Marc G Chevrette

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Education & Training

University of Wisconsin-Madison

Madison, WI

expected 04/2019

10/2017

DOCTOR OF PHILOSOPHY (PHD) – GENETICS

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

Р9

P7

P6

P4

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. "New antibiotics from insect microbiomes." *Under review*.

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

Interdisciplinary Technologies Enable Biosynthesis and Discovery of a New Antibiotic, Keyicin." *ACS Chemical Biology*, 12(12), 3093. *Click here*

[Highlighted by Nature, Click here]

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. *Click here*

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. *Click here*

IJ Miller, **MG Chevrette**, JC Kwan. (2017). "Interpreting Microbial Biosynthesis in the Genomic Age: Biological and Practical Considerations." *Marine Drugs*, 15(6), 165. *Click here*

[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. *Click here*

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. *Click here*

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. **Click here**

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, *Click here*]
 - "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, Click here]

PATENTS

T2

Τ1

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. *Click here*

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. *Click here*
- E3 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. *Click here*
- E2 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. *Click here*
- 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. *Click here*

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.
- "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 Antassociated 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 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 Killing 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.
- 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 *A. 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.
- 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.

Thonors & 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 _____

01/2017-present
03/2016-09/2017
01/2016-08/2018
10/2015-11/2015
10/2015
04/2014-10/2015
01/2011-03/2013

Pharmaceutical Sciences 491: Methods in Natural Products Chemistry, UW-Madison Lecturer	Fa 2018
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