

Fitzpatrick, Paul F.

Curriculum Vitae



Name: Paul Frederick Fitzpatrick
Address: Department of Biochemistry
University of Texas Health Science Center
San Antonio, TX 78229
Education: A.B., Biology; Harvard University, 1975
Ph.D., Biological Chemistry; University of Michigan, 1981
Appointments:
2009-present Professor
Department of Biochemistry
University of Texas Health Sciences Center, San Antonio
1998-2001 Associate Head for Graduate Studies
Department of Biochemistry and Biophysics
Texas A&M University
1996-2009 Professor
1992-1996 Associate Professor
Department of Biochemistry and Biophysics; Department of Chemistry
Texas A&M University
1986-1992 Assistant Professor
Department of Biochemistry and Biophysics, Texas A&M University
1982-1986 Postdoctoral Research Fellow
Department of Chemistry, Pennsylvania State University
1981-1982 Postdoctoral Research Fellow
Department of Biological Chemistry, University of Michigan
1975-1976 Research Assistant
Department of Biochemistry and Pharmacology, School of Medicine, Tufts Univ.
Awards: Fellow, American Association for the Advancement of Science, 2010
Established Investigator, American Heart Association, 1991-1996
National Research Service Award, National Institutes of General Medical Sciences, 1982-1984
Rackham Predoctoral Fellowship, University of Michigan, 1979-1980
Current Support: NIH: "Mechanisms of Flavoproteins" 7/1/08-6/30/14, \$1,041,138; "Regulation of Phenylalanine
Metabolism" 9/20/2011-5/31/2015, \$752,000
The Welch Foundation: "Mechanisms of Oxidative Enzymes" 6/1/11-5/31/14, \$110,000
Service: Macromolecular Biochemistry Panel, National Science Foundation, 1992-95
NIH Physical Biochemistry Study Section *ad hoc*, 1994, 2001, 2003, 2004
NIH Biochemistry Study Section *ad hoc*, 1995, 1996, 1998, 2000, 2002
NIH Biomedical Research Training Study Section, *ad hoc*, 2000
NIH Special Emphasis Panels, 2003-2006, 2012
NIH MSFA Study Section, *ad hoc*, 2005
NIH MSFE Study Section, 2007-2011
CAREERS Review Panel, NSF, 1996
Dept. of Veterans Affairs General Medical Science Review Committee, 1996-99; Chair, 1998-99
Executive Editor, Arch. Biochem. Biophys., 1999-present; Editorial Board, 1996-99
Treasurer, Division of Biological Chemistry, American Chemical Soc., 1996-99
Co-Chair, Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways, 2002
USDA Review of Dept. of Biochemistry, Virginia Tech, 2009
Co-Chair, "Trends in Enzymology" Centro Stefano Franchini, Switzerland, 2010.

Fitzpatrick, Paul F.

Recent Publications

- Li, Jun, Dangott, Lawrence J., and Fitzpatrick, Paul F. (2010) "Regulation of Phenylalanine Hydroxylase: Conformational Changes Upon Phenylalanine Binding Detected by H/D Exchange and Mass Spectrometry" *Biochemistry* **49**, 3327–3335.
- Panay, Aram J., and Fitzpatrick, Paul F. (2010) "Measurement of the Intramolecular Isotope Effect on Aliphatic Hydroxylation by *Chromobacterium violaceum* Phenylalanine Hydroxylase" *J. Amer. Chem. Soc.* **132**, 5584–5585.
- Pavon, Jorge Alex, Eser, Bekir E., Huynh, Michaela, T., and Fitzpatrick, Paul F. (2010) "Single Turnover Kinetics of Tryptophan Hydroxylase: Evidence for a New Intermediate in the Reaction of the Aromatic Amino Acid Hydroxylases" *Biochemistry* **49**, 7563–7571
- Adachi, Mariya S., Torres, Jason, M. and Fitzpatrick, Paul F. (2010) "Mechanistic Studies of the Yeast Polyamine Oxidase Fms1: Kinetic Mechanism and pH Effects" *Biochemistry* **49**, 10440-10448
- Li, Jun, Ilangovan, Udayar, Daubner, S. Colette, Hinck, Andrew P., and Fitzpatrick, Paul F. (2011) "Direct Evidence for a Phenylalanine Site in the Regulatory Domain of Phenylalanine Hydroxylase" *Arch. Biochem. Biophys.* **505**, 250–255
- Panay, Aram J., Lee, Mike, Bollinger, J. Martin, Jr., Krebs, Carsten, and Fitzpatrick, Paul F. (2011) "Evidence for a High Spin Fe(IV) Species in the Catalytic Cycle of a Bacterial Phenylalanine Hydroxylase" *Biochemistry*, **50** 1928-1933
- Wang, Shanzhi, Lasagna, Mauricio, Daubner, S. Colette, Reinhart, Gregory D., and Fitzpatrick, Paul F. (2011) "Fluorescence Spectroscopy as a Probe of the Effect of Phosphorylation at Ser40 of Tyrosine Hydroxylase on the Conformation of Its Regulatory Domain" *Biochemistry*, **50**, 2364-2370
- Gaweska, Helena, and Fitzpatrick, Paul F. (2011) "Structures and Mechanism of the Monoamine Oxidase Family" *Biomolecular Concepts* **2**, 365-377
- Fitzpatrick, Paul F. (2010) "Allosteric Regulation of Phenylalanine Hydroxylase" *Arch. Biochem. Biophys.* **519**, 194-201
- Adachi, Mariya S., Taylor, Alex B., Hart, P. John, and Fitzpatrick, Paul F. (2012) "Mechanistic and Structural Analyses of the Role of His67 in the Yeast Polyamine Oxidase Fms1" *Biochemistry* **51**, 4888-4897
- Tormos, José R., Henderson Pozzi, Michelle, and Fitzpatrick, Paul F. (2012) "Mechanistic Studies of the Role of a Conserved Histidine in a Mammalian Polyamine Oxidase" *Arch. Biochem. Biophys.*, **528**,45-49
- Gaweska, Helena M., Roberts, Kenneth M., Fitzpatrick, Paul F. (2012) "Isotope effect studies suggest a stepwise mechanism for catalysis by Berberine Bridge Enzyme" *Biochemistry* **51**, 7342-7347
- Adachi, Mariya S., Taylor, Alex B., Hart, P. John, and Fitzpatrick, Paul F. (2012) "Mechanistic and Structural Analyses of the Roles of Active Site Residues in the Yeast Polyamine Oxidase Fms1: Characterization of the N195A and D94N Enzymes" *Biochemistry* **51**, 8690-8697
- Roberts, Kenneth M., and Fitzpatrick, Paul F. (2013) "The Mechanisms of Tryptophan and Tyrosine Hydroxylase" *IUBMB Life* **65**, 350-357
- Roberts, Kenneth M., Pavon, Jorge Alex, and Fitzpatrick, Paul F. (2013) "The Kinetic Mechanism of Phenylalanine Hydroxylase: Intrinsic Binding and Rate Constants from Single Turnover Experiments" *Biochemistry* **52**, 1062-1073
- Daubner, S. Colette, Avila, Audrey, Bailey, Johnathan O., Barrera, Dimitrios, Bermudez, Jaclyn Y., Giles, David H., Khan, Crystal A., Shaheen, Noel, Thompson, Janie W., Vasquez, Jessica, Oxley, Susan P., and Fitzpatrick, Paul F. (2013) "Mutagenesis of a Specificity-Determining Residue in Tyrosine Hydroxylase Establishes that the Enzyme is a Robust Phenylalanine Hydroxylase but a Fragile Tyrosine Hydroxylase" *Biochemistry* **52**, 1446-1455
- Fitzpatrick, Paul F. (2013) "Amine and Amino Acid Oxidases and Dehydrogenases" in *Handbook of Flavoproteins* (Hille, R, Miller, S., and Palfey, B., eds.) Walter de Gruyter, Berlin, 119-137
- Gaweska, Helena M., Taylor, Alex B., Hart, P. John, and Fitzpatrick, Paul F. (2013) "The Structure of the Flavoprotein Tryptophan-2-Monooxygenase, a Key Enzyme in the Formation of Galls in Plants" *Biochemistry* **52**, 2620–2626
- Li, Jun, and Fitzpatrick, Paul F. (2013) "Regulation of Phenylalanine Hydroxylase: Conformational Changes Upon Phosphorylation Detected by H/D Exchange and Mass Spectrometry" *Arch. Biochem. Biophys.* **535**, 115-119
- Gadda, Giovanni, and Fitzpatrick, Paul F. (2013) "Solvent Isotope and Viscosity Effects on the Steady-State Kinetics of the Flavoprotein Nitroalkane Oxidase" *FEBS Letters* **587**, 2785-2789
- Krzyaniak, Matthew D., Eser, Bekir E., Ellis, Holly R., Fitzpatrick, Paul F., and McCracken, John (2013) "A Pulsed EPR Study of Amino Acid and Tetrahydropterin Binding in a Tyrosine Hydroxylase Nitric Oxide Complex: Evidence for Substrate Rearrangements in Formation of the Oxygen-Reactive Complex" *Biochemistry* **52**, 8430-8441
- Zhang, Shengnan, Huang, Tao, Ilangovan, Udayar, Hinck, Andrew P., and Fitzpatrick, Paul F. (2014) "The Solution Structure of the Regulatory Domain of Tyrosine Hydroxylase" *J. Mol. Biol.* in press.

Mechanisms of Flavin- and Pterin-Dependent Enzymes

Our present understanding of the mechanisms of two enzyme families will be discussed. A large family of flavin-dependent enzymes catalyze the oxidation of bonds between carbon and either oxygen or nitrogen. Examples are glycolate oxidase, lactate dehydrogenase, monoamine oxidase, lysine-specific demethylase, and the polyamine oxidase. Despite differences in the structures of the proteins and the substrates, kinetic isotope effects demonstrate that these enzymes use a similar hydride transfer mechanism. They differ in the need for a base to deprotonate alcohol substrates but not amine substrates. The aromatic amino acid hydroxylases each catalyze physiologically critical reactions. A combination of spectroscopic and kinetic approaches has been applied to establish the catalytic and kinetic mechanisms of this enzyme family.