2015

- Advisor: Tomás Maira-Litrán, PharmD, PhD
- Research Focus: Genome-wide Experimental & Computational Characterization of In Vivo Fitness Factors in Bacterial Infections
- Thesis: Transposon-Directed Insertion Site Sequencing for Determination of Fitness Factors in Pulmonary Infection by A. baumannii.

Rensselaer Polytechnic Institute

Troy, NY

BACHELOR OF SCIENCE (BSc) - MOLECULAR BIOLOGY & BIOINFORMATICS

12/2010

Experience

WiSolve Consulting

Madison, WI

CO-FOUNDER, DIRECTOR OF TECHNOLOGY, SENIOR CONSULTANT

03/2016-present

Provided business services (including market research analysis, business plan development, competitive landscape analysis, SBIR grant writing, and others) to early-stage companies in the biotech and pharmaceutical industries.

Currie Lab, University of Wisconsin-Madison

Madison, WI

PhD Candidate

08/2015-present

- Built genomics-driven computational and analytic pipelines to uncover novel therapeutics and study the evolution of biosynthesis in free-living and host-associated microbes.
- Systems investigated include insects (leaf-cutting ants, honey bees, & insects broadly), marine invertebrates, soil communities, & the human microbiome.

Johnson Biosignatures Lab, Harvard & Georgetown Universities

Cambridge, MA

LEAD COMPUTATIONAL BIOLOGIST

10/2013-10/2015

- Performed whole genome sequencing and metagenomic analysis of environmental samples from sulfur-rich, extreme environments with implications in microbial ecology, biogeochemistry, and exobiology.
- Characterized biosynthetic potential of metagenomic data.

Warp Drive Bio Cambridge, MA

HEAD OF EXPERIMENTAL GENOMICS

04/2013-08/2015

- Executed genomic-directed natural products drug discovery, high throughput Next Generation Sequencing (htNGS), computational biology, and molecular biology of actinomycetes and fungi.
- Designed and implemented genomic natural products searches over various scaffolds of business development and internal interest.
- Developed and curated computational pipelines and databases for assembly, annotation, and custom analysis of public and internal htNGS
 data (160,000 bacterial genomes, >150 closed and complete genomes) for analysis of novel polyketide, non-ribosomal peptide, and other
 natural product classes.
- Handled processing and management of sequence data, predictions, and analyses supporting multiple projects across discovery, molecular biology, engineering, and synthetic biology.
- Executed elucidation and prediction of novel chemical products of bacterial biosynthetic gene clusters and metabolic pathways (e.g. beta-lactams, aminoglycosides, rapamycin analogues, etc.).
- Developed internal pipelines for applied phylogenomic annotations and prioritizations of multiple data types to inform discovery and engineering efforts.
- Oversaw all lab and experimental support of actinomycete and fungal sequencing efforts for Illumina, Pacific Biosciences, and Oxford-Nanopore
 platforms.
- Bioinformatics software development to support molecular and synthetic biology efforts.
- Direct written and verbal communication of findings to senior leadership and business partners.
- Database management and delivery of sequence information to molecular biology, microbiology, and chemistry groups to aid drug discovery, strain engineering, and generation of expression constructs.

Maira-Litrán Infectious Disease Lab, Brigham & Women's Hospital

Boston, MA

RESEARCH ASSISTANT, MICROBIOLOGY & COMPUTATIONAL BIOLOGY

03/2013-08/2015

- Investigated *in vivo* fitness, horizontal gene transmission, and pathogenesis of *Acinetobacter baumannii*, *Staphylococcus aureus*, *Salmonella typhii*, and other virulent pathogens through microbiology, computational, and genomic techniques.
- Developed and optimized genetic tools to enable novel examinations of pathogen fitness, invasion, and virulence using high-throughput transposon-directed insertion site sequencing of infections in murine models.

Broad Institute of MIT & Harvard

Cambridge, MA

RESEARCH ASSOCIATE II, MOLECULAR BIOLOGY PROCESS DEVELOPMENT

01/2011-03/2013

- · Independently designed development initiatives including supporting htNGS, microfluidics, and automation goals.
- Oversaw production and up-scaling of microbial mate-pair library construction (LC), integrated internal development with vendor technologies, and managed sample-tracking via real-time messaging to internal LIMS.
- Increased throughput of microbial LC Platform 4-fold by automation and protocol development.
- Worked extensively with mate-pair NGS LC, sequence analysis tools, genomic databases, statistical software, and programming/operating lab
 robotics.

Rutledge Molecular Genetics Lab, Rensselaer Polytechnic Institute

Troy, NY

RESEARCH ASSOCIATE, MOLECULAR GENETICS

05/2010-12/2010

 Designed and developed protocols and operating procedures for transgenic Caenorhabditis elegans cultures to model stress-induced neural degeneration and Parkinson's Disease.

BCR Biotech Jamestown, RI

RESEARCH ASSISTANT, MICROBIOLOGY

09/2009-12/2009

· Wrote and optimized protocols and methods for engineering synthetic biosensing functions in Bacillus spores.

Publications, Talks, & Abstracts

PEER-REVIEWED PUBLICATIONS

*contributed equally

- P13 HA Horn,* E Gemperline,* **MG. Chevrette**, BR McDonald, JR Bratburd, L Li, CR Currie. "Specialized chemical responses to pathogens in the defensive symbionts of fungus-growing ants." *Submitted*.
- MG Chevrette, CM Carlson, HE Ortega, C Thomas, GE Ananiev, KJ Barns, AJ Book, J Cagnazzo, C Carlos, W Flanigan, KJ Grubbs, HA
 Horn, FM Hoffman, JL Klassen, JJ Knack, GR Lewin, BR McDonald, L Muller, WGP Melo, AA Pinto-Tomás, A Schmitz, E
 Wendt-Pienkowski, S Wildman, M Zhao, F Zhang, TS Bugni, DR Andes, MT Pupo, CR Currie. "The antimicrobial potential of insect microbiomes." Submitted.
- RM Stubbendieck, DS May, **MG Chevrette**, MI Temkin, E Wendt-Pienkowski, J Cagnazzo, CM Carlson, JE Gern, CR Currie. "Bacterial competition mediated by siderophore production among the human nasal microbiota." *Submitted; Preprint available*. *Link*
- GR Lewin, NM Davis, BR McDonald, AJ Book, **MG Chevrette**, S Suh, A Boll, CR Currie. "Long-term cellulose enrichment selects for highly cellulolytic consortia and competition for public goods." *Under review*.
- MG Chevrette, CR Currie. "Emerging evolutionary paradigms in antibiotic discovery." *Journal of Industrial Microbiology & Biotechnology, In press. Link*
 - N Liu,* H Li,* MG Chevrette, L Zhang, L Cao, H Zhou, X Zhou, Z Zhou, PB Pope, CR Currie, Y Huang, Q Wang. "Functional metagenomics reveals polysaccharide-degrading gene clusters and cellobiose utilization pathways in gut microbiota of a wood-feeding termite." *ISME Journal*, *In press*.
 - N Adnani, **MG Chevrette**, SN Adibhatla, F Zhang, Q Yu, D Braun, J Nelson, SW Simpkins, BR McDonald, CL Myers, J Piotrowski, C Thompson, CR Currie, L Li, SR Rajski, TS Bugni. (2017). "Co-culture of marine invertebrate-associated bacteria and
- P7 interdisciplinary technologies enable biosynthesis and discovery of a new antibiotic, keyicin." **ACS Chemical Biology**, 12(12), 3093. **Link**

[Highlighted by Nature, Link]

- AF Sanchez-Larrayoz, NM Elshamy, **MG Chevrette**, Y Fu, P Giunta, RG Spallanzani, K Ravi, GB Pier, S Lory, T Maira-Litrán. (2017).

 "Complexity of complement-resistance factors expressed by *Acinetobacter baumannii* needed for survival in human serum." *Journal of Immunology*, 199: ji1700877. *Link*
- MG Chevrette, F Aicheler, O Kohlbacher, CR Currie, MH Medema. (2017). "SANDPUMA: Ensemble predictions of nonribosomal peptide chemistry reveals biosynthetic diversity across Actinobacteria." *Bioinformatics*, 2017, 1–9. *Link*
- IJ Miller, **MG Chevrette**, JC Kwan. (2017). "Interpreting microbial biosynthesis in the genomic age: Biological and practical considerations." *Marine Drugs*, 15(6), 165. *Link*

[Cover Image for Issue 6, Volume 15 in June 2017]

K Blin, T Wolf, **MG Chevrette**, X Lu, CJ Schwalen, SA Kautsar, HG Suarez Duran, ELC de los Santos, HUK Kim, M Nave, JS Dickschat,

DA Mitchell, E Shelest, R Breitling, E Takano, SY Lee, T Weber, MH Medema. (2017). "antiSMASH 4.0 - Improvements in chemistry prediction and gene cluster boundary identification." *Nucleic Acids Research*, 1854(1), 1019–1037. *Link*

P8

- P2 GR Lewin, C Carlos, **MG Chevrette**, HA Horn, BR McDonald, RJ Stankey, BG Fox, CR Currie. (2016). "Ecology and evolution of Actinobacteria and their bioenergy applications." *Annual Review of Microbiology*. 70: 235 -254. *Link*
- SS Johnson, **MG Chevrette**, BL Ehlmann, KC Benison. (2015). "Insights from the metagenome of an acid salt lake: The role of biology in an extreme depositional environment." **PLOS ONE**. 2015 Apr; 10(4):e0122869. **Link**

INVITED TALKS

- "Host-associated microbes as a source of new antimicrobials." Natural Product Discovery & Development in the Genomic Era,
 Society for Industrial Microbiology & Biotechnology. Clearwater Beach, FL. Jan 22, 2018.
- "Natural natural products: Leveraging chemical ecology in the search for new drugs." Evolution Seminar Series, JF Crow Institute for the Study of Evolution. Madison, WI. Oct 26, 2017.
 - "Computational insights into the diverse nonribosomal peptide chemistry of Actinobacteria." Synthetic Biology for Natural Products Conference. Cancun, Mexico. Mar 6, 2017.

[Highlighted in ACS Synthetic Biology, Link]

"Darwinian drug discovery: Chemical ecology at fine and coarse evolutionary scales." International Chemical Biology Society
Annual Conference. Madison, WI. Oct 24, 2016.

[Highlighted in ACS Chemical Biology, Link]

PATENTS

T2

DC Gray, E Li, BR Bowman, GL Verdine, K Robison, **MG Chevrette**, D Udwary, PS Wang, A Li, JP Morgenstern. Compositions and methods for the production of compounds. Publication Number WO/2018/081590. Patent Application PCT/US2017/058800, filed Oct 27, 2017. *Link*

PUBLICATIONS, EDITORIAL REVIEW ONLY

- E5 **MG Chevrette**. (2018). "Natural products reawakened: New trends in discovery and development." **SIMB News Magazine**, Society for Industrial Microbiology and Biotechnology, In press.
- DR Braun, **MG Chevrette**, D Acharya, CR Currie, SR Rajski, TS Bugni. (2018). "Draft genome of *Micromonospora sp. WMMA1996*, a marine sponge-associated bacterium." *Genome Announcements*, 6(8), e00077-18. *Link*
- DR Braun, **MG Chevrette**, D Acharya, CR Currie, SR Rajski, K Ritchie, TS Bugni. (2018). "Complete genome of *Dietzia sp. WMMA184*, a marine coral-associated bacterium." *Genome Announcements*, 6(5), e01582-17. *Link*
- N Adnani, DR Braun, BR McDonald, **MG Chevrette**, CR Currie, TS Bugni. (2017). "Draft genome of *Micromonospora sp. WMMB-235*, a marine ascidian-associated bacterium." *Genome Announcements*, 5(2), 1-2. *Link*
- N Adnani, DR Braun, BR McDonald, **MG Chevrette**, CR Currie, TS Bugni. (2016). "Complete genome sequence of *Rhodococcus sp. strain WMMA185*, a marine sponge-associated bacterium." *Genome Announcements*, 4(6), 1–2. *Link*

INTERNAL SEMINARS

- "Drugs & bugs of bugs: Insect microbiomes as a source of new antibiotics." Genetics Colloquium, UW-Madison. Aug 8, 2018.
- "Host-microbe interactions as as a source of new antimicrobials ." Highlights at the Chemistry-Biology Interface Colloquium, UW-Madison. Dec 12, 2017.
- "Genome-based natural product discovery, modular biosynthesis, & applications." Highlights at the Chemistry-Biology Interface Colloquium, UW-Madison. Feb 2, 2017.
- 11 "Genome assembly: Tools & analysis." Computational Biology, Ecology, & Evolution (ComBEE), UW-Madison. Apr 27, 2016.

ABSTRACTS

- A26 MG Chevrette, CM Carlson, H Ortega, F Zhang, KJ Grubbs, MT Pupo, TS Bugni, DR Andes, CR Currie. "Insect-associated Streptomyces are a rich source of new antimicrobials." Presented at: Beneficial Microbes; Madison, WI; Jul 9, 2018.
- A25 HA Horn, E Gemperline, K Delaney, **MG Chevrette**, L Li, CR Currie. "Host specificity influences chemical resopnse in *in vivo* symbiotic interactions." Presented at: Beneficial Microbes; Madison, WI; Jul 9, 2018.
- BR McDonald, **MG Chevrette**, J Klassen, HA Horn, EJ Caldera, E Wendt-Pienkowski, MJ Cafaro, AC Ruzzini, EB Van Arnam, GM

 Weinstock, NM Gerardo, MG Poulsen, G Suen, J Clardy, CR Currie. "Biogeography and microscale diversity shapes the biosynthetic potential of fungus-growing ant associated *Pseudonocardia*." Presented at: Beneficial Microbes; Madison, WI; Jul 9, 2018.
- MG Chevrette, CM Carlson, H Ortega, F Zhang, KJ Grubbs, MT Pupo, TS Bugni, DR Andes, CR Currie. "Insect-associated

 A23 Streptomyces are a rich source of new antimicrobials with activity against resistant human pathogens." Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Apr 27, 2018.
- DD Acharya, IJ Miller, Y Cui, DR Braun, **MG Chevrette**, M Berres, L Li, J Kwan, CR Currie, TS Bugni. "Chemical cross-talk in bacterial co-cultures affects differential gene expression and antibiotic production." Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Apr 27, 2018.

- R Zarnowski, **MG Chevrette**, E Dominguez, DR Andes. "Modeling high-throughput proteomics into predictive metabolomics A novel tool for studies of medical device-associated *Candida spp.* biofilm infections." Presented at: Metabolomics Circle 2017 Bioanylytical & Omics Science, Wrocław, Poland; Nov 18, 2017.
- D Acharya, N Adnani, D Braun, IJ Miller, Q Yu, **MG Chevrette**, M Berres, CR Currie, L Li, JC Kwan, TS Bugni. "Chemical cross-talk in bacterial co-cultures affects differential gene expression and antibiotic production." Presented at: American Society for Pharmacognosy Annual Meeting, Portland, OR; Jul 30, 2017.
- AF Sanchez-Larrayoz, NM Elhosseiny, **MG Chevrette**, Y Fu, P Giunta, G Spallanzani, GB Pier, S Lory, <u>T Maira-Litrán</u>. "The membrane lipid asymmetry transport system plays a key role in protecting *Acinetobacter baumannii* against killing by human complement via the alternative pathway." Presented at: American Society for Microbiology Microbe, New Orleans, LA; Jun 2, 2017.
- MG Chevrette, CM Carlson, C Thomas, TS Bugni, DR Andes, CR Currie. "Evolutionary trends in secondary metabolism reveal insect-associated *Streptomyces* as an underexploited antibiotic resource." Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Mar 31, 2017.
- EJ Caldera, **MG Chevrette**, CR Currie. "The geographic mosaic of antibiotic coevolution in a bacterial symbiont of the fungus-farming ant *Apterostigma dentigerum*." Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Mar 31, 2017.
- A16 J Bratburd, C Keller, E Vivas, **MG Chevrette**, F Rey, L Li, CR Currie. "The human gut microbiota metabolomic response to infection." Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Mar 31, 2017.
- MG Chevrette, CR Currie, MH Medema. "prediCAT: An accurate predictive method for substrate specificity of nonribosomal peptide synthetase adenylation domains." Presented at: 30th Annual Kenneth B. Raper Symposium on Microbial Research; Madison, WI; Sep 2, 2016.
- A14 J Bratburd, BR McDonald, **MG Chevrette**, JL Klassen, HA Horn, CR Currie. "Comparative genomics of fungus-growing ant-associated *Pseudonocardia.*" Presented at: 30th Annual Kenneth B. Raper Symposium on Microbial Research; Madison, WI; Sep 2, 2016.
- HA Horn, E Gemperline, **MG Chevrette**, BR Mcdonald, J Bratburd, E Mevers, J Clardy, L Li, CR Currie. "Mass spectrometry imaging reveals differential chemical response to pathogens in an ancient ant-microbe symbiosis." Presented at: ISME International Symposium on Microbial Ecology; Montreal, QC, Canada; Aug 21-26, 2016.
- MG Chevrette, CR Currie, MH Medema. "Computational predictions of substrate specificity in nonribosomal peptide synthetases through comparative adenylation domain trees." Presented at: American Society for Microbiology Microbe; Boston, MA; Jun 16-20, 2016.
- SS Johnson, ML Soni, DJ Collins, KC Benison, MR Mormile, **MG Chevrette**, BL Ehlmann. "Biosignatures in mars analog acid salt lakes." Presented at: USRA Biosignature, Preservation and Detection in Mars Analog Environments; Lake Tahoe, Nevada; May 16-19, 2016.
- A10 MG Chevrette, C Carlson, C Thomas, TS Bugni, CR Currie. "Multifaceted antibiotic profiling across Actinomycete chemical ecology."

 Presented at: Perlman Antibiotic Discovery and Development Symposium; Madison, WI; Apr 29, 2016.
 - N Adnani, S Adibhatla, E Vazquez-Rivera, GA Ellis, D Braun, **MG Chevrette**, BR McDonald, C Thompson, JS Piotrowski, Q Yu, L Li, CR Currie, TS Bugni. "Driving production of novel natural products through marine microbial interspecies interactions." Presented at: Gordon Marine Natural Products; Ventura, CA; Mar 6-11, 2016.
- A8 MG Chevrette, DW Udwary, CR Currie, SS Johnson. "Functional classification and secondary metabolism of an extreme metagenome." Presented at: 29th Annual Kenneth B. Raper Symposium on Microbial Research; Madison, WI; Sep 1, 2015.
- A7 MG Chevrette, BL Ehlmann, KC Benison, SS Johnson. "Microbial diversity and biosynthetic potential of an extreme sediment metagenome." Presented at: Gordon Applied and Environmental Microbiology; South Hadley, MA; Jul 12-17, 2015.
- A6 MG Chevrette, M Vinacur, T Maira-Litrán. "Transposon-directed insertion site sequencing reveals *in vivo* fitness factors in *Acinetobacter baumannii* lung infections." Presented at: Boston Bacterial Meeting; Cambridge, MA; Jun 18-19, 2015.
- A5 DW Udwary, K Robison, **MG Chevrette**, GL Verdine. "Lessons from long read assembly of 100+ Actinomycete genomes." Presented at: Gordon Marine Natural Products; Ventura, CA; Mar 2-7, 2014.
- A4 K Robison, DW Udwary, **MG Chevrette**, GL Verdine. "Long read assembly of >100 Actinomycete genomes." Presented at: Advances in Genome Biology & Technology; Marco Island, FL; Feb 12-15, 2014.
- S Young, S Steelman, R Daza, **MG Chevrette**, R Lintner, S Gnerre, A Berlin, B Walker, C Nusbaum, R Nicol. "Generation of high-quality draft assemblies with a single sequencing library." Presented at: Sequencing, Finishing, Analysis in the Future; Santa Fe, NM; May 29-31, 2013.
- S Steelman, R Daza, **MG Chevrette**, P Kompella, P Trang, T Surabian, R Lintner, CZ Zhang, J Jung, M Meyerson, C Nusbaum, R Nicol.

 "Automated low input mate-pair library construction for Illumina sequencing." Presented at: Advances in Genome Biology & Technology; Marco Island, FL; Feb 15-18, 2012.
- S Steelman, R Daza, MG Chevrette, P Kompella, P Trang, T Surabian, R Lintner, R Nicol. "Microbial mate-pair library construction for de novo detection of structural rearrangements." Presented at: Broad Institute Symposium; Boston, MA; Nov 7-8, 2011.

Α9

Thomas & Awards

Ira L Baldwin Distinguished Predoc. Fellowship for Excellence in Research Bacteriology – UW-Madison	05/2018-04/2019
Chemistry-Biology Interface Predoctoral Fellowship National Institutes of Health, NIGMS – UW-Madison	06/2016-03/2018
Passed with Distinction Preliminary Examination A - Dept. of Genetics - UW-Madison	07/2017
Issue Cover Marine Drugs 15(6): Connecting Marine Microbial Natural Products to Biosynthetic Pathways	06/2017
Bacteriology Departmental Travel Grant University of Wisconsin-Madison	2016
Vilas Travel Grant University of Wisconsin-Madison	2016
Dean's Academic Achievement Award Harvard University Extension	03/2015
Finalist, Core Value Award: "Courageous: Uncompromising Science" Warp Drive Bio	2014
Finalist, Core Value Award: "Unbounded: Reimagining the Possible" Warp Drive Bio	2014
Featured Scientific Researcher - "Who is Broad?" Broad Institute of MIT & Harvard	01/2012
Rensselaer Alumni Scholarship Rensselaer Polytechnic Institute	2004-2008
Sal H. Alfiero Scholarship Rensselaer Polytechnic Institute	2004-2008
Rhode Island State Scholarship Rensselaer Polytechnic Institute	2004–2008

Service & Outreach _____

Ad hoc Reviewer Frontiers in Microbiology, FEMS Microbiology Letters, Microbial Cell Factories	
Evolution Coordinating Committee JF Crow Institute for the Study of Evolution – UW-Madison	01/2017-present
Mentor Google Summer of Code – antiSMASH – Open Bioinformatics Foundation	03/2016-09/2017
Co-chair Computational Biology, Ecology, & Evolution (ComBEE) – UW-Madison	01/2016-08/2018
Co-organizer Discovery Niche – Wisconsin Institutes for Discovery	10/2015-11/2015
Volunteer Wisconsin Science Festival	10/2015
Open Genomics Adviser Revive & Restore – Long Now Foundation	04/2014-10/2015
Environmental, Health, and Safety Representative Broad Institute of MIT & Harvard	01/2011-03/2013

♦ Teaching Experience

Microbiology 450: Diversity, Ecology, & Evolution of Microorganisms, UW-Madison Lecturer	Fa 2018
Programming in R, ComBEE, UW-Madison Group Leader, Lecturer	Sp 2016
Genetics 468: General Genetics II, UW-Madison Teaching Assistant	Sp 2016
Microbiology 450: Diversity, Ecology, & Evolution of Microorganisms, UW-Madison Teaching Assistant	Fa 2016

Professional Societies & Groups______

international Chemical Biology Society	2016-present
Natural Products Discovery and Bioengineering Network	2016-present
American Society for Microbiology	2015–present
Computational Biology, Ecology, & Evolution (ComBEE) – UW-Madison	2015–present
JF Crow Institute for the Study of Evolution	2015–present
Society for Industrial Microbiology and Biotechnology	2014-present
Laboratory Robotics Interest Group – New England Chapter	2011–2015