BIANCA R. SCULIMBRENE

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Current Position: Professor of Chemistry, College of the Holy Cross

Education:

2004-2006 NIH postdoctoral fellow, Massachusetts Institute of Technology

1999-2004 Ph.D. Chemistry, Boston College

1995-1999 B.S. Chemistry, Xavier University [Magna Cum Laude]

Research:

2006-present Independent Research (College of the Holy Cross)
Catalytic selective phosphorylation
Alkene peptide isostere synthesis

2004-2006 Postdoctoral Research (Massachusetts Institute of Technology; Advisor: Barbara Imperiali)
Lanthanide Binding Tags as Fluorescent Probes for Studying Protein-Protein Interactions

1999-2004 Doctoral Research (Boston College; Advisor: Scott J. Miller)
Catalytic Asymmetric Phosphorylation: Total Syntheses of Inositol Phosphates

1997-1999 Undergraduate Research (Xavier University; Advisor: Edward E. Fenlon)
Silatrane-Nucleosides as Transition State Analogues: Synthesis and Characterization

Courses

Organic Chemistry I (lecture and laboratory) [S07, S08, S10, S11, S12, S13, S16, S17, S18, S19, S20, S22, S23]
Organic Chemistry II (lecture and laboratory) [F06, F07, F09, F11, F12, F13, F14, F15, F18, F21, F22, F23]
Mechanistic Organic Chemistry [F11, S16, F17]
Biochemistry [F14, F16]
Chemistry of Food (lecture and laboratory) [F16, F17]
Undergraduate Research Tutorials [2006-present; 137 tutorials given to date]

Grants and Funding:

2021 Jean Dreyfus lectureship for Undergraduate Institutions
"DEI after 50 years of co-education at Holy Cross" $18,500 (Guest Lecturer: Sarah Reisman)
2020 College of the Holy Cross Research and Publication Award
"Catalytic Phosphorylation of Alcohols" $3,000
2017 College of the Holy Cross Course Development Grant
"Lighting the Way for New Discoveries in Organic Chemistry" $3,120

2016	College of the Holy Cross Research and Publication Award *"Asymmetric Phosphorylation of Diols"* $3,000
2014	College of the Holy Cross Research and Publication Award "*Synthesis of the C-terminal Fragment of Peptide Isosteres"* $3,000
2013	College of the Holy Cross Research and Publication Award *"Selective Phosphorylation of Diols"* $3,000
2009	Charles & Rosanna Batchelor Ford Faculty Fellowship "*Synthesis of Peptide-Isosteres to Study Drug Interactions"* $3,800
2008	Jean Dreyfus Boissevain Undergraduate Scholarship (awarded to O.S. Fenton) *"Development of a Catalytic Reaction for the Phosphorylation of Alcohols"* $5,500
2007	Charles & Rosanna Batchelor Ford Faculty Fellowship *"The Development of Chemical Tools in Organic Synthesis"* $3,500
2006	The Camille and Henry Dreyfus New Faculty Start-Up "*Utilizing organic synthesis for development of chemical tools: new methods for phosphorylation, facile amino acid synthesis and vancomycin probes"* $30,000

Awards and Honors:

2022	Mary Louise Marfuggi Award Academic Advising
2021	Faculty Marshall
2019	Classical High School Athletic Hall of Fame
2012	Honorary Member of Alpha Sigma Nu
2004-2006	NIH Postdoctoral Fellowship
2004	Outstanding Graduate Student Award (Boston College)
2002-2003	ACS Division of Organic Chemistry Graduate Fellowship
2002	Kenneth J. Hancock Memorial Student Award in Green Chemistry
2002	Donald J. White Teaching Excellence Award
1999-2000	GAANN Fellowship
1999	Fr. Frederick Miller Award in Chemistry (Xavier University)
1998	Council on Undergraduate Research Summer Fellowship

Publications: (* denotes undergraduate co-authors)

Research Articles

(19) "Catalyst identification for chemoselective phosphorylation of phenols and aliphatic alcohols" E.M. Eason*, W.J. Reller*, Katerine R. Fazekas*, **B.R. Sculimbrene** *Tetrahedron Lett.* **2023**, *129*, 154680.

(18) "Desymmetrization of Diols by Phosphorylation with a Titanium-BINOLate Catalyst" E.T.Ouellette*, M.G. Lougee*, A.R. Bucknam*, P.J. Endres*, J.Y. Kim*, E.J. Lynch*, E.J. Sisko*, **B.R. Sculimbrene** *J. Org. Chem.* **2021**, *86*, 7450-7459.

(17) "Outer-Sphere Control for Divergent Multicatalysis with Common Catalytic Moieties" C.R. Shugrue, **B.R. Sculimbrene**, E.R. Jarvo, B.Q. Mercado, S.J. Miller *J. Org. Chem.* **2019**, *84*, 1664-1672.

(16) "Synthesis of α-chiral-β,γ-unsaturated carboxylic acid derivatives using chiral auxiliaries" K.E. Poremba*, V.A. Lee*, **B.R. Sculimbrene** *Tetrahedron*, **2014**, *70*, 5463-5467.

(15) "Selective Phosphorylation of Diols with a Lewis Acid Catalyst" K.A. Coppola*, J.W. Testa*, E.E. Allen*, **B.R. Sculimbrene** *Tetrahedron Lett*. **2014**, *55*, 4203-4206.

(14) "Catalytic Lewis Acid Phosphorylation with Pyrophosphates" O.S. Fenton*, E.E. Allen*, K.P. Pedretty*, S.D. Till*, J.E. Todaro*, **B.R. Sculimbrene** *Tetrahedron*, **2012**, *68*, 9023-9028.

(13) "A Wet Lab Approach to Stereochemistry Using 31P NMR Spectroscopy" O.S. Fenton*, **B.R. Sculimbrene** *J. Chem. Ed.* **2011**, *88*, 662-664.

(12) "Synthesis of a D-Ala-D-Ala Peptide Isostere via Olefin Cross-metathesis and Evaluation of Vancomycin Binding" R.K. Quinn*, A.L. Cianci*, J.A. Beaudoin* and **B.R. Sculimbrene** *Bioorg. Med. Chem. Lett.* **2010**, *20*, 4382-4385.

(11) "Efficient Catalyst Turnover in the Phosphitylation of Alcohols with Phosphoramidites" P.B. Brady*, E.M. Morris*, O.S. Fenton*, and **B.R. Sculimbrene** *Tetrahedron Lett.* **2009**, *50*, 975-978.

(10) "Lanthanide-Binding Tags with Unnatural Amino Acids: Sensitizing Tb^{+3} and Eu^{+3} Luminescence at Longer Wavelengths." A. M. Reynolds, **B.R. Sculimbrene**, B. Imperiali *Bioconjugate Chem.* **2008**, *19*, 588-591.

(9) "Lanthanide-Binding Tags as Luminescent Probes for Studying Proteins." **B. R. Sculimbrene**, B. Imperiali *J. Am. Chem. Soc.* **2006**, *128*, 7346-7352.

(8) "Streamlined Synthesis of Phosphatidylinositol (PI), PI3P, PI3,5P_2, and Deoxygenated Analogues as Potential Biological Probes." Y.J. Xu, **B.R. Sculimbrene**, S.J. Miller *J. Org. Chem.* **2006**, *71*, 4919-4928.

(7) "Rapid Combinatorial Screening of Peptide Libraries for the Selection of Lanthanide-Binding Tags (LBTs)." L. J. Martin, **B.R. Sculimbrene**, M. Nitz, B. Imperiali *QCS Comb. Sci.* **2005**, *24*, 1149-1157.

(6) "Desymmetrization of Glycerol Derivatives with Peptide-based Acylation Catalysts." C.A. Lewis, **B.R. Sculimbrene**, Y.Xu, S.J. Miller *Org. Lett*., **2005**, *7*, 3021-3023.

(5) "Asymmetric Synthesis of Phosphatidylinositol-3-Phosphates with Saturated and Unsaturated Side Chains through Catalytic Asymmetric Phosphorylation." **B.R. Sculimbrene**, Y. Xu, S.J. Miller *J. Am. Chem. Soc.,* **2004**, *126*, 13182-13183.

(4) "Nonenzymatic Peptide-Based Catalytic Asymmetric Phosphorylation of Inositol Derivatives." **B.R. Sculimbrene**, A.J. Morgan, and S.J. Miller *Chem. Commun.*, **2003**, *15*, 1781-1785.

(3) "Enantiodivergence in Small-Molecule Catalysis of Asymmetric Phosphorylation: Concise Total Syntheses of the Enantiomeric D-*myo*-Inositol-1-phosphate and D-*myo*-Inositol-3-phosphate." **B.R. Sculimbrene**, A.J. Morgan, and S.J. Miller *J. Am. Chem. Soc.*, **2002**, *124*, 11653-11656.

(2) "Discovery of a Catalytic Asymmetric Phosphorylation through Selection of a Minimal Kinase Mimic: A Concise Total Synthesis of D-*myo*-Inositol-1-Phosphate."
B.R. Sculimbrene and S.J. Miller *J. Am. Chem. Soc.,* **2001**, *123,* 10125-10126.

(1) "Silatranyl-Nucleosides: Transition State Analogues for Phosphoryl Transfer Reactions."
B.R. Sculimbrene, R.E. Decanio, B.W. Peterson, E.E. Muntel, and E.E. Fenlon *Tetrahedron Lett.*, **2001**, *30*, 4979-4982.

Patents

(1) "Peptide as Kinase Mimic Catalysts for Asymmetric Phosphorylation in Synthesis of Phosphorylated Inositols and Cyclo-alkanols" **B.R. Sculimbrene**, S.J. Miller, A.J. Morgan *PCT Int. Appl*. WO 2003004141 A3, 2003.

Conference Talk Abstracts

(1) "Desymmetrization of Diols by Phosphorylation with a Titanium-BINOLate Catalyst", **B.R. Sculimbrene**, *From Abstracts of Papers, ACS National Meeting (Virtual),* (2021).

Conference Poster Abstracts (first author presenter)

(35) "Site Selective Phosphorylation with a Pyrophosphate Reagent", **B.R. Sculimbrene**, E.M. Eason*, K.R. Fazekas* *From Abstracts of Papers, Empowering Women in Organic Chemistry Conference,* Cambridge MA (June 2022).

(34) "Optimization of the site-selective phosphorylation of polyols", E.M. Eason*, **B.R. Sculimbrene**, *From Abstracts of Paper 263rd ACS National Meeting,* San Diego, CA (2022).

(33) "Phosphorylation of alcohols with a fluorinated phosphorylating agent", G.M. Gavis*, **B.R. Sculimbrene**, *From Abstracts of Paper 263rd ACS National Meeting,* San Diego, CA (2022).

(32) "Desymmetrization of Diols by Phosphorylation with a Titanium-BINOLate Catalyst", **B.R. Sculimbrene**, *From Abstracts of Papers, Empowering Women in Organic Chemistry Conference (Virtual),* (2021).

(31) "Enantioselective phosphorylation of diols" A. Bucknam*, E. Lynch*, **B.R. Sculimbrene**, *From Abstracts of Papers, 257th ACS National Meeting,* Orlando, FL (2019).

(30) "Catalytic enantioselective phosphorylation of an FTY720 model diol" E. Ouellette*, **B.R. Sculimbrene**, *From Abstracts of Papers, 255th ACS National Meeting,* New Orleans, LA (2018).

(29) "Formation of peptide isosteres via olefin cross-metathesis" T. Chickering*, **B.R. Sculimbrene**, *From Abstracts of Papers, 255th ACS National Meeting,* New Orleans, LA (2018).

(28) "Exploration of the role of base in selective phosphorylations" E. Sisko*, **B.R. Sculimbrene**, *From Abstracts of Papers, 255th ACS National Meeting,* New Orleans, LA (2018).

(27) "Enantioselective catalytic phosphorylation" P.J. Endres*, **B.R. Sculimbrene**, *From Abstracts of Papers, 253rd ACS National Meeting,* San Francisco, CA (2017).

(26) "Convergent synthesis of trans-alkene peptide isosteres" S.E. Huth*, **B.R. Sculimbrene**, *From Abstracts of Papers, 253rd ACS National Meeting,* San Francisco, CA (2017).

(25) "Catalytic asymmetric monophosphorylation of diols" M.G.Lougee*, **B.R. Sculimbrene**, *From Abstracts of Papers, 249th ACS National Meeting,* Boulder, CO (2015).

(24) "Caged phosphates in organic molecules" A.K. Dame*, **B.R. Sculimbrene**, *From Abstracts of Papers, 249th ACS National Meeting,* Boulder, CO (2015).

(23) "Lewis acid phosphorylation utilizing pyrophosphates" **B.R. Sculimbrene**, K.A. Coppola*, K.P. Pedretty*, J.W. Testa*, *From Abstracts of Papers, 247th ACS National Meeting,* Dallas, TX (2014).

(22) "Catalytic phosphorylation of diols" K.A. Coppola*, J.W. Testa*, **B.R. Sculimbrene** *From Abstracts of Papers, 247th ACS National Meeting,* Dallas, TX (2014).

(21) "Development of an efficient method for the synthesis of the c-terminal fragment of peptide isosteres" K.E. Poremba*, V.A. Lee*, **B.R. Sculimbrene**, *From Abstracts of Papers, 247th ACS National Meeting,* Dallas, TX (2014).

(20) "Phosphorylation of functionalized alcohols using a Lewis acid catalyst" K.P. Pedretty*, **B.R. Sculimbrene**, *From Abstracts of Papers, 245th ACS National Meeting,* New Orleans, LA (2013).

(19) "Development of an efficient method for the synthesis of the c-terminal fragment of peptide isosteres" K.E. Poremba*, **B.R. Sculimbrene**, *From Abstracts of Papers, 245th ACS National Meeting,* New Orleans, LA (2013).

(18) "Wet-lab approach to stereochemistry using ^{31}P and ^{1}H NMR spectroscopy" **B.R. Sculimbrene**, O.S. Fenton*, *From Abstracts of Papers 244th ACS National Meeting*, Philadelphia, PA (2012).

(17) "Synthesis of "caged" phosphates" J.E. Todaro*, **B.R. Sculimbrene**, *From Abstracts of Papers, 243rd ACS National Meeting,* San Diego, CA (2012).

(16) "Catalytic P(V) phosphorylation with orthogonal protecting groups" E.M. Allen*; **B.R. Sculimbrene** *From Abstracts of Papers, 243rd ACS National Meeting,* San Diego, CA (2012).

(15) "Synthetic phosphorylation using pyrophosphates" S.D. Till*, **B.R. Sculimbrene**, *From Abstracts of Papers, 243rd ACS National Meeting,* San Diego, CA (2012).

(14) "Development of catalytic phosphorylation reactions" O.S. Fenton*, **B.R. Sculimbrene***, From Abstracts of Papers, 239th ACS National Meeting*, San Francisco, CA, (2010).

(13) "Exploring olefin cross metathesis for the synthesis of peptide isosteres" G.M. Faxon*, **B.R. Sculimbrene**, *From Abstracts of Papers, 239th ACS National Meeting*, San Francisco, CA (2010).

(12) "Using peptide isosteres to investigate antibiotic resistance" R.K. Quinn*, **B.R. Sculimbrene**, *From Abstracts of Papers, 239th ACS National Meeting*, San Francisco, CA (2010).

(11) "Exploring stereochemistry in a teaching laboratory using 31P NMR spectroscopy" O.S. Fenton*, **B.R. Sculimbrene**, *From Abstracts of Papers, 239th ACS National Meeting*, San Francisco, CA (2010).

(10) "Phosphorylation of alcohols: New methods and reagents" **B.R. Sculimbrene**, P.B. Brady*, E.M. Morris*, O.S. Fenton*, *From Abstracts of Papers, 237th ACS National Meeting*, Salt Lake City, UT (2009).

(9) "Efficient synthesis of phosphates from alcohols using phosphoramidites" E.M. Morris*, O.S. Fenton*, **B.R. Sculimbrene**, *From Abstracts of Papers, 237th ACS National Meeting*, Salt Lake City, UT (2009).

(8) "Formation of peptide isosteres via olefin cross metathesis" J.A. Beaudoin*, **B.R. Sculimbrene**, *From Abstracts of Papers, 237th ACS National Meeting*, Salt Lake City, UT (2009).

(7) "Development of a catalytic reaction for the phosphorylation of alcohols" O.S. Fenton*, E.M. Morris*, **B.R. Sculimbrene***, From Abstracts of Papers, 237th ACS National Meeting*, Salt Lake City, UT (2009).
(6) "Development of new methods for catalytic phosphorylation" P.B. Brady*, **B.R. Sculimbrene** *From Abstracts of Papers, 235th ACS National Meeting*, New Orleans, LA (2008).
(5) "Utilizing olefin cross metathesis for the synthesis of peptide isosteres" A.L. Cianci*, **B.R. Sculimbrene**, *From Abstracts of Papers 235th ACS National Meeting*, New Orleans, LA (2008).
(4) "Development of Lanthanide Binding Tags (LBTs) as probes for protein-protein interactions" **B.R. Sculimbrene**, B. Imperiali, *From Abstracts of Papers, 230th ACS National Meeting*, Washington, DC (2005).
(3) "Asymmetric Catalytic Phosphorylation: Synthesis of Inositol Phosphates" **B.R. Sculimbrene**, A.J. Morgan, S.J. Miller, *From National Organic Symposium*, Bloomsberg, IN (2003).
(2) "Biomimetic Synthesis, Biomimetic Catalysis: Concise Synthesis of D-*myo*-Inositol-1-Phosphate" **B.R. Sculimbrene**, S.J. Miller, *From Green Chemistry and Engineering Conference*, Washington, DC (2001).
(1) "Silatranyl-Nucleosides as Transition State Analogues" **B.R. Napolitano**, E.E. Fenlon, *From CUR Posters on the Hill,* Washington, DC (1999).

Invited Lectures

(5) Fairfield University, "Challenges and Discoveries in the Selective Synthesis of Phosphates" (March 2022)
(4) Yale University, "Yale Celebration of Women in Chemistry" (November 2020)
(3) Connecticut College, "Synthesis of Chemical Tools: Phosphorylation and Peptide Isosteres" (March 2012)
(2) Wesleyan University, "Synthesis of Chemical Tools: Phosphorylation and Peptide Isosteres" (October 2011)
(1) Trinity College "Synthesis of Chemical Tools: Phosphorylation and Peptide Isosteres" (March 2011)

College of the Holy Cross research students mentored:

Sirisha (Kovvali) Rao '07	D.M.D., Boston University School of Dental Medicine
Catherine White '07	Senior Scientist at Merck Pharmaceutical
Amelia Cianci '08	M.Ed., Boston University; High School chemistry teacher
Patrick Brady '08	PhD, University of Chicago (Advisor: Prof. Yamamoto); Senior Scientist at AbbVie
Liz (Morris) Andrare '09	VP of Success at Ultranauts Inc
Jennifer Beaudoin '09	Principal Research Associate at Moderna Therapeutics
Owen Fenton '10	PhD, MIT (Advisor: Prof. Arnold); Assistant Professor at the National University of Singapore
Greg Faxon '10	Technical Services Manager, Triumvirate Environmental
Ryan Quinn '11	PhD, UNC-Chapel Hill (Advisor: Prof. Alexanian); Molecular Engineer at Emerald Therapeutics
Sean Till '12	MD, Loyola University Chicago; Internal Medicine Residency at UVM
Joseph Todaro '12	Partner at Greymatter Capital
Emily Allen '13	PhD, Boston University (Advisor: Prof. Schaus); Senior Research Scientist at Vertex
Kevin Connolly '13	DO, University of New England School of Osteopathic Medicine
Kyle Pedretty '14	Chemistry graduate student, U South Florida (Advisor: Prof. Del Valle & Prof. Lopchuk)
Kelsey Poremba '14	PhD, Caltech (Advisor: Prof. Reisman); Senior Scientist, Merck
Kyle Coppola '14	D.M.D., Tufts Medical School
Victoria Lee '15	DO Candidate, University of New England School of Osteopathic Medicine
Joseph Testa '15	MD, University of Connecticut School of Medicine
Christian Brooks '16	MD, University of Vermont
Alexis Dame '16	DO Candidate, University of New England School of Osteopathic Medicine
Marshall Lougee '16	PhD Chemistry, University of Pennsylvania (Advisor: Prof. Petersson)
Tyler Chickering '18	MS. Candidate, Tufts University and Associate Scientist, Alnylam
Paul Endres '18	MD Candidate, Thomas Jefferson University
Susannah Huth '18	Chemistry PhD Candidate, Yale University (Advisor: Scott Miller)
Erik Ouellette '18	PhD Chemistry, University of California Berkeley (Advisor: Prof. Arnold)
Callie Waite '18	PA, Cornell School of Medicine

John Kim ’19	Chemistry PhD Candidate, University of Utah (Advisor: Prof. Lopper)
Elizabeth Sisko ’19	Chemistry PhD Candidate, U California San Francisco (Advisor: Prof. Sello)
Cedric Depestre’19	FRAP student (2015-2016)
Hawar Haddadi’19	FRAP student (2015-2017)
Andrea Bucknam ’20	Chemistry PhD Candidate, Dartmouth University (Advisor: Prof. Micalizio)
Hannah Chapman ’20	Doctor of Pharmacy Candidate, MCPHS
Emma Lynch ’20	Associate Scientist, IDEXX
Hannah Miksenas ’20	MD Candidate, Albany Medical College
Christina Manxhari ’F20	MD Candidate, UMass Medical School
Noelle Zweidinger ‘21	FRAP student (2017-2018)
Aidan Pearsall ’21	FRAP student (2017-2018), Medicinal Scientist, Pfizer
Katherine Fazekas ’22	Americore Intern
Grace Gavis ’22	MD Candidate, University of Rochester
Erin Eason ’23	Chemistry PhD Candidate, University of California Irvine
Claudia Hajjar ’23	ESTEEM Master of Science, University of Notre Dame
Brianna Concepcion’26	FRAP student (2022-2023)
Dhoksia Jani’26	FRAP student (2022-2023)
Katie Stathoulopoulos’24	Current research student
Wesley Reller ’24	Current research student
Audrey Ihlefeld ’25	Current research student
Gwen Minogue ’25	Current research student
Abigail Kellogg ’25	Current research student
Tammy Huynh ’27	FRAP student (2023-2024)
Barakat Lawal ’27	FRAP student (2023-2024)

Elected College Committees and Councils:

Academic Affairs Council (2009-2012)
Committee on Nominations and Elections (2011-2012)
Committee on Faculty Affairs (2014-2016)
Committee on Tenure and Promotion (2016-2017)
Committee on Academic Standing (2017-2019), committee chair 2018-2019
Committee on Faculty Scholarship (2018-2019), committee chair S19

Appointed College Committees:

Center for Teaching Advisory Board (2013-2015)
Ad-hoc committee on Conflict of Interest (2017-2018)
Community Standards Board (2021-2024, 2012)
Healthy Community Committee (2022-2023)