

Michael W. Mullowney, PhD

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Summary

Of the five primary research projects during my PhD and postdoc, the three that I initiated remain central to the labs' research programs and continue to support three graduate students' dissertations.

- Results:**
- New class of anti-TB drug-lead
 - BiG-SCAPE/CORASON natural products discovery software
 - 3 fellowships
 - 4 scholarships/awards
 - 5 first-authored papers
 - 3 invited talks
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Work Experience

NIH NRSA Postdoctoral Fellow

Labs of Neil Kelleher
and Regan Thomson
Northwestern University

2016–present

- Discovered seven novel natural products as proof-of-concept toward development of the BiG-SCAPE/CORASON genome library mining software.
 - Advancing the 'metabologenomics' correlative discovery platform by applying it in a targeted fashion.
 - Founded and led NU's 100+ member Science Policy Outreach Taskforce (SPOT) to advocate for fact-based decision making to voters and legislators.
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NIH T32 and AFPE Predoctoral Fellow

Lab of Brian Murphy
University of Illinois at Chicago

2012–2016

- Isolated 26 natural products, including the potent, selective diazaquinomycin class of TB antibiotics, which established freshwater actinomycetes as a new natural product source. I led an international collaboration in investigations of this activity and pharmacological studies in a TB mouse model.
 - Designed and led a citizen science campaign of 15 divers and five students to investigate the microbiomes and chemistry of freshwater sponges in the Great Lakes.
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Education

Doctor of Philosophy (PhD)

Pharmacognosy (natural products drug discovery), *magna cum laude* (3.77 GPA), **University of Illinois at Chicago**, 2012–2016

Dissertation: "Antibiotics from Aquatic-Derived Actinomycete Bacteria that Inhibit *M. tuberculosis*"

Advisor: Professor Brian T. Murphy

Post-Baccalaureate

Studies in general and organic chemistry, biology, biochemistry, and microbiology (3.89 GPA), **DePaul University**, 2009–2012

Peer-reviewed Publications

8. Schorn, M.A.; Verhoeven, S.; Ridder, L.; Huber, F.; **Mullowney, M.W.**; et al.; Duncan, K.; Crüsemann, M.; Rogers, S.; Dorrestein, P.C.; Medema, M.H.; van der Hooft, J.J.J. A community resource for paired genomic and metabolomic data mining. *Nat. Chem. Biol.* 2020, *In press*.
7. Hamm, P.; Dunlap, C.A.; **Mullowney, M.W.**; Caimi, N. A.; Valdez, E.W.; Kelleher, N.L.; Thomson, R.J.; Porrás-Alfaro, A.; Northup, D.E. *Streptomyces buecheriae* sp. nov., isolated from multiple bat species. *Antonie van Leeuwenhoek.* 2020, DOI: 10.1007/s10482-020-01493-4.
6. Navarro-Muñoz, J.*; Selem-Mojica, N.*; **Mullowney, M.W.***; Kautsar, S.; Tryon, J.H.; Parkinson, E.; Santos, E.D.L.; Yeong, M.; Cruz-Morales, P.; Abubucker, S.; Roeters, A.; Lokhorst, W.; Fernandez-Guerra, A.; Dias Cappelini, L.T.; Goering, A.W.; Thomson, R.J.; Metcalf, W.W.; Kelleher, N.L.; Barona-Gomez, F.; Medema, M.H. A computational framework to explore large-scale biosynthetic diversity. *Nat. Chem. Biol.* 2020, 16, 60-68.

***Joint first authors.**

NOTE: This article was featured on the cover of the journal.

5. **Mullowney, M.W.**; McClure, R.; Robey, M.; Kelleher, N.L.; Thomson, R.J. Natural products from biosynthetic assembly lines terminating in thioester reductases. *Nat. Prod. Rep.* 2018, 35, 847-78.

NOTE: This article was featured on the cover of the journal.

4. **Mullowney, M.W.**; Ó hAinmhire, E.; Tanouye, U.; Burdette, J.E.; Pham, V.C.; Murphy, B.T. A Pimarane Diterpene and Cytotoxic Angucyclines from a Marine-Derived *Micromonospora* sp. in Vietnam's East Sea. *Mar. Drugs.* 2015, 13, 5815-27.

3. **Mullowney, M.W.**; Newsome, A.; Wan, B.; Wei, X.; Tanouye, U.; Cho, S. H.; Franzblau S.G.; Murphy, B.T. Diaza-anthracene antibiotics from a freshwater-derived actinomycete that selectively inhibit *M. tuberculosis*. *ACS Infect. Dis.* 2015, 1, 168-74.

NOTE: This article was featured on the cover of the journal.

2. **Mullowney, M.W.**; Ó hAinmhire, E.; Shaikh, A.; Wei, X.; Tanouye, U.; Santarsiero, B.D.; Burdette, J.E.; Murphy, B.T. Diazaquinomycins E-G, novel diaza-anthracene analogs from a marine-derived *Streptomyces* sp. *Mar. Drugs.* 2014, 12, 3574-86.

1. Maresh, J. J.; Crowe, S.O.; Ralko, A.; Aparece, M.D.; Murphy, C.M.; Krzeszowiec, M.; **Mullowney, M.W.** Facile one-pot synthesis of tetrahydroisoquinolines from amino acids via hypochlorite-mediated decarboxylation and Pictet-Spengler condensation. *Tetrahedron Lett.* 2014, 55, 5047-51.

Fellowships & Awards

NIH NCI Ruth L. Kirschstein (NRSA) F32 Postdoctoral Fellowship | **2017–present**

NIH NCCIH T32 Predoctoral Training Fellowship | **2013–2016**

AFPE Predoctoral Fellowship in Pharmaceutical Sciences | **2015–2016**

Northwestern University Department of Chemistry Postdoctoral Travel Award | **2020**

International Association for Great Lakes Research (IAGLR) Scholarship | **2015**

W. E. Van Doren Scholarship, University of Illinois at Chicago | **2014**

Invited Talks

Genome library mining with BiG-SCAPE/CORASON reveals novel detoxin natural products.

Society for Industrial Microbiology and Biotechnology (SIMB) Annual Meeting, Chicago, 2018.

Inhibitors of drug-resistant *M. tuberculosis* from aquatic actinomycetes.

Careers in Scientific Research, DePaul University, Chicago, 2015.

Diaza-anthracene antibiotics that inhibit drug-resistant *Mycobacterium tuberculosis*.

Baxter-UIC NMR Exchange Meeting, Baxter Healthcare, Deerfield, IL, May 21, 2014.

Professional Societies

Society for Industrial Microbiology and Biotechnology (SIMB) | **2018 – present**

American Society of Mass Spectrometry (ASMS) | **2016 – present**

American Association for the Advancement of Science (AAAS) | **2015 – present**

American Society of Microbiology (ASM) | **2014 – present**

American Society of Pharmacognosy (ASP) | **2013 – present**

American Chemical Society (ACS) | **2010 – present**

Service and Outreach

Chair, American Society of Pharmacognosy Newsletter Committee | **2020 – present**

- Leading a team of seven committee members in updating the content and delivery of the ASP Newsletter, a popular publication among ASP members and natural product researchers.

Founder and Co-chair, Science Policy Outreach Taskforce (SPOT) at Northwestern | **2017 – 2020**

- Founded and led a graduate student and postdoc organization of 10 committee members and 200 members-at-large for the advocacy and communication of science to policy makers and the voting aged public.
 - Organized and lead a trip to Springfield, IL to meet with legislators.
 - Initiated a program to write one-page info sheets that informs legislators to make evidence-based decisions about pertinent science-related policy issues and legislative actions. Our info sheets have influenced legislation such as BPA in cash register receipts and fracking in Illinois.
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Core Qualifications

- Ten years experience in microbiology, eight years in natural products discovery, and four years in advanced omics.
 - Use of Thermo software, molecular networking (GNPS), MZmine, PEAKS, and SIRIUS software for LCMS metabolomics; Geneious, antiSMASH, BiG-SCAPE, CORASON, SPAdes, and numerous smaller Linux-based tools in genomics.
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- Complex structure elucidation and dereplication of small molecules using UPLC-LCMSⁿ (Thermo Orbitrap), multidimensional NMR, derivitization, UV, IR, and CD.
 - Microbiology and sterile technique.
 - Natural product separation by liquid-liquid extraction, flash chromatography, CombiFlash, and HPLC.
 - Organic semi-synthesis for structure-activity relationships, molecular biology for target identification.
 - Adept at written, verbal, and visual communication for scientific and lay audiences; deep knowledge in figure/infographic design, animation, and illustration using Adobe suite and other software (www.MichaelMullowney.com/gallery.html).
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