Kenneth M. Roberts

Assistant Professor of Chemistry
Department of Chemistry and Physics
University of South Carolina Aiken
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EDUCATION and EXPERIENCE

Aug 2015 - present University of South Carolina Aiken	**Assistant Professor** *Courses*: Introductory Chemistry (CHEM A101) General Chemistry (CHEM A111, A112) Organic Chemistry (CHEM A331L, A332L) Biochemistry (BIOL A541, CHEM A550) *Research*: Investigating the mechanisms of the metal-dependent enzymes 2,4'-dihydroxyacetophenone dioxygenase and gallate decarboxylase
Fall 2012 - Spring 2014 Fall 2011 St. Mary's University	**Adjunct Professor** General Chemistry (CH 1401 and 1402) Organic Chemistry (CH 3411 and 3412) 80 contact hours: lecture 100 contact hours: laboratory
Apr 2010 – Jul 2015 University of Texas Health Science Center at San Antonio	**Post-Doctoral Associate**, Department of Biochemistry *Focus*: Investigation of the mechanism of the aromatic amino acid hydroxylases using rapid-reaction techniques. *Advisor*: Dr. Paul F. Fitzpatrick
Dec 2009 - Mar 2010 Washington State University	**Post-Doctoral Associate**, Department of Chemistry *Focus*: Investigation of the mechanism of benzylic hydroxylation and *N*-dealkylation in a key catalytic mutant of cytochrome P450. *Advisor*: Dr. Jeffrey P. Jones
Dec 2009 Washington State University	**Ph.D. Biochemistry** *Thesis*: Mechanistic evaluation of *N*-dealkylation by cytochrome P450 using *N*,*N*-dimethylaniline *N*-oxides and kinetic isotope effects *Advisor*: Dr. Jeffrey P. Jones
Summer 2008 Washington State University	**Lecturer/Teaching Assistant** Chemistry Related to Life Sciences (CHEM 102) 40 contact hours
Mar 1996 University of Washington	**B.S. Biochemistry**

PUBLICATIONS
**denotes undergraduate researchers*

Roberts, K. M., Connor, G. C.*, Cave, C. H.*, Rowe, G. T., Page, C. A. The metal- and substrate-dependences of 2,4′-dihydroxyacetophenone dioxygenase. *Arch. Biochem. Biophys.* **2020**, *691*. (Accepted for publication: May 27 2020; Available online: June 9, 2020). https://doi.org/10.1016/j.abb.2020.108441

Roberts, K. M., Fitzpatrick, P. F. Measurement of kinetic isotope effects in an enzyme-catalyzed reaction by continuous-flow mass spectrometry. *Methods Enzymol.* **2017**, *596*, 149-161. https://doi.org/10.1016/bs.mie.2017.07.001

Taylor, A. B., **Roberts, K. M.**, Coa, X., Clark, N. E., Holloway, S. P., Donati, E., Polcaro, C. M., Pica-Mattoccia, L., Tarpley, R. S., McHardy, S. F., Cioli, D., LoVerde, P. T., Fitzpatrick, P. F., Hart, P. J. Structural and enzymatic insights into species-specific resistance to schistosome parasite drug therapy. *J Biol. Chem.* **2017**, *292*(27), 11154-11164. https://doi.org/10.1074/jbc.M116.766527

Clark, N. E., Katolik, A., **Roberts, K. M.**, Taylor, A. B., Holloway, S. P., Schuermann, J. P., Montemayor, E. J., Stevens, S. W., Fitzpatrick, P. F., Damha, M. J., Hart, P. J. Metal dependence and branched RNA co-crystal structures of the RNA lariat debranching enzyme Dbr1. *PNAS USA* **2016**, *113*(51), 14727–14732. https://doi.org/10.1073/pnas.1612729114

Fitzpatrick, P. F., Chadegani, F., Zhang, S., **Roberts, K. M.**, Hinck, C. S. Mechanism of the flavoprotein L-hydroxynicotine oxidase: kinetic mechanism, substrate specificity, reaction product, and roles of active-site residues. *Biochemistry* **2016**, *55*(4), 697–703. https://doi.org/10.1021/acs.biochem.5b01325

Roberts, K. M., Khan, C. A., Hinck, C. S., Fitzpatrick, P. F. Activation of phenylalanine hydroxylase by phenylalanine does not require binding in the active site. *Biochemistry* **2014**, *53*(49), 7846–7853. https://doi.org/10.1021/bi501183x

Zhang, S., **Roberts, K. M.**, Fitzpatrick, P. F. Phenylalanine binding is linked to dimerization of the regulatory domain of phenylalanine hydroxylase. *Biochemistry* **2014**, *53*(42), 6625-6627. https://doi.org/10.1021/bi501109s

Roberts, K. M., Tormos, J. R., Fitzpatrick, P. F. Characterization of unstable products of flavin- and pterin-dependent enzymes by continuous-flow mass spectrometry. *Biochemistry* **2014**, *53*(16), 2672-2679. https://doi.org/10.1021/bi500267c

Roberts, K. M., Fitzpatrick, P. F. Mechanisms of tryptophan and tyrosine hydroxylase. *IUBMB Life* **2013**, *65*(4), 350-357. https://doi.org/10.1002/iub.1144

Roberts, K. M., Pavon, J. A., Fitzpatrick, P. F. Kinetic mechanism of phenylalanine hydroxylase: intrinsic binding and rate constants from single-turnover experiments. *Biochemistry* **2013**, *52*(6), 1062-1073. https://doi.org/10.1021/bi301675e

Gaweska, H. M., **Roberts, K. M.**, Fitzpatrick, P. F. Isotope effects suggest a stepwise mechanism for berberine bridge enzyme. *Biochemistry* **2012**, *51*(37), 7342-7347. https://doi.org/10.1021/bi300887m

Roberts, K. M., Jones, J. P. Anilinic *N*-oxides support cytochrome P450-mediated *N*-dealkylation through hydrogen-atom transfer. *Chemistry* **2010**, *16*(27), 8096-8107. https://doi.org/10.1002/chem.201000185

PRESENTATIONS

Oct 2019 Invited Speaker	Oxidation by DAD: A Novel Reaction or An Old Dog with New Tricks. *University of Georgia, Department of Chemistry*, Athens, GA
Apr 2019 Invited Speaker	Oxidation by DAD: A Novel Reaction or An Old Dog with New Tricks. *Paul F. Fitzpatrick Retirement Symposium: Enzymes: From Isotope Effects to Allostery*, University of Texas Health Science Center, San Antonio, TX
Mar 2019 Invited Speaker	Oxidation by DAD: A Novel Reaction or An Old Dog with New Tricks. *ACS-Savannah Research Site Local Section Spring 2019 Dinner Meeting*, Aiken, SC
Nov 2018 Speaker	Oxidation by DAD: A Novel Reaction or An Old Dog with New Tricks. *Southeast Regional Meeting of the American Chemical Society 2018*, Augusta, GA
Feb 2016 Invited Speaker	Reaction kinetics of phenylalanine hydroxylase. *University of South Carolina Aiken, Department of Biology and Geology*, Aiken, SC
Jan 2016 Invited Speaker	Detection and identification of reaction products by continuous-flow mass-spectrometry. *University of South Carolina, Department of Chemistry and Biochemistry*, Columbia, SC
Jan 2014 Invited Speaker	Characterization of the reaction of polyamine oxidase by continuous-flow mass spectrometry. *Texas Enzyme Mechanisms Conference, 2014*, University of Texas, Austin, TX.

POSTERS

denotes undergraduate researchers

Jan 2019	Cave, C. H.*, Connor, G. C.*, Rowe, G.T., **Roberts, K. M.** Substrate Binding in 2,4'-Dihydroxyacetophenone Dioxygenase (DAD). *26th Enzyme Mechanisms Conference*, New Orleans, LA
Jul 2018	Cave, C. H.*, Connor, G. C.*, Rowe, G.T., **Roberts, K. M.** Structural Insights Into Substrate Binding by 2,4'-Dihydroxyacetophenone Dioxygenase (DAD). *Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways, 2018*, Waterville Valley, NH
Jul 2016	**Roberts, K. M.**, Weeks, J. A.*, Shores, V. M.*, Foerster, E. H.*, Rowe, G. T. Characterization of 2,4'-Dihydroxyacetophenone Dioxygenase (DAD). *Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways, 2016*, Waterville Valley, NH
Jan 2015	**Roberts, K. M.**, Khan, C. A., Hinck, C. S., Fitzpatrick, P F. Activation of Phenylalanine Hydroxylase by Phenylalanine Does Not Require Binding in the Active Site. *24th Enzyme Mechanisms Conference*, Galveston, TX

Jul 2013 **Roberts, K. M.**, Fitzpatrick, P. F. The Detection of Short-Lived Products of Enzyme-Catalyzed Reactions by Continuous-Flow Mass Spectrometry. *Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways, 2013*, Waterville Valley, NH

Jan 2013 **Roberts, K. M.**, Fitzpatrick P. F. The Kinetic Mechanism of Phenylalanine Hydroxylase. *Gordon Research Conference on Metals in Biology, 2013*, Ventura, CA

Jul 2012 **Roberts, K. M.**, Fitzpatrick P. F. Kinetics of Substrate Binding by Phenylalanine Hydroxylase. *Gordon Research Conference on Enzymes, Coenzymes, and Metabolic Pathways, 2012*, Waterville Valley, NH

Jan 2012 **Roberts, K. M.**, Fitzpatrick P. F. Single Turnover Analysis of Phenylalanine Hydroxylase: Ternary Complex Formation. *Texas Enzyme Mechanisms Conference, 2012*, University of Texas, Austin, TX

Jan 2011 **Roberts, K. M.**, Fitzpatrick P. F. Probing the Mechanism of Phenylalanine Hydroxylase Using Rapid-Quench Techniques with High-Resolution Mass Spectrometry. *22nd Enzyme Mechanisms Conference*, St. Pete Beach, FL

UNDERGRADUATE PRESENTATIONS

**denotes undergraduate researchers*; SMALL CAPS *denotes primary presenter(s)*

Jul 2019
Poster
GABRIELLE C. CONNOR* and **Kenneth M. Roberts**. O_2-Dependent Kinetics of the 2,4'-Dihydroxyacetophenone Dioxygenase (DAD) Reaction.
- *SC INBRE-Summer Scholars Institute Symposium 2019*, USC Aiken, Aiken, SC

Apr 2019
Poster
HAROLD B. MCCLAIN* and **Kenneth M. Roberts**. Determining the characterization of UbiD-like genes within a three-gene operon of Gallate decarboxylase for aromatic acid decarboxylase.
- *USC Aiken Scholar Showcase 2019*, USC Aiken, Aiken, SC

Apr 2019
Poster
GABRIELLE C. CONNOR*, C. Haley Cave*, Jason A. Weeks*, Najha A. Smith*, Harold B. McClain*, Clinton A. Page, and **Kenneth M. Roberts**. N- and C-terminus truncations of 2,4'-dihydroxyacetophenone dioxygenase (DAD).
- *10th Southeast Enzyme Conference*, Georgia State University, Atlanta, GA
- *Savannah River National Laboratory/USC Aiken - Science on Tap*, Aiken, SC
- *South Carolina Academy of Science Annual Meeting 2019*, Francis Marion University, Florence, SC
- *USC Aiken Scholar Showcase 2019*, USC Aiken, Aiken, SC

Nov 2018/Jan 2019
Poster
GABRIELLE C. CONNOR*, C. Haley Cave*, Jason A. Weeks*, Najha A. Smith*, Harold B. McClain*, Clinton A. Page, and **Kenneth M. Roberts**. N- and C-terminus truncations of 2,4'-dihydroxyacetophenone dioxygenase (DAD).
- *Southeast Regional Meeting of the American Chemical Society 2018*, Augusta, GA

Apr 2018
Speaker
JASON A. WEEKS*, Mentor: **Kenneth M. Roberts**. N- and C-termini truncations of 2,4'-dihydroxyacetophenone dioxygenase (DAD).
- *USC Aiken Scholar Showcase 2018*, USC Aiken, Aiken, SC

Apr 2018
Poster

C. HALEY CAVE*, NAJHA A. SMITH*, and **Kenneth M. Roberts**. An LC/MS assay for the quantification of analytes in the DAD-catalyzed reaction.

- *9th Southeast Enzyme Conference*, Georgia State University, Atlanta, GA
- *USC Discovery Day 2018*, University of South Carolina, Columbia, SC
- *South Carolina Academy of Science Annual Meeting 2018*, Presbyterian College, Clinton, SC
- *USC Aiken Scholar Showcase 2018*, USC Aiken, Aiken, SC

Apr 2018
Poster

GABRIELLE C. CONNOR*, JASON A. WEEKS*, Clinton A. Page, and **Kenneth M. Roberts**. N- and C-terminus truncations of 2,4'-dihydroxyacetophenone dioxygenase (DAD).

- *South Carolina Academy of Science Annual Meeting 2018*, Presbyterian College, Clinton, SC
- *USC Aiken Scholar Showcase 2018*, USC Aiken, Aiken, SC

Nov 2017
Speaker

JASON A. WEEKS*, Mentor: **Kenneth M. Roberts**. An analysis of the DAD catalyzed reaction.

- *Southeast Regional Meeting of the American Chemical Society 2017*, Charlotte, NC

Apr 2017
Poster

INEISHA A. HERRINGTON* and **Kenneth M. Roberts**. Product inhibition in the reaction of 2,4'-dihydroxyacetophenone dioxygenase.

- *USC Aiken Scholar Showcase 2017*, USC Aiken, Aiken, SC

Mar/Apr 2017
Poster

JASON A. WEEKS* and **Kenneth M. Roberts**. pH-Dependence of the reaction of 2,4'-dihydroxyacetophenone dioxygenase.

- *8th Southeast Enzyme Conference*, Georgia State University, Atlanta, GA
- *South Carolina Academy of Science Annual Meeting 2017*, Coastal Carolina University, Conway, SC
- *USC Aiken Scholar Showcase 2017*, USC Aiken, Aiken, SC

Mar/Apr 2017
Poster

C. HALEY CAVE* and **Kenneth M. Roberts**. Measuring the solvent-isotope effect of deuterated water on 2,4'-dihydroxyacetophenone dioxygenase.

- *South Carolina Academy of Science Annual Meeting 2017*, Coastal Carolina University, Conway, SC
- *USC Aiken Scholar Showcase 2017*, USC Aiken, Aiken, SC

Aug 2016
Poster

JASON A. WEEKS*, VICTORIA M. SHORES*, Emma H. Foerster*, Gerard T. Rowe, and **Kenneth M. Roberts**. Characterization of 2,4'-dihydroxyacetophenone dioxygenase (DAD).

- *SC INBRE Symposium 2016*, University of South Carolina School of Medicine, Columbia, SC

Apr 2016
Poster

JASON A. WEEKS*, Emma H. Foerster*, Victoria M. Shores*, and **Kenneth M. Roberts**. The metal-dependence of 2,4'-dihydroxyacetophenone dioxygenase (DAD).

- *USC Aiken Research Day 2016*, USC Aiken, Aiken, SC
- *South Carolina Academy of Science Annual Meeting 2016*, Winthrop University, Rock Hill, SC

Apr 2016
Poster

VICTORIA M. SHORES*, Jason A. Weeks*, Emma H. Foerster*, and **Kenneth M. Roberts**. Optimization of the expression and purification of 2,4'-dihydroxyacetophenone dioxygenase (DAD).

- *USC Aiken Research Day 2016*, USC Aiken, Aiken, SC
- *South Carolina Academy of Science Annual Meeting 2016*, Winthrop University, Rock Hill, SC

Apr 2016
Poster

EMMA H. FOERSTER*, Victoria M. Shores*, Jason A. Weeks*, and **Kenneth M. Roberts**. Optimization of a standard absorbance assay for 2,4'-dihydroxyacetophenone dioxygenase activity.

- *USC Aiken Research Day 2016*, USC Aiken, Aiken, SC
- *South Carolina Academy of Science Annual Meeting 2016*, Winthrop University, Rock Hill, SC

AWARDS and FUNDING

denotes undergraduate researchers

Jul-Sep 2020
$5,000 (K. M. Roberts)
$3,000 (F. A. Oladejo*)

USC Aiken Summer Scholars Institute Award 2020
USC Aiken, College of Sciences and Engineering
Student: Faith A. Oladejo*
Title: Structure-activity relationships of 2,4'-dihydroxyacetophenone in the 2,4'-dihydroxyacetopheone dioxygenase reaction.

May-Dec 2019
$6,000

RISE: Research Initiative for Summer Engagement
University of South Carolina, Office of the Vice President for Research
Title: 2,4'-Dihydroxyacetophenone dioxygenase (DAD): metal-dependence and steady-state kinetics.

May-Aug 2019
$4,000 (K. M. Roberts)
$3,000 (A. A. Herbert*)

USC Aiken Summer Scholars Institute Award 2019
USC Aiken, College of Sciences and Engineering
Student: Austin A. Herbert*
Title: Metal-dependence of 2,4'-dihydroxyacetophenone dioxygenase (DAD).

Jan-May 2019
$2,000 (G. C. Connor*)

INBRE Extension Award
USC Aiken, INBRE PROBe Program
Student: Gabrielle C. Connor*
Title: O_2-dependent kinetics of the 2,4'-dihydroxyacetophenone dioxygenase (DAD) reaction.

Jan-May 2019
$3,000 (G. C. Connor*)

Magellan Scholar Award, Spring 2019
University of South Carolina, Office of Undergraduate Research
Student: Gabrielle C. Connor*
Title: O_2-dependent kinetics of the 2,4'-dihydroxyacetophenone dioxygenase (DAD) reaction.

May-Aug 2018
$4,000 (K. M. Roberts)
$3,000 (G. C. Connor*)

USC Aiken Summer Scholars Institute Award 2018
USC Aiken, College of Sciences and Engineering
Student: Gabrielle C. Connor*
Title: O_2-dependent kinetics of the 2,4'-dihydroxyacetophenone dioxygenase (DAD) reaction.

Jul 2017-Sep 2018
$15,000
ASPIRE: Advanced Support for Innovative Research Excellence (Track-I)
University of South Carolina, Office of the Vice President for Research
Title: Anaerobic and oxygen-dependent studies of the mechanism of the 2,4'-dihydroxyacetophenone dioxygenase reaction.

Jul 2017-July 2018
$100,000
Co-PI
ASPIRE: Advanced Support for Innovative Research Excellence (Track-III)
University of South Carolina, Office of the Vice President for Research
Title: Acquisition of a liquid chromatography-mass spectrometer (LC-MS) for materials science and biochemical applications.

Jan-May 2018
$2,500 (C. H. Cave*)
Magellan Scholar Award, Spring 2018
University of South Carolina, Office of Undergraduate Research
Student: Catherine Haley Cave*
Title: An LC/MS assay for the quantification of analytes in the DAD-catalyzed reaction.

May-Dec 2017
$6,000
RISE: Research Initiative for Summer Engagement
University of South Carolina, Office of the Vice President for Research
Title: Validation of the proposed mechanisms for the 2,4'-dihydroxyacetophenone dioxygenase reaction.

Jan-Aug 2017
$5,000 (J. A. Weeks*)
INBRE Extension Award
USC Aiken, INBRE PROBe Program
Student: Jason A. Weeks*
Title: Structure-activity relationships in the reaction of 2,4'-dihydroxy-acetophenone dioxygenase (DAD).

May-Aug 2017
$1,500 (V. M. Shores*)
INBRE Primer Award
USC Aiken, INBRE PROBe Program
Student: Victoria M. Shores*
Title: The optimization of the expression of the DAD enzyme.

May-Aug 2017
$1,500 (J. A. Weeks*)
INBRE Primer Award
USC Aiken, INBRE PROBe Program
Student: Jason A. Weeks*
Title: Mechanism of 2,4'-dihydroxyacetophenone dioxygenase.

MEMBERSHIPS

2013 – Present American Chemical Society, member