

Kathryn E. McElroy, PhD

LinkedIn: [@kathrynmcelroy](#)

EMPLOYMENT	BioKEM Solutions	10/20 – present
	Principal Biotechnology Consultant	Fresno, CA
	Muratore Architects, Inc.	04/20 – 12/21
	Office Manager & Bookkeeper	Fresno, CA
ACADEMIC APPOINTMENTS	American University	8/08 – 8/11
	Assistant Professor	Chemistry
	Johns Hopkins Medicine	7/08 – 8/11
	Visiting Scientist	Pharmacology and Molecular Sciences
EDUCATION	University of California, Berkeley	Ph.D. - Molecular and Cell Biology
	Carnegie Mellon University	B.S. - Chemistry
CONSULTING	BioKEM Solutions	Principal
	Provide customized R&D consultation tailored for clients' needs. Throughout the contract, provide thorough, updated reports on a regular basis, and attend video or phone conference meetings, as required. Primary areas of expertise include:	
	<u>Literature Review</u>	
	- Conduct literature review on disease targets, including existing therapies and clinical trials. As needed, identify research protocols for the study of the disease <i>in vitro</i> or <i>in vivo</i> , and aid in design of protocols and assays, with an emphasis on enzyme assays.	
	<u>Enzyme Kinetics</u>	
	- Data analysis of research results, particularly non-linear curve-fitting of enzyme assay data, and recommend experiments and protocols based on the results.	
	<u>Protein Redesign</u>	
	- Create and refine homology models, such as of multimolecular assemblies or enzyme-inhibitor complexes. Map all interactions at the binding interface, with attention to strength and conservation of residue-residue interactions. Propose point mutations to redesign the binding affinity in a targeted fashion. Propose strategies for combining select point mutations to make stepwise changes to binding affinity, based on expected interactions between the mutated residues.	
RESEARCH	University of California, Berkeley	Graduate Research Assistant -
	Dissertation research with Jack F. Kirsch:	Biochemistry and Molecular Biology
	<u>Aminotransferase Diversity and Function</u>	
	- Determination of the <i>in vivo</i> function of a <i>Pseudomonas aeruginosa</i> aspartate aminotransferase by correlation of growth phenotype with enzymatic properties of knockout strains (Collaboration with Joanna Goldberg at University of Virginia).	
	- Structural and kinetic analysis of an aminotransferase variant developed using directed evolution (Collaboration with James Berger at UC Berkeley).	

- Computational sequence analysis of complex covariation in protein families for purposes of function prediction and rational redesign. **C** compiled code and documentation available at:
http://mcb.berkeley.edu/labs/kirsch/programs/patterns_v4_1.exe
http://mcb.berkeley.edu/labs/kirsch/programs/Patterns_v4_readme.rtf
- Cloning, expression, purification, and substrate specificity studies of a diverse set of aminotransferases.

Johns Hopkins University

Postdoctoral Fellow -

Postdoctoral research with Phil A. Cole

Pharmacology and Molecular Sciences

Chemical Rescue of Src-family Tyrosine Kinases

- Effect of active site mutations in Src kinase on small-molecule activator binding affinities (Collaboration with John Kuriyan at UC Berkeley and David Baker at University of Washington).
- Kinetic analysis of wild-type Abl kinase and rescue of the Arg→Ala mutant.

American University

Assistant Professor -

Primary Investigator

Chemistry

Knowledge-based redesign of enzymes

- Develop protein sequence analysis software to computationally identify substrate specificity determinants in three protein families:
 - Subfamily I α aminotransferases
 - NADH-dependent malate/lactate dehydrogenases
 - Src-family protein tyrosine kinases
- Test the computational predictions by making enzyme variants and assaying their substrate specificity.
- Identify the chemical basis for the enzymatic effects that are observed.

RESEARCH
GRANTS**Research Corporation Cottrell College Science Award**

01/10 – 12/11

Single Investigator Award

\$45,000 over 2 years

Knowledge-based redesign of enzymes to identify substrate specificity determinants

NSF Major Research Infrastructure

09/10 – 09/11

Contributing Investigator

\$260,745 over 1 year

Expanding Capabilities for Research and Research Training at American University through Shared High-Performance Computing

TEACHING

Biochemistry I & II

Upperclass lecture course

General Chemistry I

Freshman lecture course for chemistry majors

Human Biochemistry Laboratory

Upperclass lab course

Human Genome

Non-majors lecture course

MENTORING

Research: Supervised the research of twelve students at the bachelor's, post-baccalaureate, or master's level during tenure at American University.**Pre-medical Advisor:** Advised seven American University undergraduate and post-baccalaureate students to assist with preparation for and application to medical programs.

VOLUNTEER/ COMMUNITY	Synergy Homeschool Cooperative Weekly enrichment classes and activities	Co-founder/Co-organizer 09/13 – present
	Carnegie Mellon University Outreach to prospective students	CMAC Alumni Volunteer 10/17 – present
PUBLICATIONS Primary Research	McElroy, K E , Bouchard, P J, Harpel, M R, Horiuchi, K Y, Rogers, K C, Murphy, D J, Chung, T D Y, and Copeland, R A. <i>Implementation of a Continuous, Enzyme-Coupled Fluorescence Assay for High-Throughput Analysis of Glutamate-Producing Enzymes.</i> <u>Analytical Biochemistry.</u> (2000) 284 : 382-387.	
	Chow, M A, McElroy, K E , Corbett, K D, Berger, J M, and Kirsch, J F. <i>Narrowing Substrate Specificity in a Directly Evolved Enzyme: The A293D Mutant of Aspartate Aminotransferase.</i> <u>Biochemistry.</u> (2004) 43 : 12780-12787.	
	Engelhardt, B E, Jordan, M I, Muratore, K E , and Brenner, S E. <i>Protein Molecular Function by Bayesian Phylogenomics.</i> <u>Public Library of Science: Computational Biology.</u> (2005) 1 : 432-445.	
	Muratore, K E , Srouji, J R, Chow, M A, and Kirsch, J F. <i>Recombinant Expression of Twelve Evolutionarily Diverse Subfamily Iα Aminotransferases.</i> <u>Protein Expression and Purification.</u> (2008) 57 : 34-44.	
	Muratore, K E , Seeliger, M A, Wang, Z, Neiswinger, J, Havrenak, J, Baker, D, Kuriyan, J and Cole, P A. <i>Comparative Analysis of Mutant Tyrosine Kinase Chemical Rescue.</i> <u>Biochemistry.</u> (2009) 48 : 3378-3386.	
	Muratore, K E , Engelhardt, B E, Srouji, J R, Jordan, M I, Brenner, S E, & Kirsch, J F. <i>Molecular function prediction for a family exhibiting evolutionary tendencies toward substrate specificity swapping: Recurrence of tyrosine aminotransferase activity in the Ia subfamily.</i> <u>Proteins: Structure, Function, and Bioinformatics.</u> (2013) 81 : 1593-1609.	
	Sheftel, S, Muratore, K E , Black, M, & Costanzi, S. <i>Graph analysis of β 2 adrenergic receptor structures: a “social network” of GPCR residues.</i> <u>In Silico Pharmacol.</u> (2013) 1 : 16.	
	Petrova, R, Patil, A R, Trinh, V, McElroy, K E , Bhakta, M, Tien, J, Wilson, D S, Warren, L, Stratton, J R. <i>Disease Pathology Signatures in a Mouse Model of Mucopolysaccharidosis Type IIIB.</i> <u>Scientific Reports.</u> (2023) 13 : 16699.	
Commentary	Muratore, K E , Cole, P A. <i>A Lock on Phosphotyrosine Signaling.</i> <u>ACS Chemical Biology.</u> (2007) 2 : 454-456.	
Higher Education	Hartings, M R, Fox, D M, Miller, A E, Muratore, K E . <i>A Hybrid Integrated Laboratory and Inquiry-Based Research Experience: Replacing Traditional Laboratory Instruction with a Sustainable Student-Led Research Project.</i> <u>J. Chem. Educ.</u> (2015) 92 : 1016-1023.	

References available upon request