

# Marc G. Chevrette

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## Education

**University of Wisconsin-Madison, Madison, WI** **In progress**

*Doctor of Philosophy (Ph.D.), Genetics*

NIH Chemistry-Biology Interface Predoctoral Fellow

**Advisor:** Cameron Currie, Ph.D.

**Harvard University Extension, Cambridge, MA** **03/2015**

*Master of Liberal Arts (ALM), Biotechnology – Bioengineering & Nanotechnology*

**Advisor:** Tomás Maira-Litrán, Pharm.D., Ph.D.

**Thesis:** Transposon-Directed Insertion Site Sequencing for Determination of Fitness Factors in Pulmonary Infection by *Acinetobacter baumannii*.

**Rensselaer Polytechnic Institute, Troy, NY** **12/2010**

*Bachelor of Science, Molecular Biology & Bioinformatics*

## Research Experience

**Currie Lab, University of Wisconsin-Madison** **08/2015–present**

*Graduate Research Assistant*

*Madison, WI*

- Built genomics-driven computational and analytical pipelines to uncover novel therapeutics and biosynthesis in free-living and host-associated actinomycetes.

**Johnson Biosignatures Lab, Harvard & Georgetown Universities** **10/2013–10/2015**

*Lead Computational Biologist*

*Washington, DC (remote)*

- 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** **04/2013–08/2015**

*Head of Experimental Genomics, (04/2014–08/2015)*

*Cambridge, MA*

*Research Associate, Experimental Genomics & Computational Biology, (04/2013–03/2014)*

- 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 ( $1.6 \times 10^5$  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** **03/2013–08/2015**

*Research Assistant, Microbiology & Computational Biology* *Boston, MA*

- Investigated *in vivo* fitness, horizontal gene transmission, and pathogenesis of *Acinetobacter baumannii*, *Staphylococcus aureus*, *Salmonella typhi*, 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** **01/2011–03/2013**

*Research Associate II, Molecular Biology Process Development* *Cambridge, MA*

- 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** **05/2010–12/2010**

*Research Associate, Molecular Genetics* *Troy, NY*

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

**BCR Biotech** **09/2009–12/2009**

*Research Assistant, Microbiology* *Jamestown, RI*

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

## Publications

**P6:** Lewin, GR, M Davis, BR McDonald, E Glasgow, AJ Book, **MG Chevrette**, S Suh, A Boll, BG Fox, CR Currie. *In preparation*. "Long-term Cellulose Enrichment Selects for Highly Cellulytic Taxa and Competition for Public Goods."

**P5:** Chevrette, MG, F Aicheler, O Kohlbacher, CR Currie, MH Medema. *In preparation*. "Ensemble Computational Predictions of NRPS Adenylation Domain Substrate Specificities."

**P4:** Adnani, N, DR Braun, BR McDonald, **MG Chevrette**, CR Currie, TS Bugni. *In preparation*. "Complete Genome of *Rhodococcus* sp. strain WMMA-185, a Marine Sponge-associated Bacterium."

**P3:** Horn, HA, E Gemperline, **MG Chevrette**, E Mevers, J Clardy, L Li, CR Currie. *In preparation*. "Mass Spectrometry Imaging Reveals Differential Chemical Response to Pathogens in an Ancient Ant-Microbe Symbiosis."

**P2:** Lewin, GR, C Carlos, **MG Chevrette**, HA Horn, BR McDonald, RJ Stankey, BG Fox, CR Currie. *In press*. "Ecology and Evolution of Actinobacteria and their Bioenergy Applications."

**P1:** Johnson, SS, **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.

## Abstracts

**A15: Chevrette, MG**, 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: Bratburd, J**, BR McDonald, **Chevrette, MG**, 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.

**A13: Horn, HA**, 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.

**A12: Chevrette, MG**, 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.

**A11: Johnson, SS**, 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: Chevrette, MG**, 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.

**A9: 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: Chevrette, MG**, DW Udworthy, 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: Chevrette, MG**, 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: Chevrette, MG**, 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: Udworthy, DW**, 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: Robison, K**, DW Udworthy, **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.

**A3: Young, S**, 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.

**A2:** Steelman, S, R Daza, **MG Chevette**, 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.

**A1:** Steelman, S, R Daza, **MG Chevette**, 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.

## Service & Outreach

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**Mentor** 03/2016–08/2016

*Open Bioinformatics Foundation – Google Summer of Code – antiSMASH*

- o Provided both scientific and technical mentorship in the development of predictive models for ribosomally synthesised and post-translationally modified peptide (RiPP) biosynthesis in the widely-used genome-mining software suite, antiSMASH.

**Co-chair** 01/2016–present

*Computational Biology, Ecology, & Evolution (ComBEE) – UW-Madison*

- o Coordinated and scheduled speakers, discussions, workshops, and meetings focused on molecular microbial ecology and evolution, computational biology, and data science.

**Co-organizer** 10/2015–11/2015

*Discovery Niche – Wisconsin Institutes for Discovery*

- o Planned, built, and maintained interactive public exhibits showcasing natural products drug discovery and bioenergy research for local Madison, Wisconsin community.

**Volunteer** 10/2015

*Wisconsin Science Festival*

**Open Genomics Advisor** 04/2014–10/2015

*Long Now Foundation – Revive & Restore*

- o Advised projects with Revive and Restore and Cofactor Genomics seeking to understand the genomics of the endangered and extremely bottlenecked black footed ferret and the extinct heath hen in an effort to reintroduce genetic diversity and aid in restoration of healthy wild populations.

**Environmental, Health, and Safety Representative** 01/2011–03/2013

*Broad Institute of MIT & Harvard*

## Achievements & Awards

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**Vilas Travel Grant** 2016

*University of Wisconsin-Madison*

**Chemistry-Biology Interface Predoctoral Fellowship** 06/2016-present

*National Institutes of Health, NIGMS – UW-Madison*

**Dean's Academic Achievement Award** 03/2015

*Harvard University Extension*

**Featured Scientific Researcher – "Who is Broad?"** 01/2012

*Broad Institute of MIT & Harvard*

<b>Rensselaer Alumni Scholarship</b> <i>Rensselaer Polytechnic Institute</i>	2004–2008
<b>Sal H. Alfiero Scholarship</b> <i>Rensselaer Polytechnic Institute</i>	2004–2008
<b>Rhode Island State Scholarship</b> <i>Rensselaer Polytechnic Institute</i>	2004–2008

## **Professional Societies & Groups**

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