# Christian B. Macdonald, Ph.D.

Postdoctoral Scholar
Department of Bioengineering and Therapeutic Sciences
UCSF

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| Education | | |
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| | **University of California, San Francisco** | **San Francisco, CA** |
| | Postdoctoral Scholar | September 2021 – |
| | Advisor: Dr. James Fraser | |

**University of Michigan**  **Ann Arbor, MI**
*Ph.D.*, Biophysics  2015 – August 2021
Advisor: Dr. Randy Stockbridge
Thesis: "Complexity in the Membrane"

**Arizona State University**  **Tempe, AZ**
*B.S.*, Biochemistry and *B.S.*, Math, *summa cum laude*  2011 – 2015
Advisors: Dr. George Pettit and Dr. Xu Wang
Thesis: "Total Synthesis of Dolastatin 16 and the Silstatins: Cyclic Depsipeptides from the Sea"

**Publications**

Olive E. Burata, Trevor Justin Yeh, **Christian B. Macdonald** and Randy B. Stockbridge (accepted). Still rocking in the structural era: a molecular overview of the Small Multidrug Resistance (SMR) transporter family. *Journal of Biological Chemistry*

**Christian B. Macdonald**, David Nedrud, Patrick Rockefeller Grimes, Donovan Trinidad, James S. Fraser, Willow Coyote-Maestas (2022). Deep Insertion, Deletion, and Missense Mutation Libraries for Exploring Protein Variation in Evolution, Disease, and Biology. *bioRxiv (preprint)*. doi:10.1101/2022.07.26.501589

Ali A. Kermani and **Christian B. Macdonald** (equal contributions), Olive Burata, B. Ben Koff, Akiko Koide, Eric Denbaum, Shohei Koide and Randy B. Stockbridge (2020). The structural basis of promiscuity in small multidrug resistance transporters. *Nature Communications* 11, 6064. doi:10.1038/s41467-020-19820-8

Ali A. Kermani, **Christian B. Macdonald**, Roja Gundepudi, and Randy B. Stockbridge (2018). Guanidinium export is the primal function of SMR family transporters. *Proceedings of the National Academy of Sciences* 115, 3060-3065. doi:10.1073/pnas.1719187115

**Christian B. Macdonald** and Randy B. Stockbridge. (2017). A topologically diverse family of fluoride channels. *Current Opinion in Structural Biology* 45, 142-149. doi:10.1016/j.sbi.2017.04.003

George R. Pettit, Pablo M. Arce, Jean-Charles Chapuis, and **Christian B. Macdonald** (2015). Antineoplastic Agents. 600. From the South Pacific Ocean to the Silstatins. *Journal of Natural Products.* 78, 510-523. doi:10.1021/np501004h

George R. Pettit, Thomas H. Smith, Pablo M. Arce, Erik J. Flahive, Collin R. Anderson, Jean-Charles Chapuis, Jun-Ping Xu, Thomas L. Groy, Paul E. Belcher, and **Christian B. Macdonald**. (2015). Antineoplastic Agents. 599. Total Synthesis of Dolastatin 16. *Journal of Natural Products.* 78, 476-485. doi:10.1021/np500925y

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| Talks | *Molecular Mechanisms in Evolution Gordon Research Conference* | **2019** |

"A shared non-canonical substrate facilitates the evolution of drug export in the Small Multidrug Resistance (SMR) family of transporters" (15 minute selected talk)

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| | *Biophysics Program Symposium, University of Michigan* | **2019** |

"Evolving with promiscuous substrates in the small multidrug resistance family"

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| Selected Posters | **Christian B. Macdonald**, James Fraser, Willow Coyote-Maestas. | **2022** |

Illuminating trafficking and function of a potassium channel with a novel deep mutational scanning library
*Ligand Recognition and Molecular Gating Gordon Research Conference*

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| | **Christian B. Macdonald**, Alexis Kelley*, Jenna Pellegrino, Willow Coyote-Maestas, James Fraser. | **2022** |

Using deep mutational scanning to identify the determinants of antibiotic resistance.
*Biophysical Society 66th Annual Meeting*

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| | Alexis Kelley*, **Christian B. Macdonald**, James Fraser. | **2022** |

Dismantling antibiotic resistance one variant at a time: In vitro and computational analysis of VatD
*Biophysical Society 66th Annual Meeting*

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| | **Christian B. Macdonald**, Troy Cao*, and Randy Stockbridge. | **2021** |

Evolution of inverted repeats in membrane transporters.
*Biophysical Society 65th Annual Meeting*

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| | Troy Cao*, **Christian B. Macdonald**, and Randy B. Stockbridge. | **2020** |

Understanding the evolution of inverted repeats using the Fluc family of proteins.
*Biophysical Society 64th Annual Meeting*

*: mentored student author

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| Awards | Krimm Exceptional Dissertation Award | **2021** |
| | Program in Biomed. Sci. 20th Anniversary Excellence in Research Award | **2019** |
| | Poster award - Society of General Physiologists 72nd Annual Symposium | **2018** |
| | NSF Graduate Research Fellowship Program - Honorable mention | **2016** |
| | Maas Fellowship - University of Michigan | **2015** |

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| Teaching | *BIOPHYS 440: Biophysics of Diseases* | **2017, 2018** |
| | Guest lecturer | |
| | *BIOPHYS 454: Biophysical Chemistry II* | **2017** |
| | Guest lecturer | |
| | *BIOPHYS 420: Structural Biology I* | **2017** |
| | Graduate student instructor. Created material and taught ancestral reconstruction module. | |
| | *BIOPHYS 120: Mysteries of the Double Helix* | **2016** |
| | Graduate student instructor. | |
| | *BIOPHYS 440: Biophysics of Diseases* | **2015** |
| | Graduate student instructor. Created lecture material and taught NMR module. | |

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| Service | DEI journal club organizer | **2022-** |

|                | Reviewer | **2021-** |
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- eLife (Early-career reviewer in Structural Biology and Molecular Biophysics)
- Nature Communications
- BBA - General Subjects
- Biophysical Chemistry

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| | Head steward, UAW 5810 | **2021-** |
| | Department steward, GEO 3550 | **2017 - 2018** |
| | Organizer, NMR journal club and NMR workshop | **2016 - 2017** |
| | Graduate student representative | **2016 - 2017** |

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| Training | Evidence-Based Teaching Course (STEP-UP) | **2022** |
| | Inclusive Research Mentor Course | **2022** |
| | Inclusive STEM Teaching Project | **2021** |
| | Nanion Surfe$^2$R N1 Research Grant | **2018** |
| | University of Minnesota Advanced NMR Workshop | **2016** |

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| Mentorship | **University of California, San Francisco** | |
| | Alexis Kelley, UCSF PROPEL post-baccalaureate researcher | **2021-2022** |
| | Currently: PhD student, Biophysics, Johns Hopkins University | |

**University of Michigan**
Fox Baudelaire, Pathways Master's student **2021**
Currently: PhD student, MCDB, University of Michigan

Vivek Parikh, Undergraduate honors thesis **2021**
"Topological evolution of the Small Multidrug Resistance (SMR) family of Transporters"
Currently: University of Virginia School of Medicine

Troy Cao, Undergraduate honors thesis **2019**
"Towards Understanding the Evolution of Dual-Topology Membrane Proteins: Examining The Flucs, a Family of Fluoride Ion Channels"
Currently: Ohio State University College of Medicine

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| Other skills | Programming: Python, R, LaTeX |

Languages: English (primary), German (basic proficiency)

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| References | Available upon request |