

CHRISTOPHER JOHN HALKIDES

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POSITION

Professor, Dept. of Chemistry and Biochemistry, UNC-Wilmington, Wilmington, NC 28403

EDUCATION

Institute of Molecular Biology, University of Oregon, Eugene, OR 97403
Postdoctoral Research Associate Advisor: Professor Frederick W. Dahlquist

synthesized and solved the structure of an analog to the phospho-form of CheY.

Brandeis University, Waltham, MA 02254
Postdoctoral Research Associate Advisor: Professor Alfred G. Redfield

characterized p21 *ras* with NMR, ESEEM, and EPR.

Ph.D. (1990) Institute for Enzyme Research, U. Wisconsin-Madison, Madison, WI 53705

Thesis Advisor: Professor Perry A. Frey
Major: Biochemistry Minor: Chemistry

synthesized the labile compound *sym*-monothiopyrophosphate (MTP), compared it to pyrophosphate for PP_i-PFK, characterized the hydrolysis of MTP.

A.B., *summa cum laude*. Wabash College, Crawfordsville, IN 47933

Major: Chemistry Minor: Economics

AWARDS AND PROFESSIONAL MEMBERSHIPS

National Institutes of Health Postdoctoral Fellow
National Science Foundation Predoctoral Fellow
Phi Beta Kappa
American Chemical Society

PUBLICATIONS (1987-1996)

Kenneth J. Gruys, Christopher J. Halkides, and Perry A. Frey, "Synthesis and properties of 2-acetylthiamin pyrophosphate: an enzymatic reaction intermediate," *Biochemistry* 26 (1987), 7575.

John M. Konopka, Christopher J. Halkides, Janeen L. Vanhooke, David G. Gorenstein, & Perry A. Frey, "Uridinediphosphogalactose 4-epimerase. Phosphorus-31 nuclear magnetic resonance analysis of NAD⁺ and NADH bound at the active site," *Biochemistry* 28 (1989), 2645.

Christopher J. Halkides & Perry A. Frey; "The Mechanism of Hydrolysis of μ -Monothiopyrophosphate," *J. Am. Chem. Soc.* 113 (1991), 9843-9848.

Christopher J. Halkides, Eric S. Lightcap, & Perry A. Frey; "The Chemical and Enzymatic Reactivity of μ -Monothiopyrophosphate," *Heteroatom Chemistry* 2 (1991), 171.

Christopher J. Halkides, Matthew Benning, & Perry A. Frey; "The Structure of Tetramethyl μ -Monothiopyrophosphate," *Heteroatom Chemistry* 2 (1991), 655.

Eric S. Lightcap, Christopher J. Halkides, & Perry A. Frey; "Interactions of Metal Ions with μ -Monothiopyrophosphate," *Biochemistry* 30 (1991), 10307-10313.

Christopher J. Halkides, Eric S. Lightcap, & Perry A. Frey; "The Substrate Reactivity of μ -Monothiopyrophosphate with Pyrophosphate-Dependent Phosphofructokinase: Evidence for a Dissociative Transition State in Enzymatic Phosphoryl Group Transfer," *Biochemistry* 30 (1991), 10313-10322.

Russell G. Larsen, Christopher J. Halkides, Alfred G. Redfield, & David J. Singel; "Electron Spin Echo Envelope Modulation Spectroscopy of Mn²⁺•GDP complexes of N-*ras* p21 with Selective ¹⁵N Labeling," *J. Am. Chem. Soc.* 114 (1992), 9608-9611.

Russell G. Larsen, Christopher J. Halkides, & David J. Singel, "A Geometric Representation of Nuclear Modulation Effects: The Effects of High Electron Spin Multiplicity on the ESEEM Spectra of Mn(II) complexes of N-*ras* p21," *J. Phys. Chem.* 98 (1993), 6704-6721.

Anne-Frances Miller, Christopher J. Halkides, and Alfred G. Redfield, "Details of the Conformational Switch of p21*ras*," *Biochemistry* 32 (1993), 7367-7376.

Christopher J. Halkides, John Tobin, & Perry A. Frey, "Observation of an Unusually Fast α -keto Deuteration in Acetylthiamin Pyrophosphate and an Acetyl Thiazolium salt," *J. Am. Chem. Soc.* 115 (1993), 3332-3333.

Christopher J. Halkides, Christian T. Farrar, Russell G. Larsen, Alfred G. Redfield, & David J. Singel, "Characterization of the Active Site of p21 *ras* by Electron Spin-Echo Envelope Modulation Spectroscopy with Selective Labeling: Comparisons between GDP- and GTP-forms," *Biochemistry* 33 (1994), 4019-4035.

Christopher J. Halkides & Alfred G. Redfield, "The Effect of ¹⁷O on the Relaxation of an Amide Proton Within a Hydrogen Bond," *J. Biomol. NMR* 5 (1995), 362-366.

Christopher J. Halkides, Christian T. Farrar, Alfred G. Redfield, and David J. Singel, "The Active Site of p21 *ras*: Conformational Changes Induced by the Binding of Nucleotides," *Biological Structure and Dynamics, Vol. 1; Proceedings of the Ninth Conversation*, R. H. Sarma and M. H. Sarma, Eds. Adenine Press (1996), pp. 249-255.

Brendan F. Bellew, Christopher J. Halkides, Gary J. Gerfen, Robert G. Griffin, and David J. Singel, "High Frequency Electron Paramagnetic Resonance Measurement of the Hydration in Ternary Complexes of Mn(II), Guanine Nucleotides and *ras* p21," *Biochemistry* 35 (1996), 12186-12193.

Christopher J. Halkides, Brendan F. Bellew, Gary J. Gerfen, Percy H. Carter, Bernice Ruo, David A. Evans, Robert G. Griffin, and David J. Singel, "High Frequency (139.5 GHz) Electron Paramagnetic Resonance Spectroscopy of the GTP Form of p21 *ras* with Selective ^{17}O -labeling of Threonine, *Biochemistry* 35 (1996), 12194-12200.

Christopher J. Halkides, Yong Qian Wu, and Christopher J. Murray, "A Low Barrier Hydrogen Bond in Subtilisin: ^1H and ^{15}N NMR Studies with Peptidyl Trifluoromethyl Ketones," *Biochemistry* 35 (1996), 15941-15948.

PUBLICATIONS (1997-present) (names of UNCW students are underlined)

Christian T. Farrar, Christopher J. Halkides, and David J. Singel, "The active-site structure of p21 *ras* shows weak coordination of Thr35 to the divalent metal ion in frozen solution ESEEM studies," *Structure* 5 (1997), 1055-1066.

Travis S. Humble, Christopher J. Halkides, Jason D. Keltner, and Michael Messina, "A Theoretical Study of Intra-Molecular Vibrational effects on Fractionation Factors for Molecules Containing Intra-molecular Low Barrier Hydrogen Bonds," *Chem. Phys Lett.* 289 (1998), 90-96.

Christopher J. Halkides, Christian T. Farrar, & David J. Singel, "The Effects of Cryoprotectants on the Activity and Structure of p21 *ras*: Implications for Electron Spin-Echo Envelope Modulation Spectroscopy," *J. Mag. Reson.* 134 (1998), 142-153.

Christopher J. Halkides, Xiangyang Zhu, Philip Matsumura, and Frederick W. Dahlquist, "Synthesis and biochemical characterization of an analog of CheY-phosphate, a signal transduction protein in bacterial chemotaxis," *Biochemistry* 37 (1998), 13674-13680.

Todd Mayover, Christopher J. Halkides, and Richard C. Stewart, "Kinetic Characterization of CheY Autophosphorylation Using Small Phosphodonor Molecules," *Biochemistry* 38 (1999) 2259-2271.

Christopher J. Halkides, Megan M. McEvoy, Eric Casper, Philip Matsumura, Karl Volz, and Frederick W. Dahlquist "The 1.9 Å Resolution Crystal Structure of Phosphono-CheY an Analogue of the Active Form of the Response Regulator, CheY" *Biochemistry* 39 (2000), 5280-5286.

Christopher J. Halkides, "Assigning and Using Oxidation Numbers in Biochemistry Lecture Courses," *J. Chem. Ed.*, 77 (2000), 1428-1432.

Christopher J. Halkides and Cynthia McClure, "NMR Spectroscopy," *Annual Reports on the Progress of Chemistry, Section B, Organic Chemistry* 96 (2000).

Christian T. Farrar, David J. Singel, Jianpeng Ma, and Christopher J. Halkides "The binding of GAP alters the structure of p21 *ras*," *Structure*, 8 (2000), 1279-1287.

Kelly M. Ventura, Shannon, N. Greene, Christopher J. Halkides, and Michael Messina, "Computational Studies of Solvent Effects on the Low Barrier Hydrogen Bond," *Structural Chemistry*, 12, (2001), 23-31.

Christopher J. Halkides and Cynthia McClure, "NMR Spectroscopy," *Annual Reports on the Progress of Chemistry, Section B, Organic Chemistry* 97 (2001).

Christopher J. Halkides and R. Thomas Williamson, "NMR Spectroscopic Methods," *Annual Reports on the Progress of Chemistry, Section B, Organic Chemistry* 98 (2002).

David A. MacDonald, Gregory, E. Eppard, Christopher J. Halkides, and Michael Messina, "A Critical Comparison of Approximation Methods and Models for Equilibrium Properties of Low-Barrier Hydrogen Bonds," *Journal of Chemical Information and Computer Science* 42, 1390-1397 (2002).

Nolan E. Dean, Jeffrey E. Miller, Christopher J. Halkides, and Michael Messina, "On the Possibility of Detecting Low Barrier Hydrogen Bonds with Kinetic Measurements," *J. Chem. Inf. Comput. Sci.* 43, 554-559 (2003).

Lloyd A. Butler, Jeffrey E. Miller, Christopher J. Halkides, and Michael Messina, "On the Possibility of Using UV Spectroscopy as a Measure of the Low-Barrier Hydrogen Bond," *Structural Chemistry*, 14, 605-616, (2003).

Christopher J. Halkides, "Classroom Demonstration of a Spot Test for Phenylpyruvic Acid and its Relationship to Phenylketonuria" *Journal of Chemical Education* 81, 366-367 (2004).

Steven Van Sluyter, Michael J. Durako, and Christopher J. Halkides, Chitinase activities in *Vitis vinifera* cvs Chardonnay and Cabernet Sauvignon berries are significantly higher than in *Vitis rotundifolia* cv Fry berries," *American Journal of Enology and Viticulture* 56, 81-85 (2005).

Christopher J. Halkides and Russell Herman, "Introducing Michaelis-Menten Kinetics Through Simulation" *Journal of Chemical Education* 84, 434-437 (2007).

David R. Weyna, David Loveless, Cory Bottone, Nathan Hifko, and Christopher J. Halkides, "Synthesis of Benzyl Diisopropyl 5-Phosphonopentanoate and 5-Phosphonopentanoic Acid: An Analog of Succinyl Phosphate" *Phosphorus, Sulfur, and Silicon* 182, 563-567 (2007).

Christopher J. Halkides, Cory J. Bottone, Eric S. Casper, R. Matthew Haas, and Kenneth McAdams, "Synthesis of a stable analog of the phosphorylated form of CheY: Phosphono-CheY" *Methods in Enzymology*, 422, 338 (2007).

E. Crisp McDonald, Rachel C. Applefield, Christopher J. Halkides, Joseph H. Reibenspies, and Robert D. Hancock, "A thermodynamic and crystallographic study of complexes of the highly preorganized ligand 8-hydroxyquinoline-2-carboxylic acid" *Inorganica Chimica Acta* (2008), 361, 1937-1946.

McAdams, K., Casper, E. S., Haas, R. M., Santarsiero, B. D., Eggler, A. L., Mesecar, A. and Halkides, C. J., “The Structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY Help to Explain Their Binding Affinities to the FliM and CheZ Peptides” *Archives of Biochemistry and Biophysics* (2008) 479, 105-113.

Lawrence B. Cahoon*¹, Christopher J. Halkides², Bongkeun Song³, C. Michael Williams⁴, George R. Dubays⁵, Alexandra Fries⁶, Johanna Farmer⁷, William Fridrich⁸, Charles Brookshire⁹ “Swine waste as a source of natural products: A carotenoid antioxidant,” *Agricultural Sciences* (2012) 3 806-815.

Christopher J. Halkides, “Using molecular models to show steric clash in peptides: an illustration of two disallowed regions in the Ramachandran diagram,” *Journal of Chemical Education* (2013) 90(6) 760-762. [dx.doi.org/10.1021/ed3001528](https://doi.org/10.1021/ed3001528) |.

R Sircar, PP Borbat, MJ Lynch, J Bhatnagar, MS Beyersdorf, CJ Halkides, JH Freed, BR Crane, “Assembly states of FliM and FliG within the flagellar switch complex” *Journal of Molecular Biology* (2015) 427(4) 867-86. doi: 10.1016/j.jmb.2014.12.009.

Christopher Halkides and Kim Lott “Presumptive and Confirmatory Blood Testing” in *Forensic Science Reform Protecting the Innocent*, Wendy J. Koen and C. Michael Bowers, editors, Elsevier, 2017. ISBN: 978-0-12-802719-6.

Beyersdorf MS, Sircar R, Lookadoo DB, Bottone CI, Lynch MJ, Crane BR, Halkides CJ “Production characterization, and assessment of a stable analog of the response regulator CheY-phosphate from *Thermotoga maritima*” *Protein Science* 2017 August 26(8):1547-1554. doi: 10.1002/pro.3180.

Daniel B. Lookadoo, Matthew S. Beyersdorf, and Christopher J. Halkides “Synthesis of a Stable Analog of the Phosphorylated Form of CheY: Phosphono-CheY” *Bacterial Chemosensing Methods and Protocols* *Methods in Molecular Biology* 2018 1729:337-343, Michael Manson, editor. https://doi.org/10.1007/978-1-4939-7577-8_26

W. Scott Langford, William Stanley Kish, Neal P. Johnson, Daniel B. Lookadoo, Brandon Hey, David Jansen, Nathan Hifko, and Christopher J. Halkides “Synthesis of Proposed Inhibitors of the Enzyme Aspartate- β -Semialdehyde Dehydrogenase,” 2018 *Journal of Undergraduate Chemistry Research* 17(1):12-16.

Steve van Sluyter, Robyn Cain, Mark Zweigart, and Christopher Halkides, “Inactivation of Vaccinia H1 related phosphatase in the presence of phosphonomethylating agents,” 2019 *Journal of Undergraduate Chemistry Research* 18(3):6-10.

GRANTS FUNDED (1998-2018)

“Phosphonomethylation of Response Regulators,” \$39,944, Academic Research Initiation Grants program of the North Carolina Biotechnology Center, July 1, 1999-June 30, 2001.

“Synthesis of Phosphonates with Possible Antimicrobial Properties” \$1250, Charles L. Cahill Award, UNCW, June 1, 2001-August 1, 2001.

“Overexpression of CheY from Bacteria,” \$3000, Summer Research Initiatives, UNCW, Summer, 2001.

Halkides, C.J. “Complexes of Phosphono-CheY with Peptides,” 2001. National Institutes of Health, Academic Research Enhancement Award, \$140,000, April 2003-March 2006.

Halkides, C.J. “Synthesis of possible inhibitors of aspartate semialdehyde dehydrogenase” \$3500, Summer Research/Curriculum Development Initiative Award, May 15-August 15, 2006.

Halkides, C.J. “Syntheses of S-2,2,2-trifluoroethylcysteine sulfone and S-allylcysteine sulfone” \$3000, Charles L. Cahill, UNCW, June 1-July 30, 2008.

Cahoon, L. Halkides, C.J., and Song, B.-K., “Microbial anti-oxidants from swine waste lagoons” * \$116,500 University of North Carolina Research Competitiveness Fund, January 1-October 31, 2008.

"High sensitivity calorimetry instrumentation to study interactions in biochemical systems", *North Carolina Biotechnology Center 2009-IDG-1031 04/01/2009--03/31/2011, \$171,000 (total, including a 42K UNCW match). PI, Paulo Almeida

"Acquisition of a 600 MHz NMR," * Sponsored by National Science Foundation, Federal, \$700,000.00. (August 1, 2009 - Present). PI, Pamela Seaton.

“Synthesis of phosphono-CheY and phosphono-VHR” \$150,000, National Institutes of Health, Academic Research Enhancement Award. Resubmitted June, 2009 (May 1, 2010-April 30, 2015).

“Synthesis of novel bisubstrate analogs for aspartate semialdehyde dehydrogenase” Charles Cahill Award, \$3000. (1 June 2015-30 August 2015)

CSURF Supply award \$186. (October 2017)

“Synthesis of novel inhibitors of aspartate semialdehyde dehydrogenase” Charles Cahill Award \$3400 (April 2018)

College of Arts & Sciences Pilot Grant Award \$3500 (notification: Fall 2019)

UNCW Office of Innovation and Commercialization translational research grant \$10,000 (notification: Fall 2019)

An asterisk (*) denotes a grant where I was a Co-PI, investigator, or supporting personnel.

GRANT PROPOSALS

“Phosphonomethylation of Response Regulators,”* \$50,000, National Science Foundation, Purchase of departmental research instrumentation for use by junior faculty in establishing their careers (submitted July 1998; funding denied).

“Upgrade of X-ray Diffractometer with CCD Capabilities,”* National Science Foundation, CRIF program (submitted 2000; funding denied).

“Synthesis of Phosphonomethylcysteine Sulfoxide, a Possible Antimicrobial Compound,” \$2500, Charles L. Cahill Award, UNCW, June 1, 2000-August 1, 2000 (submitted fall, 1999; funding denied).

“Complexes of Phosphono-CheY with Peptides,” \$100,000, National Institutes of Health, Academic Research Enhancement Award (submitted September 2000; funding denied).

Charles L. Cahill Award, June 1 through August 1, 2006 (submitted fall, 2005; funding denied).

“Microbial anti-oxidants in swine waste lagoons,”* \$173,652, North Carolina Biotechnology Center (submitted October, 2006; funding denied).

“Synthesis of phosphono-CheY and phosphono-VHR” \$150,000, National Institutes of Health, Academic Research Enhancement Award (submitted June, 2007; not funded).

“Acquisition of a high resolution, accurate mass LC/MSn”* submitted August 2009, National Science Foundation (not funded)

“Synthesis of phosphono-CheY and phosphono-VHR” \$150,000, National Institutes of Health, Academic Research Enhancement Award (resubmitted October, 2008; not funded).

2010 Summer Research Initiative (submitted October, 2009; not funded).

“MRI: Acquisition of an LC/MSn,”* NSF Major Research Instrumentation, \$187,884 12/01/10-11/3013 (submitted April 2010). PI Ralph Mead, Co-PI Pamela Seaton.

National Science Foundation Research Experiences for Undergraduates* (submitted 2012; funding denied).

“Synthesis of bisubstrate analogs of aspartate semialdehyde dehydrogenase” North Carolina Biotechnology Center BRG preproposal (submitted September, 2012; not considered further)

“Synthesis of possible antimicrobials based on isonicotinamide” Summer Research Enhancement Award, \$5800, UNCW, (submitted March 2013; funding denied).

National Science Foundation Research Experiences for Undergraduates* (submitted 2013; funding denied).

“Synthesis of bisubstrate analogs of aspartate semialdehyde dehydrogenase” North Carolina Biotechnology Center BRG preproposal, (submitted September, 2013, not considered further)

“Synthesis of bisubstrate analogs of aspartate semialdehyde dehydrogenase” North Carolina Biotechnology Center BRG preproposal (submitted September, 2014, not considered further)

“Solid State NMR in Chemistry and Biology*” 2018 North Carolina Biotechnology Center Institutional Development Grant.

An asterisk (*) denotes a grant where I was a Co-PI, investigator, senior personnel, or supporting personnel.

ORAL PRESENTATIONS (1995-present)

“The Active Site of p21 *ras*: Conformation Changes Induced by the Binding of Nucleotides” Ninth Conversation in the Discipline Biomolecular Stereodynamics, Albany, NY, June 20-24, 1995

“Structural Comparison of CheY in the Phospho and Dephospho Forms,” Bacterial Locomotion and Signal Transduction, Cuernavaca, Mexico, January 9-13, 1997.

“Using Oxidation Numbers and Teaching Kinetics in Biochemistry Lectures,” 53rd SERMACS, Savannah, GA, September 23-26, 2001.

“The structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY and their binding affinities to the FliM and CheZ peptides,” Gordon Research Conference on Sensory Transduction in Microorganisms, Ventura, CA, January 11-16, 2004.

“The structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY help to explain their phenotypes,” FW Dahlquist Colloquium – I. Santa Barbara, CA, July 13, 2007.

“Purification and Characterization of a Carotenoid from Hog Lagoons,” North Carolina NMR Symposium, 12 April 2010, David H. Murdock Research Institute, North Carolina Research Campus, Kannapolis, NC.

“Forensic Failures in the Stallings case and the Knox/Sollecito case,” 10th Haines Lecture, 19 April 2011, Wabash College, Crawfordsville, IN.

“Phosphono-CheY, an analog of a labile phosphoprotein” 10th Haines Lecture, 19 April 2011, Wabash College, Crawfordsville, IN.

“Forensic Failures in the Stallings and the Knox/Sollecito cases,” Eastern North Carolina Sectional meeting, 12 April 2012.

“Forensic Failures in the Stallings, Chamberlain, Knox/Sollecito and Lundy Cases,” UNCW Chemistry Club, 23 February 2016.

POSTER PRESENTATIONS (1998-present)

“Synthesis of Phosphono-CheY,” Gordon Research Conference: Sensory Transduction in Microorganisms, Ventura, CA, January 1998.

“Synthesis of Phosphono-CheY, an Analog of CheY-P,” Second UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 1998.

“Structural Comparison of CheY in the Phospho and Dephospho Forms,” Third UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 29-30, 1999.

“Structural Comparison of CheY in the Phospho and Dephospho Forms,” American Chemical Society Southeast Regional Meeting, Research Triangle Park, NC, November 1999.

“Structural and Biochemical Comparison of CheY in the Phospho and Dephospho Forms,” Gordon Research Conference: Sensory Transduction in Microorganisms, Ventura, CA, January 2000.

“Synthesis of Two Analogs of Aspartyl Phosphate,” Fourth UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 26-27, 2000.

“Structural and Biochemical Comparison of CheY in the Phospho and Dephospho Forms,” Fourth UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 26-27, 2000.

“The Synthesis and Characterization of T87I-CheY in its Signalling Form,” Fourth UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 26-27, 2000.

“The Structure of T87I CheY Phosphono-CheY and its Binding to the FliM Peptide,” Sixth Conference on Bacterial Locomotion and Signal Transduction, January 14-19, 2001, Cuernavaca, Mexico.

“The Structure of T87I CheY in the Phospho Form,” Fifth UNCW Symposium on Chemistry and Biochemistry, January 28-29, 2001.

“A Mixed Quantum-Classical Approach for Computing Effects of Intra-molecular Motion on the Low Barrier Hydrogen Bond,” Fifth UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 26-27, 2001.

Synthesis of Phosphonate Enzyme Inhibitors,” Fifth UNCW Symposium on Chemistry and Biochemistry, Wilmington, NC, January 26-27, 2001.

“The Structure of T87I Phosphono-CheY and its Binding to the FliM and CheZ Peptides,” 53rd SERMACS, Savannah, GA, September 23-26, 2001.

“Teaching Chromatography Across the Undergraduate Chemistry Curriculum. Part 2: Overview, Advanced Organic, Analytical, and Biochemistry,” 53rd SERMACS, Savannah, GA, September 23-26, 2001.

“Toward the Synthesis of Valerophosphonate, an Analog of Succinyl Phosphate,” 6th UNCW Symposium on Chemistry and Biochemistry, January 25-26, 2002.

Why Low-Barrier Hydrogen Bonds Should Be More Properly Termed Low-Curvature Hydrogen Bonds ,” 6th UNCW Symposium on Chemistry and Biochemistry, January 25-26, 2002.

“Oxidation Numbers in Biochemistry,” 6th UNCW Symposium on Chemistry and Biochemistry, January 25-26, 2002.

“The Structure of T87I Phosphono-CheY and its Binding to the FliM and CheZ Peptides,” 6th UNCW Symposium on Chemistry and Biochemistry, January 25-26, 2002.

“The Structure of T87I Phosphono-CheY and its Binding to the FliM and CheZ Peptides,” 54th SERMACS, Charleston, SC, November 14-15, 2002,

“Chemical Modification of two proteins involved in Signal Transduction,” 29th Steenbock Symposium: Coenzymes, Cofactors, and Catalysis, May 29-June 2, 2003.

“Expansion of the Genetic Code by a Combination of Site-Directed Mutagenesis and Chemical Modification,” Dedication of the Wabash College Science Building, Crawfordsville, IN, September 19-20, 2003.

“The structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY and their binding affinities to the FliM and CheZ peptides,” Gordon Research Conference: Sensory Transduction in Microorganisms, Ventura, CA, January 11-16, 2004.

“The structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY and their binding affinities to the FliM and CheZ peptides,” 56th SERMACS, Research Triangle Park, NC November 10-13, 2004.

“Synthesis of a protein tyrosine phosphatase intermediate analog,” 56th SERMACS, Research Triangle Park, NC November 10-13, 2004.

“The structures of T87I Phosphono-CheY and T87I/Y106W Phosphono-CheY and their binding affinities to the FliM and CheZ peptides,” Bacterial Locomotion and Signal Transduction, Boca Raton, FL, January 16-21. 2005.

“Synthesis and Characterization of Phosphono-CheY from *Thermotoga maritima*,” Gordon Research Conference: Sensory Transduction in Microorganisms, Ventura, CA January 22-27, 2006.

“The structure of T87I/Y106W Phosphono-CheY Compared to other Phosphono-CheY Proteins,” Gordon Research Conference: Sensory Transduction in Microorganisms, Ventura, CA January 22-27, 2006.

“Synthesis and Characterization of Several Potential inhibitors of the Enzyme Aspartate- β -Semialdehyde Dehydrogenase (ASADH),” National Organic Chemistry Symposium, Durham, NC June 2007.

“Synthesis of the Leaving Group Trichloromethanesulfonate, A Probable General Route To Sulfonic Esters,” National Organic Chemistry Symposium, Durham, NC June 2007.

“NMR Characterization of a Carotenoid from Hog Lagoons,” Environmental Chemistry Seminar to accompany “The Plastic Ocean,” 14 January 2010, UNCW, Wilmington, NC.

“NMR Characterization of a Carotenoid from Hog Lagoons,” UNCW Health-Related Studies Annual Research Symposium, 9 April 2010, UNCW, Wilmington, NC.

“NMR Characterization of a Carotenoid from Hog Lagoons,” North Carolina NMR Symposium, 12 April 2010, David H. Murdock Research Institute, North Carolina Research Campus, Kannapolis, NC.

“Syntheses of potential bisubstrate analogs of aspartate semialdehyde dehydrogenase,” Langford, W. Scott, Kish, William, and Halkides, Christopher J. SERMACS 2011, Richmond, VA.

“Syntheses of Proposed Inhibitors of Aspartate- β -Semialdehyde Dehydrogenase,” Langford, W. Scott, Colner, Matthew, Kish, William S., Jansen, David, Hifko, Nathan, van Gorder, Eric and Halkides, Christopher J. SERMACS 2012, Raleigh, NC.

“Synthesis, characterization, and crystallization of phosphono-CheY from *Thermotoga maritima*,” Beyersdorf, M.S., Roebuck, J.A., Sircar, R., Pavlovsky, A., Crane, B.R., Halkides, C.J. Signal Transduction in Microorganisms (Gordon Research Conference) 12-17 January 2014, Ventura, CA.

“Synthesis, characterization, and crystallization of phosphono-CheY from *Thermotoga maritima*,” Beyersdorf, M.S.*, Roebuck, J.A.*, Sircar, R., Pavlovsky, A., Crane, B.R., Halkides, C.J. 36th Steenbock Symposium, 22-24 May 2014, Madison, WI.

“Teaching the steady-state and Michaelis-Menten kinetics to undergraduates,” Halkides, C.J., Lookadoo, D.*, and Herman R. 36th Steenbock Symposium, 22-24 May 2014, Madison, WI. Poster (this poster was a late submission and does not appear in the list of abstracts for this meeting).

“Production of a stable analog of the cysteinyl phosphate intermediate of VHR phosphatase,” (ID: 2828679) Daniel B. Lookadoo, Matthew S. Beyersdorf, Brian Milley, Jon Nance, Michael Lynch, Christopher J. Halkides, Brian R. Crane, Southeast Regional Meeting of the American Chemical Society 7-11 November 2017, Charlotte, NC.

“Production of a stable analog of the cysteinyl phosphate intermediate of VHR phosphatase,” Daniel B. Lookadoo, Matthew S. Beyersdorf, Brian Milley, Jon Nance, Michael Lynch, Christopher J. Halkides, Brian R. Crane, Reception following Larry Overman Seminar, 26 April 2019, Wilmington, NC.