

Elizabeth E. Trimmer

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EDUCATION

- 1997-2000 University of Michigan, Department of Biological Chemistry
Postdoctoral Research Fellow
Research advisor: Dr. Rowena G. Matthews
- June 1997 Massachusetts Institute of Technology, Department of Chemistry
Ph.D. in Biological Chemistry
Research advisor: Dr. John M. Essigmann
- 1988-1989 Pennsylvania State University, Department of Chemistry
Graduate student, Major in Organic Chemistry
Research advisor: Dr. Joseph J. Villafranca
- June 1988 Carleton College, Northfield, MN
B.A. with distinction in Chemistry, Magna Cum Laude
Research advisor: Dr. Jerry R. Mohrig

PROFESSIONAL EXPERIENCE

- 2018-present Professor of Chemistry: Grinnell College, Grinnell, IA.
- 2014-2015 Visiting Adjunct Professor: University of Texas Health Science Center, San Antonio
(Sabbatical with Dr. Paul Fitzpatrick)
- 2006-2018 Associate Professor of Chemistry: Grinnell College, Grinnell, IA.
- 2007-2008 Visiting Professor: University of Texas at Austin (Sabbatical with Drs. Kenneth Johnson and Dean Appling)
- 2000-2006 Assistant Professor of Chemistry: Grinnell College, Grinnell, IA.
- Spring 1999 Visiting Assistant Professor of Chemistry: Kalamazoo College, Kalamazoo, MI.
- 1997-2000 Postdoctoral Research Fellow: University of Michigan.
- 1990-1997 Graduate Research Assistant: Massachusetts Institute of Technology.
- 1989-1990 Graduate Teaching Assistant: Massachusetts Institute of Technology.
- 1988-1989 Graduate Teaching Assistant: Pennsylvania State University.
- 1984-1988 Undergraduate Teaching Assistant: Carleton College, Northfield, MN.

ACADEMIC HONORS

- 2002 Travel Award for 14th International Congress on Flavins and Flavoproteins (\$500)
- 1999 Travel Award for 13th International Congress on Flavins and Flavoproteins (\$500)
- 1988 Bachelor of Arts Degree with distinction in chemistry (Carleton College)
- 1984 William Carleton Scholar (Carleton College)

GRANTS AND FELLOWSHIPS

2019-2020	Grinnell College Research Grant (\$14,200)
2018-2019	Grinnell College Research Grant (\$17,000)
2017-2018	Grinnell College Research Grant (\$12,350)
2016-2017	Grinnell College Research Grant (\$10800)
2014-2015	Grinnell College Sabbatical Leave (year at full pay)
2014-2015	Grinnell College Research Grant (\$3,200)
2013-2014	Grinnell College Research Grant (\$14,200)
2012-2013	Grinnell College Research Grant (\$11,300)
2011-2012	Grinnell College Research Grant (\$10,900)
2009-2010	Grinnell College Research Grant (\$16,900)
2007-2008	Grinnell College Study Leave in combination with Sabbatical Leave (year at full pay)
2006-2007	Grinnell College Research Grant (\$1500)
2003-2005	American Chemical Society Petroleum Research Fund, Type G Grant (\$35,000)
2003-2004	Grinnell College Research Grant (\$11,100)
2002-2003	Grinnell College Research Grant (\$10,900)
2001-2002	Grinnell College Research Grant (\$10,400)
1999-2000	NIH Individual Postdoctoral Fellowship

PROFESSIONAL SOCIETIES

2011-present	American Society of Biochemistry and Molecular Biology
2000-present	Midwestern Association of Chemistry Teachers at Liberal Arts Colleges
1998-present	Council on Undergraduate Research
1995-present	Association for Women in Science
1993-present	American Association for the Advancement of Science
1988-present	Sigma Xi
1987-present	American Chemical Society

PROFESSIONAL SERVICE

Dec. 2018	Tenure Review for Franklin and Marshall College
July 2018	Manuscript Review for the Journal <i>Archives of Biochemistry and Biophysiscs</i>
February 2018	Manuscript Review for the Journal <i>Nature Communications</i>
October 2016	Chaired session at the Midwest Enzyme Chemistry Conference (Chicago, IL)
March 2016	Grant Review for the National Science Foundation (NSF), Division of Chemistry, Chemistry of Life Processes (CLP)
December 2015	Manuscript Review for the Journal <i>Molecular Biology Reports</i>
July 2015, 2009	Manuscript Review for the Journal <i>Biochemistry</i>
May 2015	Manuscript Review for the Journal <i>FEBS Letters</i>
March 2015	Grant Review Panel member for the National Science Foundation (NSF), Division of Chemistry, Chemistry of Life Processes (CLP), Enzymes and Metalloproteins Redox Cofactors Panel
March 2014	Tenure Review for Davidson College
August 2013	Grant Review for Research Corporation
March 2010	Grant Review for the National Science Foundation (NSF), Division of Molecular and Cellular Biosciences, Genes and Genome Systems, Molecular Biochemistry Panel

Sept. 2009 Tenure Review for Gustavus Adolphus College
 October 2008 Manuscript Review for the *Journal of Chemical Education*
 May 2007 Tenure Review for Pomona College

INSTITUTIONAL SERVICE

2020-present Chemistry Department Chair
 2018-2020 College Curriculum Committee (member)
 2016-present Institutional Biosafety Committee (member)
 2015-2017 College Personnel Committee (member)
 2015 HHMI Grant Planning Committee (submitted pre-proposal December 2015, not funded)
 2012-present *Ad hoc* Noyce Science Center Power Outage Committee
 2005-11, 13-14 Institutional Animal Care and Use Committee (chair)
 2010-2011 HHMI Grant Planning Committee (submitted October 2011, funded)
 2011-2013 Institutional Animal Care and Use Committee (member)
 2010-2012 Grinnell Science Division (chair), Grinnell Executive Council (member)
 2010-2013 Interdisciplinary Studies Advisory Board (member)
 2009-2010 Grinnell Science Project (co-director)
 2008-2010 Health Professions Advisory Committee (co-chair)
 2000-present Biological Chemistry Committee (member)
 2008-2011 HHMI Grant Planning Committee for support of interdisciplinary work (submitted October 2008, funded)
 2006-2007 Biological Chemistry Committee (chair)
 2001-03, 08-09 Teacher Education Committee
 2002-2007 Health Professions Advisory Committee (member)
 2006-2007 Science Teaching and Learning Discussion Group (leader)
 2006-2007 Chemistry Department Seminar Coordinator
 2004-2007 Noyce Science Center Building Planning Committee
 2002-2007 Faculty director of Grinnell College American Chemical Society student group
 2004-2007 HHMI Grant Planning Committee for support of biological chemistry major (submitted October 2004, funded)
 2004-2006 Off-Campus Study Committee

COURSES TAUGHT

General Chemistry (2000-2003; 2008-2011, 2013, 2019)
 Analytical and Inorganic Chemistry (2003, 2016, 2018)
 Organic Chemistry I (2001, 2003-2006, 2008-2010, 2012-2019)
 Organic Chemistry II (2006)
 Introduction to Biological Chemistry (2002-2003, 2005-2010, 2012-2014, 2015, 2017-2020)
 Enzyme Mechanisms/Bioorganic Chemistry (2001, 2002, 2004, 2006, 2008, 2011, 2013, 2016, 2018, 2020)
 Chemistry of Artists' Materials (2012, 2014, 2017)
 Restoration of the Sistine Chapel Ceiling – Chemistry and Controversy (tutorial, 2005)
 Papermaking – a Chemistry Approach (tutorial, 2010)
 Detecting Art Forgeries by Visual and Scientific Analyses (tutorial, 2018)

PUBLICATIONS (*Undergraduate co-authors in italics.*)

Zuo, C., Jolly, A.L., Satzer, D.I., Nikolova, A.P., Cao, S., Sanchez, J.S., Ballou, D.P. and Trimmer, E.E. March 15, 2018. A Role for Glutamine 183 in the Folate Oxidative Half-Reaction of *E. coli* Methylenetetrahydrofolate reductase. Arch. Biochem. Biophys., 642, 63-74.

Trimmer, E.E., Wanninayake, U.S., and Fitzpatrick, P.F. March 29, 2017. Mechanistic Studies of an Amine Oxidase Derived from D-Amino Acid Oxidase. Biochemistry, 56, 2024-2030.

Trimmer, E. E. April 2013. Methylenetetrahydrofolate Reductase: Biochemical Characterization and Medical Significance, a Review in Current Pharmaceutical Design (M. Medina, M. Martinez-Julvez, P. Ferreira eds.), 19, 2574-2593.

Lee, M.N., Takawira, D., Nikolova, A.P., Ballou, D.P., Furtado, V.C, Phung, N.L., Still, B.R., Thorstad, M.K., Tanner, J.J., and Trimmer, E.E. August 18, 2009. A Functional Role for the Conformationally Mobile Amino Acid Phenylalanine 223 in the Reaction of Methylenetetrahydrofolate Reductase from *Escherichia coli*. Biochemistry, 48, 7673-7685.

Mohrig, J. R., Carlson, H.K., Coughlin, J.M, Hofmeister, G.E., McMartin, L.A., Rowley, E.G., Trimmer, E.E., Wild, A.J., and Schultz, S.C. February 2, 2007. Novel Syn Intramolecular Pathway in Base-Catalyzed 1,2-Elimination Reactions of β -Acetoxy Esters. J. Org. Chem., 72(3), 793-798.

Trimmer, E.E., Ballou, D.P., Galloway, L.J., Scannell, S.A., Brinker, D.R, and Casas, K.R. May 10, 2005. Aspartate 120 of *Escherichia coli* Methylenetetrahydrofolate Reductase: Evidence for Major Roles in Folate Binding and in Catalysis, Minor Role in Flavin Reactivity. Biochemistry, 44, 6809-6822.

Ballou, D.P., Yamada, K., Pejchal, R., Ludwig, M.L., Matthews, R.G., Trimmer, E.E. 2002. Studies of the Mechanisms of Bacterial and Mammalian Methylenetetrahydrofolate Reductases in Flavins and Flavoproteins 2002, (R.N. Perham ed.), pp. 13-22.

Trimmer, E.E., Ballou, D.P., Matthews, R.G. May 29, 2001. Methylenetetrahydrofolate Reductase from *Escherichia coli*: Elucidation of the Kinetic Mechanism by Steady-State and Rapid-Reaction Studies, Biochemistry, 40, 6205-6215.

Trimmer, E.E., Ballou, D.P., Ludwig, M.L., Matthews, R.G. May 29, 2001. Folate Activation and Catalysis in Methylenetetrahydrofolate Reductase from *Escherichia coli*: Roles for Aspartate 120 and Glutamate 28, Biochemistry, 40, 6216-6226.

Sheppard, C.A., Trimmer, E.E., and R.G. Matthews. February 1999. Purification and properties of NADH-dependent 5,10-methylenetetrahydrofolate reductase (MetF) from *Escherichia coli*. J. Bacteriology, 181(3), 718-725.

Trimmer, E.E. and J.M. Essigmann. 1999. Cisplatin, in Essays in Biochemistry (D.P. Ballou ed.), 34, 191-211.

Mello, J.A., Trimmer, E.E., Kartalou, M., and J.M. Essigmann. 1998. The conflicting roles of mismatch repair and nucleotide excision repair in cellular susceptibility to anticancer drugs, in Nucleic Acids and Molecular Biology (F. Eckstein, D.M.J. Lilley, ed.) 12, 249-274.

Trimmer, E.E., Zamble, D.B., Lippard, S.J., and J.M. Essigmann. January 6, 1998. Human testis-determining factor SRY binds to the major DNA adduct of cisplatin and a putative target sequence with comparable affinities. *Biochemistry*, 37, 352-362.

Trimmer, E.E. and S.J. Lippard. 1992. Commentary on: *HMG1-related DNA -binding protein isolated with V-(D)-J Recombination Signal Probes* by M. Shirakata, K. Huppi, S. Usada, K. Okazaki, K. Yoshida, and H. Sakano, *Chemtracts-Biochemistry and Molecular Biology*, 3, 30-32.

INVITED ORAL PRESENTATIONS (*Undergraduate co-authors in italics.*)

"Use of KinTek Explorer to teach enzyme pre-steady-state kinetics in an advanced undergraduate biochemistry course", oral presentation by E.E. Trimmer at the Symposium "Use of Computer Simulation to Teach Chemical Kinetics & Enzyme Kinetics in Undergraduate Research & Education" at the American Chemical Society National Meeting (Boston, MA), August 19, 2018.

"Exploring a Proton Relay Mechanism in the Folate Half-Reaction of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR)", by E.E. Trimmer, *R. Li, S. Du, Y. Pan, M.G. Tetrick, J.U. Seng, J. Chien, B. McWilliams, and J.S. Sanchez*, oral presentation by E. E. Trimmer at the 2018 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Waterville Valley, NH), July 22-26, 2018.

"Mechanistic Studies of the Flavin-containing Enzyme Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*", oral presentation by E.E. Trimmer at University of Texas Health Science Center (San Antonio, TX), October 31, 2014.

"Mechanistic Studies of the Flavin-containing Enzyme Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*", oral presentation by E.E. Trimmer at St. Mary's University (San Antonio, TX), October 17, 2014.

"A Functional Role for Glutamine 183 in the Folate Oxidative Half-Reaction of *E. coli* Methylenetetrahydrofolate reductase" by E.E. Trimmer, *A.L. Jolly, D.I. Satzer, J.S. Sanchez, S. Cao, and A.P. Nikolova*, oral presentation by E. E. Trimmer at the 18th International Symposium on Flavins and Flavoproteins (Pechaburi, Thailand), July 27 - August 1, 2014.

"Mechanistic Studies of the Flavin-containing Enzyme Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*", oral presentation by E.E. Trimmer at St. Olaf College (Northfield, MN), February 24, 2011.

"Mechanistic Studies of the Flavin-containing Enzyme Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*", oral presentation by E.E. Trimmer at the University of Texas, Austin, Department of Medicinal Chemistry, College of Pharmacy, (Austin, TX), February 21, 2008.

"Mechanistic Studies of the Flavin-containing Enzyme Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*", oral presentation by E.E. Trimmer at the University of Arizona, Department of Biochemistry and Molecular Biophysics (Tucson, AZ), February 8, 2008.

"Aspartate 120 of *Escherichia coli* Methylenetetrahydrofolate Reductase: Evidence for Major Roles in Folate Binding and in Catalysis, Minor Role in Flavin Reactivity" by E.E. Trimmer, *D.P. Ballou, L.J. Galloway, S.A. Scannell, D.R. Brinker and K.R. Casas*, oral presentation by E. E. Trimmer at the 2005 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Biddeford, ME), July 17-22, 2005.

“Aspartate 120 of *Escherichia coli* Methylenetetrahydrofolate Reductase: Evidence for Major Roles in Folate Binding and in Catalysis” by E.E. Trimmer, D.P. Ballou, *L.J. Galloway, S.A. Scannell, D.R. Brinker* and *K.R. Casas*, oral presentation by E. E. Trimmer at Grinnell College Chemistry Department Seminar, April 20, 2005.

“Protein Homology Searching and Molecular Modeling, a Biochemistry Exercise”, oral presentation by E.E. Trimmer at the Pew Midstates Science and Mathematics Consortium Workshop: Computational Solutions to Biological Problems, Washington University, St. Louis, MO, June 25, 2003.

"Folate Binding and Catalysis in Methylenetetrahydrofolate Reductase from *Escherichia coli*", E. E. Trimmer, *E.W. Burke, D.R. Brinker, K.R. Casas*, and *R.Y.H. Mohamed*, oral presentation by E. E. Trimmer at the University of Iowa, Department of Medicinal and Natural Products Chemistry, January 14, 2003.

POSTER PRESENTATIONS (*Undergraduate co-authors in italics*)

“Exploring a Proton Relay Mechanism in the Folate Half-Reaction of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR)”, by E.E. Trimmer, *S. Du, M.G. Tetrack, Y. Pan, R. Li, J.U. Seng, J. Chien, J.S. Sanchez*, and *B. McWilliams*, poster presentation by E. E. Trimmer at the 2019 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Waterville Valley, NH), July 21-25, 2019.

“Exploring a Proton Relay Mechanism in the Folate Half-Reaction of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR)”, by E.E. Trimmer, *R. Li, S. Du, Y. Pan, M.G. Tetrack, J.U. Seng, J. Chien, B. McWilliams*, and *J.S. Sanchez*, poster presentation by E. E. Trimmer at the 2018 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Waterville Valley, NH), July 22-26, 2018.

“Importance of Ser26 in the folate half-reaction of *E. coli* MTHFR”, by E. E. Trimmer and *R. Li*, poster presentation by E. E. Trimmer at the 2017 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways (Waterville Valley, NH), July 16-21, 2017.

“Mechanistic Studies of an Amine Oxidase Derived from D-Amino Acid Oxidase” by E.E. Trimmer, U.S. Wanninayake, M.B. Suarez, M.B. and P.F. Fitzpatrick, poster presentation by E. E. Trimmer at the Midwest Enzyme Chemistry Conference (Chicago, IL), October 1, 2016.

“Mechanistic Studies of an Amine Oxidase Derived from D-Amino Acid Oxidase” by E.E. Trimmer, U.S. Wanninayake, M.B. Suarez, M.B. and P.F. Fitzpatrick, poster presentation by E. E. Trimmer at the 2016 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways (Waterville Valley, NH), July 24-29, 2016.

“A Functional Role for Glutamine 183 in the Folate Oxidative Half-Reaction of *E. coli* Methylenetetrahydrofolate reductase” by *C. Zuo, A.L. Jolly, D. I. Satzer, J. S. Sanchez, S. Cao, A.P. Nikolova*, D.P. Ballou, and E.E. Trimmer, poster presentation by E. E. Trimmer at the 24th Enzyme Mechanisms Conference (Galveston, TX), January 4-7, 2015.

“A Functional Role for Glutamine 183 in the Folate Oxidative Half-Reaction of *E. coli* Methylenetetrahydrofolate reductase” by E.E. Trimmer, *C. Zuo, A.L. Jolly, D. I. Satzer, J. S. Sanchez, S. Cao*, and *A.P. Nikolova*, poster presentation by E. E. Trimmer at the 18th International Symposium on Flavins and Flavoproteins (Phechaburi, Thailand), July 27 - August 1, 2014.

“Stopped-flow and Kinetic Isotope Studies of the Oxidative Half-Reaction Catalyzed by Flavin Enzyme Methylene tetrahydrofolate Reductase from *Escherichia coli*”, by E. E. Trimmer, D. P. Ballou, L. J. Galloway, S. A. Scannell, D. R. Brinker, and K. R. Casas, poster presentation by E. E. Trimmer at the 2014 Gordon Research Conference on Isotopes in Biological & Chemical Sciences, (Galveston, TX), February 2-7, 2014.

“pH-dependent Studies of Flavin Enzyme Methylene tetrahydrofolate Reductase (MTHFR) from *E. coli*”, by E. E. Trimmer and *J. Wang*, poster presentation by E. E. Trimmer at the 2013 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways (Waterville Valley, NH), July 14-19, 2013.

“pH-dependent Studies of Flavin Enzyme Methylene tetrahydrofolate Reductase (MTHFR) from *E. coli*”, by E. E. Trimmer and *J. Wang*, poster presentation by E. E. Trimmer at the Midwest Enzyme Chemistry Conference (Chicago, IL), October 13, 2012.

“A Functional Role for Gln 183 in the Folate-Half Reaction of MTHFR from *Escherichia coli*” by E.E. Trimmer, *A.L. Jolly, D. I. Satzer, S. Cao, and A.P. Nikolova*, poster presentation by E. E. Trimmer at the Experimental Biology, ASBMB 2012 Conference (San Diego, CA), April 21-25, 2012.

“A Functional Role for Gln 183 in the Folate-Half Reaction of MTHFR from *Escherichia coli*” by E.E. Trimmer, *A.L. Jolly, D. I. Satzer, S. Cao, and A.P. Nikolova*, poster presentation by E. E. Trimmer at the 17th International Symposium on Flavins and Flavoproteins (Berkeley, CA), July 24-29, 2011.

“A Functional Role for Gln 183 in the Folate-Half Reaction of MTHFR from *Escherichia coli*” by E.E. Trimmer, *A.L. Jolly, D. I. Satzer, S. Cao, and A.P. Nikolova*, poster presentation by E. E. Trimmer at the FASEB Summer Research Conference on Folic Acid, Vitamin B₁₂ and One-Carbon Metabolism (Carefree, AZ), August 1-6, 2010.

“A Functional Role for the Conformationally Mobile Amino Acid Phenylalanine 223 in the Reaction of Methylene tetrahydrofolate Reductase from *E. coli*.” by *M. N. Lee, D. Takawira, A. P. Nikolova, D. P. Ballou, V. C. Furtado, N. L. Phung, B. R. Still, M. K. Thorstad, J. J. Tanner, and E. E. Trimmer*, poster presentation by E. E. Trimmer at the 2009 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways (Waterville Valley, NH), July 5-10, 2009.

“A Functional Role for the Conformationally Mobile Amino Acid Phenylalanine 223 in the Reaction of Methylene tetrahydrofolate Reductase from *E. coli*.” by *M. N. Lee, D. Takawira, A. P. Nikolova, D. P. Ballou, and E. E. Trimmer*, poster presentation by E. E. Trimmer at the 16th International Congress on Flavins and Flavoproteins (Jaca, Spain), June 8-12, 2008.

“High resolution crystal structure of the Phe223Leu mutant of methylene tetrahydrofolate reductase from *E. coli*.” by Thorstad, M. K., Trimmer, E. E.; Tanner, J. J, poster presentation by M. K. Thorstad at the American Chemical Society National Meeting (New Orleans, LA), April 6-10, 2008.

“Probing the Role of Phe 223 in Methylene tetrahydrofolate Reductase from *Escherichia coli*” by E. E. Trimmer, *M. N. Lee, D. Takawira, and A. P. Nikolova*, poster presentation by E. E. Trimmer at the 2007 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways (Biddeford, ME), July 8-12, 2007.

“Probing the Roles of Phe 223 and Gln 183 in Methylene tetrahydrofolate Reductase from *Escherichia coli*” by E. E. Trimmer, *A. L. Jolly, D. Takawira, M. N. Lee, and S. Cao, and A. P. Nikolova*, poster presentation by E. E. Trimmer at the 20th Enzyme Mechanisms Conference (St. Pete Beach, FL), January 3-6, 2007.

“Probing the Roles of Phe 223 and Gln 183 in Methylenetetrahydrofolate Reductase from *Escherichia coli*” by E. E. Trimmer, A. L. Jolly, D. Takawira, A. P. Nikolova, M. N. Lee, and S. Cao, poster presentation by E. E. Trimmer at the 2006 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Biddeford, ME), July 17-21, 2006.

“Discovery-based Exercises in Infrared Spectroscopy” by J. G. Lindberg, H. Trujillo, E. E. Trimmer, and T.A. Mobley, poster presentation by J. G. Lindberg in the Division of Chemical Education at the 2006 American Chemical Society National Meeting, (Atlanta, GA), March 26-30, 2006.

“Aspartate 120 of *Escherichia coli* Methylenetetrahydrofolate Reductase: Evidence for Major Roles in Folate Binding and in Catalysis, Minor Role in Flavin Reactivity” by E.E. Trimmer, D.P. Ballou, L.J. Galloway, S.A. Scannell, D.R. Brinker and K.R. Casas, poster presentation by E. E. Trimmer at the 2005 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Biddeford, ME), July 17-22, 2005.

“Aspartate 120 of *Escherichia coli* Methylenetetrahydrofolate Reductase: Evidence for Roles in Folate Binding and in Catalysis” by E.E. Trimmer, L.J. Galloway, S.A. Scannell, K.R. Casas, D.R. Brinker, D.P. Ballou, R. Pejchal, and M.L. Ludwig, poster presented by E. Trimmer at FASEB Summer Research Conference on Folic Acid, Vitamin B₁₂ and One-Carbon Metabolism (Snowmass, CO), August 1, 2004.

“Folate Binding and Catalysis in Methylenetetrahydrofolate Reductase from *Escherichia coli*: Insights into Roles for Aspartate 120 from Site-directed Mutants”, E. E. Trimmer, K.R. Casas, S.A. Scannell, L.J. Galloway, D.R. Brinker, E.W. Burke, R.Y.H. Mohamed, poster presented by E. Trimmer at the 2003 Gordon Research Conference on Enzyme, Coenzymes, and Metabolic Pathways, (Meriden, NH), July 13-18, 2003.

"Folate Binding and Catalysis in Methylenetetrahydrofolate Reductase from *Escherichia coli*: Insights into Roles for Aspartate 120 from Asp120Asn and Asp120Ser Mutants", E.E. Trimmer, K.R. Casas, D.R. Brinker, R. Pejchal, and M.L. Ludwig, poster presented by E. Trimmer at FASEB Summer Research Conference on Folic Acid, Vitamin B₁₂ and One-Carbon Metabolism (Snowmass, CO), August 5, 2002.

"An Unprecedented Acidic Residue (Aspartate 120) at the N1-C2=O Flavin Locus in Methylenetetrahydrofolate Reductase from *Escherichia coli*: Redox and Kinetic Studies of Wild-type and Asp120Asn MTHFR", E.E. Trimmer, E.W. Burke, R.Y.H. Mohamed, R. Pejchal, D.P. Ballou, M.L. Ludwig, and R.G. Matthews, poster presentation by E. Trimmer at the 14th International Congress on Flavins and Flavoproteins (Cambridge, U.K.), July 15, 2002.

"Characterization of two *E. coli* methylenetetrahydrofolate reductase (MTHFR) mutants, Asp120Asn and Glu28Gln", E.E. Trimmer, D.P. Ballou, M.L. Ludwig, and R.G. Matthews, poster presented by E. Trimmer at FASEB Summer Research Conference on Folic Acid, Vitamin B₁₂ and One-Carbon Metabolism (Snowmass, CO), August 5, 2000.

"Characterization of two *E. coli* methylenetetrahydrofolate reductase (MTHFR) mutants, Asp120Asn and Glu28Gln", E.E. Trimmer, B.D. Guenther, M.L. Ludwig, and R.G. Matthews, poster presented by E. Trimmer at 13th International Congress on Flavins and Flavoproteins (Konstanz, Germany), August 29, 1999.

PRESENTATIONS BY UNDERGRADUATE COLLABORATORS

"Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Leu277Ala and Leu277Ile", by *J. Hua, T. Tran, J. Chien*, and E.E. Trimmer, poster presented by *J. Hua* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 26, 2019, October 24, 2020 (virtual).

"Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzyme Phe184Ala", by *Z. Liu, J. Chien*, and E.E. Trimmer, poster presented by *Z. Liu* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 26, 2019, October 24, 2020 (virtual).

"The Role of Ser26 in the Catalysis of *E. coli* MTHFR", by *Y. Pan, M. Tetrick, R. Li, J.U. Seng*, and E.E. Trimmer, poster presented by *Y. Pan* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 26, 2019, October 24, 2020 (virtual).

"Effect of Concentration and Mutation on the Conformational Dynamics of MTHFR", by *R. Guo*, E.E. Trimmer, and E.M. Marzluff, poster presented by *R. Guo* at the National American Chemical Society Meeting, (Orlando, FL), March 31-April 4, 2019.

"Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes His273Ala and His273Gln", by *S. Du, M.G. Tetrick, R. Li, J. Chien*, and E.E. Trimmer, poster presented by *S. Du* and *M.G. Tetrick* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 20, 2018.

"Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Ser26Ala and Ser26Thr", by *Y. Pan, R. Li, J.U. Seng*, and E.E. Trimmer, poster presented by *Y. Pan* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 20, 2018.

"Conformational analysis of MTHFR mutants with folate substrate binding utilizing H/D exchange and mass spectrometry", *J. Wang*, E. E. Trimmer, and E. M. Marzluff, poster presented by *J. Wang* at the National American Chemical Society Meeting, (New Orleans, LA), March 18-22, 2018.

"pH-dependent studies of the reductive half-reaction of *E. coli* methylenetetrahydrofolate reductase", *A. Li, J. Wang*, and E. E. Trimmer, poster presented by *A. Li* at the National American Chemical Society Meeting, (New Orleans, LA), March 18-22, 2018.

"pH-dependent studies of the reductive half-reaction of *E. coli* methylenetetrahydrofolate reductase", *A. Li, J. Wang*, and E. E. Trimmer, poster presented by *A. Li* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 14, 2017.

"Importance of Ser26 in the folate half-reaction of *E. coli* MTHFR", *R. Li* and E. E. Trimmer, poster presented by *R. Li* at the National American Chemical Society Meeting, (San Francisco, CA), April 2-6, 2017.

"Characterization of MTHFR oligomers utilizing H/D exchange coupled with LC-MS", *C. K. Jeon*, E. E. Trimmer, and E. M. Marzluff, poster presented by *C. K. Jeon* at the National American Chemical Society Meeting, (San Francisco, CA), April 2-6, 2017.

"pH-dependent studies of the reductive half-reaction of *E. coli* methylenetetrahydrofolate reductase", *A. Li* and E. E. Trimmer, poster presented by *A. Li* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 1, 2016.

“Importance of Ser26 in the folate half-reaction of *E. coli* MTHFR”, *R. Li* and E. E. Trimmer, poster presented by *R. Li* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 1, 2016.

“The minor role of Gln 183 in the NADH reductive half-reaction of *E. coli* methylenetetrahydrofolate reductase”, *C. Zuo, A. L. Jolly, A. P. Nikolova, S. Cao, J. S. Sanchez*, and E. E. Trimmer, poster presented by *C. Zuo* at the Experimental Biology, ASBMB 2014 Conference (San Diego, CA), April 26-30, 2014.

“Construction of *Escherichia coli* plasmid vectors encoding site-specific methylenetetrahydrofolate reductase mutants” *J. U. Seng* and E. E. Trimmer, poster presented by *J. Seng* at the Experimental Biology, ASBMB 2014 Conference (San Diego, CA), April 26-30, 2014.

“pH-dependent studies on the reductive half-reaction of *E. coli* methylenetetrahydrofolate reductase”, *K. N. Schlasner, J. J. Wang*, and E. E. Trimmer, poster presented by *K. N. Schlasner* at the Experimental Biology, ASBMB 2014 Conference (San Diego, CA), April 26-30, 2014 and at the Midstates Undergraduate Research Symposium in Chicago, IL October 26, 2013.

“Glutamine 183 Plays a Minor Role in MTHFR’s Reductive Half-Reaction”, *J. S. Sanchez* and E. E. Trimmer, poster presented by *J. S. Sanchez* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 12, 2013.

“pH-dependent Studies of Asp120Ala *E. coli* Methylenetetrahydrofolate Reductase (MTHFR): Oxidative Half-Reaction”, *N. Bonamici* and E. E. Trimmer, poster presentation by *N. Bonamici* at the Midstates Undergraduate Research Symposium in St. Louis, MO, November 2-3, 2012.

“pH-dependent Studies of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR)”, *J. Wang* and E. E. Trimmer, poster presentation by *J. Wang* at the Experimental Biology, ASBMB 2012 Conference (San Diego, CA), April 21-25, 2012.

“Discovering the Catalytic Intermediate of MTHFR, *M. Bierlein De la Rosa* and E. E. Trimmer, poster presentation by *M. Bierlein De la Rosa* at the Experimental Biology, ASBMB 2012 Conference (San Diego, CA), April 21-25, 2012.

“Characterization of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzymes Gln183Ala and Gln183Glu”, *D. I. Satzer* and E. E. Trimmer, poster presented by *D. I. Satzer* at the National American Chemical Society Meeting, (San Francisco, CA), March 21-25, 2010.

“Characterization of *E. coli* Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzymes Gln183Ala and Gln183Glu”, *D. I. Satzer* and E. E. Trimmer, poster presented by *D. I. Satzer* at the Midwest Regional American Chemical Society Meeting, (Iowa City, IA), October 21-24, 2009.

“Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Phe223Leu”, *M. N. Lee* and E. E. Trimmer, poster presented by *M. N. Lee* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), September 30, 2006.

“Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Gln183Glu”, *S. Cao* and E. E. Trimmer, poster presented by *S. Cao* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), September 30, 2006.

“Construction of Gln183Ala and Gln183Glu Mutants of Methylenetetrahydrofolate Reductase (MTHFR) and Kinetic Characterization of Phe223Ala MTHFR”, *A. Nikolova* and E. E. Trimmer, poster presented by *A. Nikolova* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), September 30, 2006.

“Probing the Role of Phe 223 in Methylenetetrahydrofolate Reductase (MTHFR) from *Escherichia coli*: Studies of the Phe223Leu Mutant”, *D. Takawira* and E. E. Trimmer, poster presented by *D. Takawira* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 8, 2005.

“Steady-state Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Gln183Ala Reveals Role of Gln 183 in Folate Catalysis”, *A. J. Jolly*, *A. P. Nikolova*, and E. E. Trimmer, poster presented by *A.J. Jolly* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 8, 2005.

“pH Dependence of Methylenetetrahydrofolate Reductase (MTHFR): A Study of the Reductive Half-Reaction”, *M.C. O’Conor* and E.E. Trimmer, poster presented by *M.C. O’Conor* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 4, 2003.

“Investigation of the Midpoint Potential of Wild-type and Mutant Methylenetetrahydrofolate Reductase (MTHFR)”, *L.J. Galloway* and E. E. Trimmer, poster presented by *L.J. Galloway* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 4, 2003.

Kinetic Characterization of Methylenetetrahydrofolate Reductase Mutants Reveals Role for Aspartate 120 in the NADH-half Reaction”, *S.A. Scannell* and E. E. Trimmer, poster presented by *S.A. Scannell* at the Midwest Enzyme Chemistry Conference, (Chicago, IL), October 4, 2003.

UNDERGRADUATE COLLABORATORS

Zehui (Nora) Liu ('21). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Phe184Ala and Phe184Leu, Summer, Fall 2019.

Junmin Hua ('21). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Leu277Ala and Leu277Ile, Summer, Fall 2019, Spring 2020.

Tin Tran ('20). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Leu277Ala and Leu277Ile, Summer 2018, Spring, Fall 2019.

Siyuan Du ('20). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes His273Ala and His273Gln, Spring, Summer, Fall 2018, Spring, Fall 2019, Spring 2020.

Yuwei Pan ('20). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase Enzymes Ser26Ala and Ser26Thr, Spring, Summer, Fall 2018, Fall 2019, Spring 2020.

Maxwell Tetrick ('19). Kinetic Characterization of Methylenetetrahydrofolate Reductase (MTHFR) His273Ala and His273Gln Mutants, Spring, Fall 2018, Spring 2019.

Zhiye Lu ('19). Introduction to flavin enzyme research, Spring 2017.

Allyson Li ('18). pH-dependent Studies of *E. coli* Methylenetetrahydrofolate Reductase, Spring, Summer, Fall 2016, Spring 2017, Fall 2017, Spring 2018.

Richard Li ('17). Kinetic Characterization of Mutant Methylenetetrahydrofolate Reductase (MTHFR) Enzymes, Summer, Fall 2016, Fall 2017.

Jason Chien ('16). Construction and Study of Mutant Methylenetetrahydrofolate Reductase Enzymes, Spring 2016.

Brogan McWilliams ('16). Kinetic Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Glu28Asp Mutant, Spring 2016.

Chong Zuo ('15). Kinetic Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Gln183Ala and Gln183Glu Mutants, Summer 2013, Spring 2014.

Katherine N. Schlasner ('15). pH-dependent Studies of Glu28Gln *E. coli* Methylenetetrahydrofolate Reductase: Reductive Half-Reaction, Summer, Fall 2013.

John U. Seng ('14). Construction and Study of Mutant Methylenetetrahydrofolate Reductase Enzymes, Summer, Fall 2013.

- Jeremy Sanchez ('14). Kinetic Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Gln183Ala and Gln183Glu Mutants, Summer 2012, Spring 2013, Spring 2014.
- Nicolas Bonamici ('14). pH-dependent Studies of Asp120Ala *E. coli* Methylenetetrahydrofolate Reductase, Summer, Fall 2012
- Jingjing Wang ('13). pH-dependent Studies of *E. coli* Methylenetetrahydrofolate Reductase, Summer, Fall 2011, Spring 2012, Spring 2013.
- Metzere Bierlein De la Rosa ('13). Investigation of *E. coli* Methylenetetrahydrofolate Reductase Enzyme/Folate Complexes by Absorbance and Fluorescence Spectroscopy, Summer, Fall 2011.
- Yanwen Xu ('11). Nonenzymatic Model Studies for the Oxidative Half-Reaction of MTHFR that Adopt Organic Catalysts and Trapping, Spring 2010.
- Ivy Hsieh ('10). Proton Uptake Studies of the Methylenetetrahydrofolate Reductase (MTHFR) Folate Half-Reaction, Summer, Fall 2009.
- Tianqi Zhang ('11). Kinetic and Thermodynamic Model Studies of 5, 10-methylenetetrahydrofolate Nonenzymatic Conversions, Summer, Fall 2009; Spring 2010.
- David Satzer ('11). Kinetic Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzymes Gln183Ala and Gln183Glu, Summer 2009.
- Moon (Ryan) N. Lee ('07). Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Phe223Leu, Summer 2006, Fall 2006, Spring 2007.
- Sirui Cao ('08). Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Gln183Ala, Spring 2006, Summer 2006, Fall 2006, Spring 2007.
- Andriana Nikolova ('07). Construction of *E. coli* MTHFR mutants Gln183Ala, Glu, Phe223Ala, Leu. Spring, Fall 2005; Spring, Fall 2006, Spring 2007.
- Desire Takawira ('06). Construction and Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzymes Phe223Leu and Phe223Ala, Summer, Fall 2005.
- Amber Jolly ('06). Characterization of Methylenetetrahydrofolate Reductase (MTHFR) Mutant Enzyme Gln183Glu, Summer 2005, Fall 2005, Spring 2006.
- M. Catherine O'Connor ('04). pH dependence of *E. coli* MTHFR. Summer, Fall 2003.
- Lara J. Galloway ('05). Investigation of the protonation state of the flavin hydroquinone in wild-type and Asp120Asn MTHFR. Spring, Summer, Fall 2003.
- Sara A. Scannell ('05). Kinetic Characterization of MTHFR Mutant Enzymes. Spring, Summer 2003.
- Katie R. Casas ('04). Kinetic characterization of Asp120Ser MTHFR mutant enzyme. Summer, Fall 2002.
- Rania Heather Mohamed ('03). Anaerobic studies of the flavin enzyme MTHFR. Spring, Summer 2002.
- Danielle R. Brinker ('02). Construction of *E. coli* MTHFR mutant Asp120Ser. Summer, Fall 2001.
- Emily W. Burke ('02). Investigation of ionization state of flavin in MTHFR. Spring 2001, Summer 2001, Fall 2001, Spring 2002.