Kathryn E. Muratore

Fresno, CA

ACADEMIC APPOINTMENTS

American University — Assistant Professor
Chemistry — 8/08 – 8/11

Johns Hopkins Medicine — Visiting Scientist
Pharmacology and Molecular Sciences — 7/08 – 8/11

EDUCATION & TRAINING

Carnegie Mellon University — B.S. - Chemistry

University of California, Berkeley — Ph.D. - Molecular and Cell Biology
Dissertation research with Jack F. Kirsch:

Aminotransferase Diversity and Function

- Determination of the *in vivo* function of a *Pseudomonas aeruginosa* 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** source code and documentation available at http://mcb.berkeley.edu/labs/kirsch).
- Cloning, expression, purification, and substrate specificity studies of a diverse set of aminotransferases.

Johns Hopkins University — Postdoctoral Fellow - Pharmacology and Molecular Sciences
Postdoctoral research with Phil A. Cole:

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.

EMPLOYMENT

Muratore Architects, Inc. — Office Manager & Bookkeeper, Part-time
Architectural firm — 04/20 – present

RESEARCH

Knowledge-based redesign of enzymes

- Develop protein sequence analysis software to computationally identify substrate specificity determinants in three protein families:
  - Subfamily Iα 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.

AWARDS
External

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

AWARDS
Internal

American University College of Arts and Sciences Mellon Grant – 11/10-11/11
Single Investigator Award
$1000 over 1 year
Probing the conserved residues in aspartate aminotransferase

American University Major Equipment in the Sciences Award – AY '09-'10
with A. Cheh (lead PI), D. Angelini, D. Fox
$35,000
Facility for Macromolecular Purification and Characterization

American University Curriculum Development Award – AY '09-'10
with Jim Girard (Chairman, Dept of Chemistry)
$5000 over 1 summer
Development and Improvement of Chem-508 (Human Biochemistry Laboratory)

American University Major Equipment in the Sciences Award – AY '08-'09
with V. Connaughton (lead PI), D. Angelini, K. Decicco-Skinner, D. Fong, D. Fox, D. Culver, T. Riley
$135,000
Digital Imaging Core Facility

American University GEFAP – Spring '09
General Education Faculty Assistance Program
$300 towards undergraduate stipend
Undergraduate assistance in locating visual learning aids for *The Human Genome* (Chem-205)

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.

VOLUNTEERING

Synergy Homeschool Cooperative Co-founder/Co-organizer
Weekly enrichment classes and activities 09/13 – 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. *Implementation of a Continuous, Enzyme-Coupled Fluorescence Assay for High-Throughput Analysis of Glutamate-Producing Enzymes.* Analytical Biochemistry. (2000) **284:** 382-387.

Chow, M A, **McElroy, K E**, Corbett, K D, Berger, J M, and Kirsch, J F. *Narrowing Substrate Specificity in a Directly Evolved Enzyme: The A293D Mutant of Aspartate Aminotransferase.* Biochemistry. (2004) **43:** 12780-12787.

Engelhardt, B E, Jordan, M I, **Muratore, K E**, and Brenner, S E. *Protein Molecular Function by Bayesian Phylogenomics.* Public Library of Science: Computational Biology. (2005) **1:** 432-445.

Muratore, K E, Srouji, J R, Chow, M A, and Kirsch, J F. *Expression of Twelve Evolutionarily Diverse Subfamily Iα Aminotransferases.* Protein Expression and Purification. (2008) **57**: 34-44.

Muratore, K E, Seeliger, M A, Wang, Z, Neiswinger, J, Havrenak, J, Baker, D, Kuriyan, J and Cole, P A. *Comparative Analysis of Mutant Tyrosine Kinase Chemical Rescue*. Biochemistry. (2009) **48**: 3378-3386.

Muratore, K E, Engelhardt, B E, Srouji, J R, Jordan, M I, Brenner, S E, & Kirsch, J F. *Molecular function prediction for a family exhibiting evolutionary tendencies toward substrate specificity swapping: Recurrence of tyrosine aminotransferase activity in the Ia subfamily*. Proteins: Structure, Function, and Bioinformatics. (2013) **81**: 1593-1609.

Sheftel, S, **Muratore, K E**, Black, M, & Costanzi, S. *Graph analysis of β 2 adrenergic receptor structures: a "social network" of GPCR residues.* Silico Pharmacol. (2013) **1**: 16.

Commentary

Muratore, K E, Cole, P A. *A Lock on Phosphotyrosine Signaling.* ACS Chemical Biology. (2007) **2**: 454-456.

Higher Education

Hartings, M R, Fox, D M, Miller, A E, **Muratore, K E.** *A Hybrid Integrated Laboratory and Inquiry-Based Research Experience: Replacing Traditional Laboratory Instruction with a Sustainable Student-Led Research Project.* J. Chem. Educ. (2015) **92**: 1016-1023.

*Name changed from Kathryn McElroy to Kathryn Muratore. Relevant author is highlighted.

REFERENCES Available upon request