

CURRICULUM VITA

Madeline Elizabeth Rasche

Current Address:

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Education

- 1985-1991 Ph.D. Biochemistry, University of California, Riverside, CA.
1981-1985 B.S. Biology (Magna cum laude), Santa Clara University, Santa Clara, CA.

Professional Experience and Academic Positions

- 8/2007 to present Professor of Biochemistry, Chemistry and Biochemistry Department, California State University at Fullerton (CSUF), Fullerton, CA.
8/2007 to 8/2008 Grant Program Director, Metabolic Biochemistry, National Science Foundation, Arlington, VA (On Professional Leave from CSUF)
2004-2007 Associate Professor and Graduate Coordinator, Department of Microbiology and Cell Science, University of Florida, Gainesville. (Research Area: Coenzyme Biosynthetic Pathways in Archaea)
1998-2004 Assistant Professor, Department of Microbiology and Cell Science, University of Florida, Gainesville. (Coenzyme Biosynthesis & Microbial Protein Biochemistry)
1997-1997 Postdoctoral Research Associate, Department of Biochemistry and Anaerobic Microbiology, Virginia Polytechnic Institute and State University, Blacksburg, VA. Advisor: Dr. Robert White. (Methanogen Coenzyme Biosynthesis)
1995-1997 Postdoctoral Research Associate, Chemistry and Biochemistry Department, Utah State University, Logan, UT. Advisor: Dr. Lance Seefeldt. (Enzymology of Nitrogenase)
1991-1995 Postdoctoral Research Associate, Department of Biochemistry and Anaerobic Microbiology, Virginia Polytechnic Institute and State University, Blacksburg, VA. Advisor: Dr. James Greg Ferry. (Biochemistry of Methanogenesis)
1985-1991 Graduate Research Assistant, Biochemistry Department, University of California, Riverside, CA. Advisor: Dr. Daniel J. Arp. (Microbial Biodegradation of Halogenated Environmental Pollutants)
1982-1985 Undergraduate Research Assistant, Biology Department, Santa Clara University, CA. Advisor: Dr. William Eisinger. (Cytokinins and flower senescence)

Awards and Fellowships

- 2014 Outstanding Faculty Teaching Recognition Award for High-Impact Practices, CSU Fullerton College of Natural Sciences and Mathematics, Chemistry and Biochemistry Department
- 2008-2010 Elected Chair of Gordon Research Conference on the Molecular Basis of Microbial One-Carbon Metabolism, Bates College, Lewiston, Maine
- 1993-1996 National Science Foundation Minority Postdoctoral Fellowship
- 1985-1989 National Science Foundation Predoctoral Fellowship
- 1985 Chancellor's Distinguished Fellowship, University of California, Riverside
- 1985 Phi Beta Kappa Honor Society, Santa Clara University, CA

Grant Funding

Current:

1. **CSU Fullerton Intramural Junior / Senior** Faculty Grant program
Title: Discovering the Function of New Proteins Needed for Microbial Methane Production
Role: Principal Investigator
Amount: \$2500 plus 3 WTU's release time (\$6219)
Dates: July 1, 2014 to June 30, 2015
2. California State University Program for Education and Research in Biotechnology (**CSUPERB**) Faculty-Student Collaborative Research: Development Grant
Title: Structural Biology of Archaeal and Bacterial Dihydromethanopterin Reductases
Role: Principal Investigator
Amount: \$15,000
Proposed Duration: 18 months
Dates: July 1, 2014 to December 31, 2015

Declined, in revision:

National Science Foundation Research at Undergraduate Institutions (NSF-RUI) Program, Molecular and Cellular Biology, Molecular Biochemistry Panel
Title: RUI: Structure-function Function Insights into Methanopterin Biosynthesis Enzymes
Role: Principal Investigator
Amount Requested: \$233,000
Proposed Duration: 2 years
Submitted November 15, 2013, declined July 9, 2014.

Pending or submission planned:

1. **National Institutes of Health AREA (R15) Program**
Title: Methanogen Cofactor Biosynthesis Enzymes, Potential Targets for Inhibiting Methane-Producing Microorganisms Associated with Obesity

Role: Principal Investigator
Requested Amount: \$300,000
Proposed Duration: 3 years
Submission planned: October 25, 2014

Previous:

1. California State University, Fullerton, Office of Grants & Contracts Incentive Grant
Title: Improving a Research-Based Biotechnology Laboratory Course to Increase Undergraduate Contributions to Original Research
Role: Principal Investigator
Amount: \$10,000
Duration: 1 year (January 1, 2012 to December 31, 2012)
2. CSU Fullerton, Milton A. Gordon Fund for Scholarly & Creative Activities
Title: Limiting Biological Methane Production as a Potential Contribution to Obesity
Role: Principal Investigator
Amount: 3 WTU teaching release time
Duration: 1 year (January 1, 2012 to December 21, 2012)
3. National Science Foundation, Metabolic Biochemistry, #0420766 / #1020200
Title: Methanopterin Biosynthesis in Archaea and Methylophilic Bacteria
Role: Principal Investigator
Amount: \$607,000
Duration: 6 years (January 1, 2005 to March 31, 2011)
4. National Science Foundation, Research Experiences for Undergraduates (REU)
Title: REU Site: Fueling a Microbiology Research Training Network from the University of Florida
Role: Principal Investigator
Amount: \$240,000
Duration: 3 years (February 2007 to February 2010)
5. National Science Foundation, Metabolic Biochemistry, Grant #9876212 (CAREER Award)
Title: Methanopterin Biosynthesis in Archaea and Methylophilic Bacteria
Role: Principal Investigator
Amount: \$492,000
Duration: 5 years (May 1999 to May 2004)
6. National Science Foundation Starter Grant #9815924
Title: Nitrite Inhibition of Carbon Monoxide Dehydrogenase
Role: Principal Investigator
Amount: \$35,000
Duration: 1 year (May 1999 to May 2000)

Manuscript submitted:

[‡]Masters student, [†]Undergraduate researcher

1. Bobik, T.A., [‡]Morales, E.J., Shin, A., Cascio, D., Sawaya, M.R., Arbing, M., Yeates, T.O., and Rasche, M.E. Structure of the methanofuran/methanopterin biosynthetic enzyme MJ1099 from *Methanococcus jannaschii*. Submitted to ***Acta Crystallographica F*** on August 18, 2014.

Publications: 31 total (28 Peer-Reviewed, 3 Book Chapters/Reviews)

[‡]Masters student, [†]Undergraduate researcher

1. McNamara, D.E., Cascio, D., Jorda, J., [†]Bustos, C., [†]Wang, T., Rasche, M.E., Yeates, T.O., and *Bobik, T.A. 2014. Structure of dihydromethanopterin reductase: a cubic Protein cage for redox transfer. ***J. Biol. Chem.* 289**:8852-8864.
2. [‡]Wang, S., [†]Tiongson, J., and Rasche M.E. 2014. Discovery and characterization of the first archaeal dihydromethanopterin reductase (DmrX), an iron-sulfur flavoprotein from *Methanosarcina mazei*. ***J. Bacteriol.* 196**:204-209.
3. [†]Testani, J., [†]Dabelic, R. and Rasche, M. E. 2006. Chemical reduction of pterins to dihydropterins. ***Analytical Biochem.* 358**:20-24.
4. Rasche, M. E., and Ferry, J. G. 2005. Molecular Biology of Methanogens and Archaeobacteria, p. 237-261. In R. A. Meyers (ed.), Encyclopedia of Molecular Cell Biology and Molecular Medicine, 2nd ed, vol. 8. Wiley-VCH Verlag GmbH & Co., Weinheim. (Review)
5. Chistoserdova, L., Rasche, M.E., and Lidstrom, M.E. 2005. Novel tetrahydromethanopterin biosynthesis genes discovered via mutagenesis in *Methylobacterium extorquens* AM1. ***J. Bacteriol.* 187**: 2508-2512.
6. [‡]Hamilton, R., [‡]Casasús, A., Rasche, M. Narang, A, Svoronos, S. A., and Koopman, B*. 2005. A structured model for denitrifier diauxic growth. ***Biotechnology and Bioengineering*, 90**: 501–508.
7. [‡]Caccamo, M. A., [†]Malone, C. S., and Rasche, M. E. 2004. Biochemical characterization of dihydromethanopterin reductase, a tetrahydromethanopterin biosynthesis enzyme in *Methylobacterium extorquens* AM1. ***J. Bacteriol.* 186**:2068-2073
8. Rasche, M. E., [‡]Wyles, S. A., and [†]Rosenzvaig, M. 2004. Characterization of two methanopterin biosynthesis mutants of *Methylobacterium extorquens* by use of a tetrahydromethanopterin bioassay. ***J. Bacteriol.* 186**:1565-1570.
9. Bobik, T.A., Rasche, M.E. 2004. Purification and partial characterization of the

Pyrococcus horikoshii methylmalonyl-CoA epimerase. **Appl. Microbiol. & Biotech.** **63**:682-685.

10. Rasche, M. E. 2004. Outcomes of a research-driven laboratory and literature course designed to enhance undergraduate contributions to original research. **Biochem. and Molecular Biology Educ.** **32**:101-107.
11. Kima, P.E., Rasche, M.E. 2004. Sex determination using the polymerase chain reaction. **Biochem. and Molecular Biology Educ.** **32**:115-119.
12. Dumitru, R., Palencia., H., Schroeder, S. D., DeMontigny, B., Takacs, J., Rasche, M. E., Miner, J. L., and *Ragsdale, S. W. 2003. Targeting methanopterin biosynthesis to inhibit methanogenesis. **Appl. Environ. Microbiol.** **69**:7236-7241.
13. ‡Bechard, M.E., †Chhatwal, S. †Garcia, R.E., and Rasche, M.E. 2003. Application of a colorimetric assay to identify putative ribofuranosylaminobenzene 5'-phosphate synthase genes expressed with activity in *Escherichia coli*. **Biological Procedures Online** **5**:69-77. (<http://www.biologicalprocedures.com/bpo/general/home.html>)
14. Bobik, T. A., and Rasche, M. E. 2003. HPLC assay for methylmalonyl-CoA epimerase. **Analytical and Bioanalytical Chemistry** **375**:344-349.
15. Uz, I., Rasche, M. E., Townsend, T., Ogram, A. V., and Lindner, A. S. 2003. Characterization of methanogenic and methanotrophic assemblages in landfill samples. **Proc. R. Soc. Lond. B (Suppl.)** **270**:S202-S205.
16. Scott, J. W., and Rasche, M. E. 2002. Purification, overproduction, and partial characterization of β -RFA-P synthase, a key enzyme in the pathway of methanopterin biosynthesis. **J. Bacteriol.** **184**:4442-4448.
17. Bobik, T. A., and Rasche, M. E. 2001. Identification of the human methylmalonyl-CoA racemase gene based on the analysis of prokaryotic gene arrangements: implications for decoding the human genome. **J. Biol. Chem.** **276**:37194-37198.
18. Rasche, M. E., and White, R. H. 1998. Mechanism for the enzymatic formation of 4-(beta-D-ribofuranosyl)aminobenzene 5'-phosphate during the biosynthesis of methanopterin. **Biochemistry** **37**:11343-11351.
19. Rasche, M. E., and Seefeldt, L. C. 1997. Reduction of thiocyanate, cyanate, and carbon disulfide by nitrogenase: kinetic characterization and electron paramagnetic spectroscopic analysis. **Biochemistry** **36**:8574-8585.
20. Rasche, M. E., Smith, K. S., and Ferry, J. G.* 1997. Identification of cysteine and arginine residues essential for phosphotransacetylase from *Methanosarcina thermophila*. **J. Bacteriol.** **179**:7712-7717.

21. Rasche, M. E., and Ferry, J. G. 1996. Molecular biology of methanogens and archaea. *In* Encyclopedia of Molecular Biology. Meyers, R. A., Ed., VCH Publishers, New York. (Review).
22. Rasche, M. E., Terlesky, K. C., Abbanat, D. R., and Ferry, J. G. 1995. Purification of carbon monoxide dehydrogenase from *Methanosarcina thermophila*. *In* Archaea: A Laboratory Manual. K. R. Sowers, and H. J. Schreier, Eds., Cold Spring Harbor Laboratory Press, New York. (Invited paper).
23. Seefeldt, L. C.* , Rasche, M. E., and Ensign, S. A. 1995. Carbonyl sulfide and carbon dioxide as new substrates, and carbon disulfide as a new inhibitor, of nitrogenase. **Biochemistry** **34**:5382-5389.
24. Peer, C. W., Painter, M. H., Rasche, M. E., and Ferry, J. G.* 1994. Characterization of a CO:heterodisulfide oxidoreductase system from acetate-grown *Methanosarcina thermophila*. **J. Bacteriol.** **176**:6974-6979.
25. Lu, W. P., Jablonski, P. E., Rasche, M., Ferry, J. G., and Ragsdale, S. W.* 1994. Characterization of the metal centers of the Ni/Fe-S component of the carbon-monoxide dehydrogenase enzyme complex from *Methanosarcina thermophila*. **J. Biol. Chem.** **269**:9736-9742.
26. Oxenrider, K. A., Rasche, M. E., Thorsteinsson, M. V., and Kennelly, P. J.* 1993. Inhibition of an archaeal protein phosphatase activity by okadaic acid, microcystin-LR, or calyculin A. **FEBS Lett.** **331**:291-295.
27. Rasche, M. E., Hyman, M. R., and Arp, D. J.* 1991. Substrate specificity and toxicity as factors limiting chlorocarbon oxidation by *Nitrosomonas europaea*. **Appl. Environ. Microbiol.** **57**:2986-2994.
28. Rasche, M. E., Hyman, M. R., and Arp, D. J.* 1990. Biodegradation of halogenated hydrocarbon fumigants by nitrifying bacteria. **Appl. Environ. Microbiol.** **56**:2568-2571.
29. Rasche, M. E., Hicks, R. H., Hyman, M. R., and Arp, D. J.* 1990. Oxidation of monohalogenated ethanes and *n*-chlorinated alkanes by whole cells of *Nitrosomonas europaea*. **J. Bacteriol.** **172**:5368-5373.
30. Rasche, M. E., and Arp, D. J.* 1989. Hydrogen inhibition of nitrogen reduction by nitrogenase in isolated soybean nodule bacteroids. **Plant Physiol.** **91**:663-668.
31. Cook, D., Rasche, M. E., and Eisinger, W. R.* 1985. Regulation of ethylene biosynthesis and action in cut carnation flower senescence by cytokinins. **J. Amer. Soc. for Horticultural Science.** **110**:24-27.

Invited presentations:

- 2014 Invited Seminar, “Targeting Methanopterin Biosynthesis to Inhibit the Microbial Production of Methane as a Greenhouse Gas”, CSU Fullerton, Chemistry and Biochemistry Department, Fullerton, CA, September 11, 2014.
- Invited Seminar, “Methane-Producing Microorganisms: Environmental Heroes or Agents of Metabolic Disease?” Villa Park High School, Villa Park, CA, January 17, 2014.
- Invited Seminar, “Preparing Competitive Proposals for Submission to NSF: Research in Undergraduate Institutions (RUI)”, 2014 CSUPERB Annual Meeting, Santa Clara, CA, January 2, 2014.
- 2013 Invited Seminar, “Methane-Producing Microorganisms: Environmental Heroes or Agents of Metabolic Disease?” Villa Park High School, Villa Park, CA, February 21, 2013.
- 2012 Invited Seminar, “The Importance of Methane-Producing Microorganisms (Methanogens)”, CSUF Osher Lifelong Learning Institute (CSUF-OLLI), California State University, Fullerton, CA, June 26, 2012.
- 2010 Invited Seminar, “Biosynthesis of Methanopterin, a Folate Analog in Methane-Producing Microorganisms”, Chemistry and Biochemistry Department, California State University, Los Angeles, CA, February 9, 2010.
- 2009 Invited Seminar, “Biosynthesis of Methanopterin, a Folate Analog in Methane-Producing Microorganisms”, Chemistry Department, University of the Pacific, Stockton, CA, October 6, 2009
- 2008 Seminar Speaker, “Effective Grant Writing for Molecular and Cellular Biosciences”, NSF Regional Grants Conference, Providence, RI, April 2008.
- 2006 Invited Discussion Leader, Gordon Research Conference on the Molecular Basis of One-Carbon Metabolism, Topic: “Methanogenesis”
- 2004 Invited Seminars, “Biosynthesis of Methanopterin, a Folate Analog in Archaea”
- Chemistry & Biochemistry Department, Calif. State University, Fullerton, CA
 - Microbiology Department, North Carolina State University, Raleigh, NC
 - Biology Department, Santa Clara University, Santa Clara, CA
- 2004 Invited Speaker, “A Research-Driven Laboratory and Literature Course Designed to Enhance Undergraduate Contributions to Original Research”, Southeastern Branch Meeting of the American Society for Microbiology, Jacksonville, Alabama, October 2004
- 2002 Invited Seminars, “Biosynthesis of Methanopterin, an Unusual Folate Analog in Archaea”
- Biology Department, University of Alabama, Huntsville, Alabama
 - Biology Department, University of South Florida, Tampa, Florida
 - Biochemistry Department, University of Nebraska, Lincoln, Nebraska

- 2002 Invited Speaker, “Methanopterin Biosynthesis in Archaea and Methylophilic Bacteria”, Gordon Research Conference on the Molecular Basis of One-Carbon Metabolism, July 2002
- 2000 Invited Speaker, “Purification of RFAP Synthase, a Key Enzyme in Methanopterin Biosynthesis”, Gordon Research Conference on the Molecular Basis of One-Carbon Metabolism, June 2000
- 1998 Invited Speaker, “Enzymatic Formation of Ribofuranosyl Aminobenzene 5'-Phosphate During Methanopterin Biosynthesis”, Gordon Research Conference on the Molecular Basis of One-Carbon Metabolism, July 1998

Poster Presentations (Presenting author*) ‡CSUF Masters student, †CSUF undergraduate or HHMI or STEM grant-funded undergraduates, #HHMI-funded High school student or teacher

- 2014 ‡**Morales, E.***, Bobik, T., Cascio, D., Rasche, M. Bioinformatic and Crystallization Studies of the Second Potential Phosphoribosyl Transferase, ORF22, in the Tetrahydromethanopterin Biosynthesis Pathway. 2014 CSUPERB Annual Meeting, Santa Clara, CA, January 2-4, 2014.
- ‡**Yousef, M.**, †Petullo, M., Rasche, M.E. (2014) Biochemical characterization of a dihydropteroate synthase homologue Orf20 from *Methylobacterium extorquens* AM1 to elucidate its role in the dephospho-tetrahydromethanopterin biosynthesis pathway. Poster presented at the 2014 CSUPERB Annual Meeting, Santa Clara, CA, January 2-4, 2014.
- 2013 ‡**Morales, E.***, Bobik, T., Cascio, D., Rasche, M. Potential Methane Mitigation Enzyme: ORF22 from *Methanocaldococcus jannaschii* in the Tetrahydromethanopterin Biosynthesis Pathway. Annual Meeting of the Southern California branch of the American Society for Microbiology (SCASM), La Jolla, CA. October 4-5, 2013.
- †**Nguyen, G.D.***, Rasche, M.E. Biochemical studies of the Orf19 protein from *Methylobacterium extorquens* AM1 and its homolog from *Methylibium petroleiphilum* PM1. Annual Meeting of the Southern California branch of the American Society for Microbiology (SCASM), La Jolla, CA. October 4-5, 2013.
- #**Chan, A.**, #Navarro, A., #Clarke, K., Rasche, M. Site-directed Mutagenesis of Cysteine 159, an Iron-Sulfur Cluster Binding Residue in Dihydromethanopterin Reductase X (DmrX) from a Methane-Producing Archaeon. Annual Meeting of the Southern California branch of the American Society for Microbiology (SCASM), La Jolla, CA. October 4-5, 2013.
- 2012 ‡**Wang, S.***; †Tiongson, J.; Rasche, M.E., Electron Transfer Reactions in an

Iron-Sulfur Flavoprotein Linked to Tetrahydromethanopterin Biosynthesis in the Methane-Producing Microorganism *Methanosarcina mazei*, 24th Annual CSU Program for Education and Research in Biotechnology (CSUPERB) Symposium, Santa Clara, CA, January 5-7, 2012.

‡Wang, S.; †Tiongson, J.; **Rasche, M.E. ***, Electron Transfer Reactions in an Iron-Sulfur Flavoprotein Linked to Tetrahydromethanopterin Biosynthesis in the Methane-Producing Microorganism *Methanosarcina mazei*, 4th Trends in Enzymology: "Going Beyond Frontiers" Meeting, Goettingen University, Goettingen, Germany, June 3-6, 2012.

‡**Wang, S.***; †Tiongson, J.; Rasche, M.E., Discovery and Characterization of the First Archaeal Dihydromethanopterin Reductase (DmrX) from *Methanosarcina mazei*, 2012 Gordon Research Conference (GRC) on the Molecular Basis of Microbial One-Carbon Metabolism, Bates College, Lewiston, ME, 5-10 August, 2012 and associated Graduate Research Seminar, Lewiston, ME, August 4-5, 2012.

#**Weatherwax, C.*** (Visiting High School Researcher), Investigation into the Function of AfpA, a Putative Dihydromethanopterin Reductase, Baltimore Area Science Convention, Baltimore, MD, February 2012. (Won second place in Molecular Biology division)

Rasche, M.E.*, From Lab Exercises to Original Research -- Taking a Research Oriented Laboratory Course to the Next Level. National Conference to Enhance Training of Next Generation of Scientists, California State University, Fullerton, CA, July 26-28, 2012.

Rasche, M.E.*, Formalizing Networks Between a Research-Oriented Laboratory Class and Summer Internships to Facilitate Research Contributions by High School and Community College Students. National Conference to Enhance Training of Next Generation of Scientists, California State University, Fullerton, CA, July 26-28, 2012.

2011 ‡**Farahani, P.***; Rasche, M.E., Production and characterization of three ribofuranosylaminobenzene 5'-phosphate (RFAP) synthase mutants of *Methanothermobacter thermautotrophicus*, 241st American Chemical Society National Meeting & Exposition, Anaheim, CA, March 27-31, 2011.

†**Tiongson, J.K.***; Rasche, M.E., Site-Directed Mutagenesis of a Cysteine Motif Proposed To Ligate a 4Fe-4S Cluster in a Putative Dihydromethanopterin Reductase of *Methanosarcina mazei*, 2011 General Meeting of the American Society for Microbiology, New Orleans, LA, May 21-24, 2011

†**Tiongson, J.K.***; Rasche, M.E., Site-Directed Mutagenesis of a Cysteine Motif Proposed To Ligate a 4Fe-4S Cluster in a Putative Dihydromethanopterin Reductase of *Methanosarcina mazei*, 2011 Southern California Undergraduate

Research Conference, Santa Barbara, CA, April 23, 2011

- 2010 †**Tiongson, J. K.***, Rasche, M. E., "Site-Specific Mutational Analysis of a Cysteine Proposed To Ligate a 4Fe-4S Cluster in a Methanogen Dihydromethanopterin Reductase", 2010 Southern California Branch of the American Society for Microbiology Student Colloquium, La Jolla, CA, November 5-6, 2010.
- 2003 **Bechard, M. E.** Garcia, R.E., Greene, D., and Rasche, M. E. 2003. Purification, biochemical characterization, and site-directed mutagenesis of RFAP synthase from *Methanotermobacter thermautotrophicus*. General Meeting of the American Society for Microbiology, Washington, D.C., May 2003
- Caccamo, M. A., **Malone, C.S.**, and Rasche, M. E. 2003. Biochemical Characterization of Dihydromethanopterin Reductase. General Meeting of the American Society for Microbiology, Washington, D.C., May 2003
- Rasche, M. E.** 2003. A Research-Driven Laboratory and Literature Course Designed to Enhance Undergraduate Contributions to Original Research. Educational Meeting of the American Society for Microbiology, Baltimore, MD, May 2003
- 2002 **Bechard, M. E.**, and Rasche, M. E. 2002. Purification and Partial Characterization of a Methanogen RFAP Synthase, Gordon Research Conference on the Molecular Basis of One-Carbon Metabolism, June 2002
- 2000 **Wyles, S. A.**, and Rasche, M.E. 2000. Characterization of Two Methanopterin Biosynthesis Mutants of *Methylobacterium extorquens* Using a Tetrahydromethanopterin Bioassay. Southeastern Branch Meeting of the Amer. Soc. for Microbiology, October 2000
- 1999 Scott, J. S. **Kopf, V.**, and Rasche, M.E. 1999. Identification of the gene Encoding beta-ribofuranosyl aminobenzene 5'-phosphate synthase. Gordon Research Conference on Archaea, August 1999

Membership in Professional Societies

American Society for Microbiology
American Chemical Society
American Society for Biochemistry and Molecular Biology
American Association of University Women

Graduate Students and Postdoctoral Research Scientists Sponsored

- Postdoctoral research scientists:
 - Dr. Gregory Havemann
 - Dr. Adriana Pacheco
 - Dr. Robert Byrne
- Graduate students:
 - Joseph Scott, M.S. (8-2002)
 - Matthew Bechard, M.S. (12-2003)
 - Payam Farahani, M.S. (8-2011)
 - Sixi (Alex) Wang, M.S. (5-2012)
 - Mohannad Yousef, M.S. (8-2014)
 - Erick Morales (Current M.S. Student)
 - Mark Burton (Current M.S. Student)
 - Ali Saleh (Current M.S. Student)
 - Carlos Molina (Current M.S. Student)

Honors for Rasche Laboratory Students

2014, Ali Saleh, M.S. Student, Howard Hughes Medical Institute (HHMI) Graduate Research scholarship, May 2014-May 2015.

2014, Erick Morales, M.S. Student, CSUF-NSM Outstanding Graduate Student Teaching Award in Biochemistry, May 2014.

2012, Erick Morales, M.S. Student, 2012 CSUPERB Crellin Pauling Student Teaching Award winner, following state-wide competition including his essay entitled, "Our Civic Duty as Scientists, at 24th Annual CSUPERB Symposium, January 5-7, 2012.

2012, Colleen Weatherwax, Visiting High School Student from Baltimore, MD. Second place award in category of Molecular Biology at local Science Convention competition for poster entitled "Investigation into the Function of AfpA, a Putative Dihydromethanopterin Reductase", Baltimore, MD, February 2012.

2011, Alessandra Altamirano, Undergraduate researcher, Louis Stokes Alliances for Minority Participation (LSAMP) summer research scholar, and 2011 Glenn Nagel Research Scholar

2010, Joane Tiongson, Community College Summer Intern, Outstanding Undergraduate Poster, 2010 Branch Meeting of the Southern California American Society of Microbiology (SC-ASM), and \$2000 travel award to present poster at the National ASM Meeting in New Orleans, LA.

1999, Kirenia Lopez, McNair Minority Research Scholar

Synergistic Service Activities (Scientific Community, Regional, National, International)

- Ad hoc reviewer for journals: Applied and Environmental Microbiology (2014), Enzyme and Microbial Technology (2013), Environmental Microbiology and Environmental Microbiology Reports (2012), Microbiology (2002-2004), Archives of Microbiology (2001-2003), Journal of Bacteriology (2003, 2005), Microbial Ecology (2003)
- Chair (2010) and Vice Chair (2008): international Gordon Research Conference on the “Molecular Basis for Microbial One-Carbon Metabolism”, August 1-6, 2010 and July 20-25, 2008, Bates College, Lewiston, Maine.
- Program Director, National Science Foundation, Molecular and Cellular Biosciences, Metabolic Biochemistry Panel, Arlington, VA, (8/2007-8/2008)
- Grant Proposal Review Panel, National Science Foundation, Metabolic Biochemistry (2002-2006)
- Grant Proposal Review Panel, Department of Energy, Basic Energy Biosciences (1998), NABIR panel (2005), Metabolic Eng. (2007),
- Ad hoc grant proposal reviewer for National Science Foundation (1999-2007), DOE Basic Energy Sciences (2005)
- Secretary-Treasurer, Southeastern Branch of Amer. Soc. for Microbiology (2002-2003)
- Policy Committee, Southeastern Branch of Amer. Soc. for Microbiology (2002-2006)

Synergistic Educational Activities

- Presented two posters at the CSUF and NSF-sponsored “National Conference to Enhance Training of Next Generation of Scientists.” (See “Poster Presentations” for poster titles.)
- Community College Student research mentor for Summer Howard Hughes Medical Institutes (HHMI)-related programs (1 student in 2013, 2 students in 2012, 1 student in 2011, 2 students in 2010) and the inaugural year of the CSUF STEM² program (1 student in 2013, 2 students in 2012).
- High school Student and High School Teacher mentor for HHMI summer program (one teacher and two HS students in 2010, 2011, 2012, and 2013), and mentor for individual high school students (one individual high school research student each summer in 2010, 2011, and 2012).
- Graduate Record Examination (GRE) Test-Writing Committee; Subject:

Biochemistry, Molecular Biology, & Cell Biology, (question writing and review, (8/2004-8/2010), Biochemistry Subcommittee Chair (8/2009-8/2013), Full Committee Chair (2011-2012)

- Two Peer-reviewed Publications in Educational Journals: (1) Rasche, M. E. 2004. Outcomes of a research-driven laboratory and literature course designed to enhance undergraduate contributions to original research. *Biochem. and Molecular Biology Educ.* 32:101-107. (2) Kima, P.E. and Rasche, M.E. 2004. Sex determination using the polymerase chain reaction. *Biochem. and Molecular Biology Educ.* 32:115-119.
- Educational Grant Funding: NSF-REU (National Science Foundation Research Experience for Undergraduate) Grant at the University of Florida (2/2007 to 2/2010), Amount: \$240,000, Role: PI.
- Teaching Minigrant Award (\$3000). Project objective: producing video minidocumentaries for the improvement of microbiology courses at the Univ. of Florida, (1999) Role: PI

Synergistic Community Activities

- Submitted NSF grant proposal that includes collaboration with Dana Hills High School Chemistry teacher Kristine Clarke to bring Biotechnology research experiments into High School classroom. Submitted November 15, 2013.
- Annual invited seminar at Villa Park High School, on “Methane-Producing Microorganisms: Environmental Heroes or Agents of Metabolic Disease?” Villa Park, CA, February 21, 2013 and January 18, 2014.
- Presented two-hour talk for retired seniors and other members of the community on “The Importance of Methane-Producing Microorganisms (Methanogens), through the CSUF Osher Lifelong Learning Institute (CSUF-OLLI), California State University, Fullerton, CA, June 26, 2012.
- Spoke with groups of Girl Scouts at the 2012 Anaheim “Air Experts Fair” on the topic of greenhouse gasses and global warming. Anaheim, Girl Scouts Program Center, Anaheim, CA, July 8th, 2012.

Teaching Experience

California State University at Fullerton (CSUF), Chemistry and Biochemistry Department (2008 to present)

- General Biochemistry, Part A, Chem 423A, 3 credits, 70-114 students.
First semester of the two-semester upper division Biochemistry course for Biochemistry Majors (Fall 2008, 2009, 2010, 2011, 2012, 2013)
- General Biochemistry, Part B, Chem 423B, 3 credits, approx.60 students.
Second semester of the two-semester upper division Biochemistry course for Biochemistry Majors (Spring 2011, 2013)
- Biological Chemistry, Chem 421, 3 credits, 65-80 students.
One-semester Biochemistry survey course for upper division biology majors, non-biochemistry majors, and premedical and preprofessional students (Fall 2008, Spring 2009, Fall 2009, Spring 2010)
- Advances in Biotechnology Laboratory, Chem 472B, 3 credits, 10-18 students.
One-semester research-oriented upper division laboratory course applies biochemistry and molecular biology techniques towards addressing an original research problem based on site-directed mutagenesis, protein purification, and characterization. (Spring 2010, 2011, 2012, 2013)
- Nucleic Acid Chemistry, Chem 542, 3 credits, 4-9 students.
Chem 542 covers the biochemistry of nucleic acids in living systems at the molecular level. Advances and techniques used in nucleic acid research are also covered. A strong emphasis is placed on critical reading, analysis, and presentation of primary literature. (Fall 2010 (team-taught 50%) and Fall 2012 (100% responsibility))
- Protein Biochemistry, Chem 541, 3 credits, 4-9 students.
Chem 541 covers protein isolation strategies and techniques; chemical/physical characterization and modeling; functional characterization (kinetics, binding, chemical modification); molecular biology, including protein expression and engineering. (Team-taught 50% Fall 2009; 100% responsibility Fall 2011, 2013)
- General Biochemistry Laboratory, Chem 422, 2 credits (6 hours of lab per week).
Chem 422 is a laboratory course covering the chemistry and metabolism of carbohydrates, nucleic acids, lipids and proteins; techniques of enzyme chemistry and isolation; research methods. (In Fall 2011, designed and participated in teaching original research-based experiment involving plasmid transformation and enzymatic assay of a protein produced for the first time.)

University of Florida, Microbiology and Cell Science Department (1999 to 2007)

- Basic Biology of Microorganisms, MCB 3020, 3 credits, approx. 250 students. Introductory Microbiology Lecture for upper division Microbiology Majors, premedical and preprofessional students (Taught one semester each year from 1999 to 2007).
- Advanced Microbiology Laboratory, MCB 4034L, 1 credit (3 hours per week); two sections of 36 students each (Team taught from 2002 to 2004). Senior level laboratory for Microbiology Majors covering protein purification, enzyme assays, polymerase chain reaction, gel electrophoresis, ELISA assays, and RT-PCR.
- Research-Driven Advanced Microbiology Laboratory, MCB 4034L, 1 credit (3 hours per week); limited to 16 students (Taught in even numbered years). Senior level laboratory covering similar techniques as the regular section, but in the context of an original research problem involving site-directed mutagenesis or cloning a new gene.
- Literature Research in Microbiology Laboratory, MCB 4934, 1 credit; limited to 16 students (Taught in even numbered years). Co-requisite for Research-Driven Advanced Microbiology Laboratory. Lecture and colloquium with essay exams, oral presentation of research papers, and grant writing assignment.
- Anaerobic Microbiology and Biotechnology, 3 credits; 8-10 Graduate Students (Taught in even numbered years).

Teaching Assistant Assignments

- General Chemistry, Fall Quarter 1996, Teaching Assistant for 250 students (7 sections), Utah State University, Chemistry and Biochemistry Department.
- Introductory Biochemistry Laboratory, Fall Quarter 1986, Teaching Assistant for approx. 100 students, University of California, Riverside.
- Introduction to Biochemistry, Part Two (Metabolism and Genetics), Winter Quarter 1986, Teaching Assistant for approx. 50 students, University of California, Riverside.

Teaching Awards and Honors

- 2014, CSU Fullerton Outstanding Faculty Teaching Recognition Award for High-Impact Practices
- 1999 through 2004, Anderson / CLAS Scholar Faculty Honoree, designated as most influential faculty member by a recipient of an Anderson or CLAS scholarship, University of Florida
- 1988, Walton B. Sinclair Award for Outstanding Graduate Teaching Assistant in Graduate Teaching Assistant in Biochemistry, U. C. Riverside, CA