Michael A. Bertucci

Department of Chemistry
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EDUCATION

The University of North Carolina at Chapel Hill — Chapel Hill, NC
Ph.D. Organic Chemistry — August 2014
Advisor: Prof. Michel R. Gagné
Thesis: Synthetic Agents for the Derivatization of *N*-Acyl Homoserine Lactones

Stevens Institute of Technology — Hoboken, NJ
B.S. Chemical Biology (4.0 GPA), Minor in Social Sciences — May 2009

TEACHING EXPERIENCE

2015 – present **Assistant Professor, Moravian College**
Fall 2015: Organic Chemistry I; Organic Chemistry I Laboratory
Spring 2016: Organic Chemistry II; Organic Chemistry II Laboratory
Fall 2016: Organic Chemistry I; Organic Chemistry I Laboratory; Bioorganic & Medicinal Chemistry
Spring 2016: Organic Chemistry II; Organic Chemistry II Laboratory
Fall 2017: Organic Chemistry I; Organic Chemistry I Laboratory; Synthetic Organic Chemistry
Spring 2018: Organic Chemistry II; Organic Chemistry II Laboratory; Senior Seminar in Chemistry & Biochemistry
Fall 2018: Organic Chemistry I; Organic Chemistry I Laboratory; Senior Seminar in Chemistry & Biochemistry
Spring 2019: Organic Chemistry II; Organic Chemistry II Laboratory; Bioorganic & Medicinal Chemistry
Fall 2019: Organic Chemistry I; Organic Chemistry I Laboratory; Senior Seminar in Chemistry & Biochemistry
Spring 2020: Organic Chemistry II; Organic Chemistry II Laboratory; Synthetic Organic Chemistry

2014 - 2015 **Visiting Assistant Professor, Hartwick College**
Fall 2014: Organic Chemistry I; Organic Chemistry II Laboratory; General Chemistry I
Spring 2015: Organic Chemistry II; General Chemistry II Lab; General, Organic, and Biological Chemistry

2009 – 2013 **Teaching Assistant, The University of North Carolina at Chapel Hill**
Spring 2013 Organic Chemistry II Laboratory
Spring 2010 General Chemistry II Laboratory
Fall 2009 General Chemistry II Laboratory

Fall 2013 **Instructor, Issues in Modern Biology, The University of North Carolina at Chapel Hill**
Team-taught course in collaboration with four biology graduate students under the mentorship of Dr. Jennifer Coble; held five independent class sessions on bacterial pathogenesis and antibiotic resistance; gained experience in syllabus development, lesson planning, active learning strategies, and assessment design

2012 – 2013 **Lecturer, Moldova AID, The University of North Carolina at Chapel Hill**
Held Skype lectures on the impact of chemistry to Master's students at Moldova State University
Spring 2012 Chemistry & Renewable Energy
Spring 2013 The Maillard Reaction & the Chemistry of Food

2011 & 2014 **Undergraduate Research Mentor, The University of North Carolina at Chapel Hill**
Fall 2014 Design and synthesis of iodinated D-glucal derivatives for radioimaging in collaboration with the department of applied sciences (Mentee: Roland Manning Jones, UNC-CH)

Summer 2011 NSF REU Student; trained techniques of organic synthesis and solid-phase synthesis to develop methods for the generation of thiourea catalyst combinatorial libraries (Mentee: Chido Hambira, Berea College)

RESEARCH EXPERIENCE

2015 – present **Independent Scholarship, Moravian College (*Current Advisee)**
Structure-activity relationships between hydrophobic residues on CSP-1 and quorum sensing in *Streptococcus pneumoniae*
Collaborator: Dr. Yftah Tal-Gan (University of Nevada, Reno)
Undergraduate Advisees: Elizabeth Hutnick*, Naomi Rieth, Alec Buttner, Emilee Engler*, Kylie Chichura, Robert Hillman, Michelle Pomposello, Erin Tiwold

Investigating structure-activity relationships in LamD, the cyclic peptide autoinducer responsible for regulating quorum sensing in *Lactobacillus plantarum*
Undergraduate Advisees: Gabe Chlebove*, Naomi Rieth*, Fadi Hanna*, Ashlyn Cantrel, Jonathan Nadraws, Jonathan Le

Exploring the impact of alanine scanning, N-methylation & cyclization of the peptide autoinducer $PapR_7$ on *Bacillus cereus* quorum sensing
Collaborator: Dr. Zvi Hayouka (The Hebrew University of Jerusalem)
Undergraduate Advisees: Emilee Engler*, Elizabeth Hutnick*, Jessica Lynch

Understanding electronic interactions that manipulate degradation rates of the native signaling molecules in gram-negative bacterial communication
Undergraduate Advisees: Daniel Schmucker, Sydney Dunbar

July 2019 **Visiting Scholar, The Robert H. Smith Faculty of Agriculture, Food & Environment, The Hebrew University of Jerusalem**
Collaborator: Prof. Zvi Hayouka
Investigated the impact of N-methyl and cyclic variants of the signaling peptide PapR7 on quorum sensing in *Bacillus cereus* while learning protein purification and assays for bacteria-induced hemolysis

2014 – 2015 **Independent Scholarship, Hartwick College**
Undergraduate Advisees: Sydney Dunbar, Kareem March
Developed and mentored undergraduate-focused research projects integrating organic synthesis, bioorganic chemistry and microbiology to design small molecules and peptides capable of bacterial quorum sensing and biofilm inhibition.

2009 – 2014 **Doctoral Research, The University of North Carolina at Chapel Hill**
Advisor: Prof. Michel R. Gagné
Thesis: Synthetic Agents for the Derivatization of *N*-Acyl Homoserine Lactones.
Employed methods of synthetic chemistry, peptide chemistry, combinatorial chemistry, and microbiology to develop synthetic agents for the functionalization of *N*-acyl homoserine lactones, chemical messengers in bacterial quorum sensing.

2007 – 2009 **Undergraduate Research, Stevens Institute of Technology**
Advisor: Prof. A. K. Ganguly
Utilized synthetic chemistry to develop enantioselective methods for the assembly of spirooxindoles, necessary precursors in the synthesis of Horsifiline analogs.

2008 **Merck Future Talent Program, Merck Research Laboratories**
Advisor: Dr. Ramzi Sweis
Employed methods of synthetic and medicinal chemistry to develop novel inhibitors of HDL cholesterol reducing enzymes.

Michael A. Bertucci

PUBLICATIONS (*undergraduate scientist)

Bertucci, M.A. and Smith, K.J., The future of peptide science: Recognizing the American Peptide Society's Young Investigators. *Peptide Science*, **2020** 112: e24211.

Schmucker, D. J.*, Dunbar, S. R.*, Shepherd, T. D., Bertucci, M.A. n → π* Interactions in N-Acyl Homoserine Lactone (AHL) Derivatives and Their Effects on Hydrolysis Rates. *J. Phys. Chem. A.*, **2019**, *123* (13), 2537 - 2543.

Koirala, B., Hillman, R. A.*, Tiwold, E. K.*, Bertucci, M. A., Tal-Gan, Y., Defining the Hydrophobic Interactions that Drive Competence Stimulating Peptide (CSP):ComD Binding in Streptococcus pneumoniae. *Beilstein J. Org. Chem.*, **2018**, *14*, 1769 - 1777.

Hillman, R. A.*, Nadraws, J. W.*, Bertucci, M. A. The Hydrocarbon Staple & Beyond: Recent Advanced Towards Stapled Peptide Therapeutics that Target Protein-Protein Interactions. *Curr. Top. Med. Chem.*, **2018**, *18*, 611 – 624.

Bertucci, M. A. and March, K.*, Non-Natural D-Amino Acids to Control Bacterial Virulence. *Proceedings of the 24th American Peptide Symposium*, **2015**, 51 – 53.

Bertucci, M. A., Lee, S. J., Gagné, M. R., Selective Transamidation of 3-oxo-N-Acyl Homoserine Lactones by Hydrazine Derivatives. *Org. Biomol. Chem.*, **2014**, *12*, 7197 – 7200.

Bertucci, M. A., Lee, S. J., Gagné, M. R., Thiourea-catalyzed aminolysis of N-acyl homoserine lactones. *Chem. Commun.*, **2013**, *49*, 2055-2057.

Alluri, S. S.; Wang, C.; Bertucci, M. A Novel Enantioselective Synthesis of Spiro-Oxindoles: Analogs of Horsifiline and Spirotryprostatin. Saarbrücken: *Lambert Academic Publishing*, **2010**.

PRESENTATIONS (*undergraduate scientist, **presenter in bold**)

Bertucci, M. A., "Instruction through human simulation in undergraduate organic chemistry" Biennial Conference on Chemical Education (BCCE), Poster Presentation (cancelled due to COVID-19), 2020.

Schmucker, D. J.*, Dunbar, S. R.*, Shepherd, T. D., **Bertucci, M. A.**, "Assessing the influence of n → π* interactions on hydrolysis rates of n-acyl homoserine lactone derivatives" 259th American Chemical Society National Meeting and Exposition, Oral Presentation (online due to COVID-19), 2020.

Engler, E.*, Buttner, A. R.*, Milly, T., Chichura, K.*, Tal-Gan, Y., Bertucci, M. A. "Quorum sensing inhibition in *Streptococcus* pneumoniae using optimized CSP1 modifications including a key E1A substitution" 259th American Chemical Society National Meeting and Exposition, Poster Presentation (online due to COVID-19), 2020.

Buttner, A.R.*, Engler, E.*, Milly, T., Chichura, K.*, Tal-Gan, Y., Bertucci, M. A. "Synthesis of an inhibitory peptide for quorum sensing in *Streptococcus pneumoniae* through optimization of the hydrophobic binding face and substitution of the N-terminus residue" 259th American Chemical Society National Meeting and Exposition, Poster Presentation (online due to COVID-19), 2020.

Koirala, B., Hillman, R. A.*, Tiwold, E. K.*, Chichura, K.*, Tal-Gan, Y., **Bertucci, M. A.** "Assessing the Role of Hydrophobic Interactions in Competence Stimulating Peptide (CSP)-ComD Binding in *Streptococcus pneumoniae*" 26th American Peptide Symposium, Poster Presentation, 2019.

Hillman, R. A.*, Tiwold, E. K.*, Koirala, B., Tal-Gan, Y., **Bertucci, M. A.** "Remodeling the hydrophobic face of CSP-1, a peptide autoinducer for quorum sensing in *Streptococcus pneumoniae*" 256th American Chemical Society National Meeting and Exposition, Oral Presentation, 2018.

Chichura, K. S.*, Koirala, B., Tal-Gan, Y., Bertucci, M. A**.** "Effects of multiple amino acid mutations of a key quorum sensing peptide, CSP-1" 256th American Chemical Society National Meeting and Exposition, Poster Presentation, 2018.

Cantrel, A. S.*, Bertucci, M. A**.** "Synthesis of lactam derivatives of LamD, a cyclic signaling peptide of *Lactobacillus plantarum*" 256th American Chemical Society National Meeting and Exposition, Poster Presentation, 2018.

Schmucker, D. J.*, Dunbar, S. R., **Bertucci, M. A.** "Experimental evidence of a stabilizing n→π* interaction in N-acyl homoserine lactone (AHL) hydrolysis" 254th American Chemical Society National Meeting and Exposition, Oral Presentation, 2017.

Hillman, R. A.*, Tal-Gan, Y., Bertucci, M. A**.** "Effects of modifying carbon number and structure of hydrophobic amino acid residues on CSP-1, a key quorum sensing peptide in *S. pneumoniae*" 254th American Chemical Society National Meeting and Exposition, Poster Presentation, 2017.

Nadraws, J.*, Le, J., Bertucci, M. A**.** "Optimizing cyclization of LamD derivatives in preparation for bioassays of *Lactobacillus plantarum*" 254th American Chemical Society National Meeting and Exposition, Poster Presentation, 2017.

Tiwold, E.*, Le, J.*, Tal-Gan, Y., **Bertucci, M. A.**, "Establishing SARs in gram-positive symbiotes & pathogens to develop quorum sensing modulators" 25th American Peptide Symposium, Poster Presentation, Biologically Active Peptides, 2017.

Young, S. C., Staretz-Greenfield, M. E., Mayville, F. C., Husic, H. D., **Heindel, N. D.**, Bertucci, M. A., "Development and evaluation of a team-taught online course in medicinal chemistry" 45th Middle Atlantic Regional Meeting of the American Chemical Society, Oral Presentation, 2017.

Bertucci, M. A., Schmucker, D.*, Dunbar, S. R.*, Le, J.* "Determining the impact of a hypothesized n→π* interaction on hydrolysis rates of N-acyl homoserine lactones" 252nd American Chemical Society National Meeting and Exposition, Poster Presentation, 2016.

Lynch, J. K.*, Bertucci, M. A**.** "Establishing preliminary relationships between peptide structure and quorum sensing activity in *Bacillus cereus*" 252nd American Chemical Society National Meeting and Exposition, Poster Presentation, 2016.

Tiwold, E.*, Bertucci, M. A**.** "Manipulating signal hydrophobicity to alter quorum sensing in *Streptococcus pneumoniae*" 252nd American Chemical Society National Meeting and Exposition, Poster Presentation, 2016.

Schmucker, D.*, and Bertucci, M. A**.** "Manipulating the n→π* orbital interaction in N-acyl homoserine lactones (AHLs) and its effects on hydrolysis rates" *National Council on Undergraduate Research (NCUR)*, Poster Presentation, 2016.

Bertucci, M. A. and March, K.*, "Amino acids & peptides to control bacterial virulence." 24th American Peptide Symposium, Poster Presentation, Biologically Active Peptides, 2015.

Bertucci, M. A., Dunbar, S. R.*, and March, K.* "Synthetic approaches to controlling bacterial virulence." 249th American Chemical Society National Meeting and Exposition, Poster Presentation, Division of Organic Chemistry, 2015.

Dunbar, S. R.* and Bertucci, M. A. "Manipulation of n to π* orbital interactions in the hydrolysis of para-substituted N-acyl homoserine lactones." 249th American Chemical Society National Meeting and Exposition, Poster Presentation, 2015.

March, K.* and Bertucci, M. A. "Purposeful biofilm disassembly with unnatural alkyl and aromatic D-amino acids." 249th American Chemical Society National Meeting and Exposition, Poster Presentation, 2015.

Bertucci, M. A., Waters, M. L., and Gagné, M. R., "Intramolecular amide cleavage of 3-oxo-N-acyl homoserine lactones by hydrazine-containing peptides." Gordon Research Seminar, Chemistry & Biology of Peptides, Oral Presentation, 2014.

Bertucci, M. A., Waters, M. L., and Gagné, M. R., "Intramolecular amide cleavage of 3-oxo-N-acyl homoserine lactones by hydrazine-containing peptides." Gordon Research Conference, Chemistry & Biology of Peptides, Poster Presentation, 2014.

Bertucci, M. A. and Gagné, M. R., "Deactivating 3-oxo-N-acyl homoserine lactones with quorum quenching peptides." 244th American Chemical Society National Meeting and Exposition, Poster Presentation, Division of Organic Chemistry, 2013

Bertucci, M. A. and Gagné, M. R., "Thiourea-catalyzed aminolysis of N-acyl homoserine lactones." Southeastern Regional Meeting of the American Chemical Society, Poster Presentation, 2012.

Bertucci, M. A. and Gagné, M. R., "Thiourea-catalyzed aminolysis of N-acyl homoserine lactones." North Carolina American Chemical Society, Poster Presentation, 2012.

Bertucci, M. A. and Gagné, M. R., "Combinatorial development of peptide-based nucleophiles for *N*-acyl homoserine lactone aminolysis." North Carolina American Chemical Society, Poster Presentation (**1st Place**), 2011.

Bertucci, M. A. and Gagné, M. R., "Towards quorum quenching via catalyzed lactonolysis." The University of North Carolina at Chapel Hill University Research Day, Poster Presentation, 2011.

INVITED LECTURES

"Assessing the Impact of Peptide Structure on Quorum Sensing Activity in *Streptococcus pneumoniae* and *Lactobacillus plantarum*," **The Hebrew University of Jerusalem,** Faculty of Agriculture, Food & Environment (Rehovot, Israel) July 25, 2019

"Approaches to Understanding the Chemistry Behind Bacterial Communication," **Rowan University** (Glassboro, NJ) September 20, 2017

"Manipulating Electronic Interactions to Degrade Signaling Molecules in Bacterial Communication," Faculty Luncheon Seminar Series, **Moravian College** (Bethlehem, PA) February 27, 2016.

"Synthetic Strategies to Control Bacterial Virulence," **Trinity College** (Hartford, CT) March 6, 2015.

"Optimizing Clickers in the Classroom," **Hartwick College** (Oneonta, NY) February 19, 2015.

"Graduate Student Governance & the American University," **University of York** (York, UK) July 14, 2012.

GRANTS

2020 Student Opportunities for Academic Research (SOAR) Grant for Elizabeth Hutnick & Naomi Rieth
2019 Student Opportunities for Academic Research (SOAR) Grant for Emilee Engler & Alec Buttner
2019 Pennsylvania Academy of Sciences (PAS) Research Grant
2018 National Science Foundation (NSF) "Chemical Biology Approaches to Interrogate Interspecies Communication in Streptococci" (PI: Yftah Tal-Gan) Participant Support for Moravian College-University of Nevada, Reno Student Exchange Program, 6/2018 – 5/2021, $19,500
2018 Student Opportunities for Academic Research (SOAR) Grant for Kylie Chichura
2017 Student Opportunities for Academic Research (SOAR) Grant for Jonathan Nadraws
2017 Student Opportunities for Academic Research (SOAR) Grant for Robert Hillman
2016 LVAIC Teagle Hybrid Learning Collaborative Grant for Medicinal Chemistry Course Development
2016 Student Opportunities for Academic Research (SOAR) Grant for Erin Tiwold
2016 Student Opportunities for Academic Research (SOAR) Grant for Jessica Lynch
2015 The Rochester Academy of Science, Inc. Student Research Grant for Kareem March
2014 Hartwick College Faculty Research Grant

CONSULTING

Present BioSpectra, Inc. (Bangor, PA)

AWARDS & FELLOWSHIPS

2017 ODK Golden Apple Award for Excellence in Teaching
2014 NIH Institutional Research and Academic Career Development Award (IRACDA) (offered)
2013 UNC Center for Faculty Excellence Future Faculty Fellow
2013 American Chemical Society Coaches Program
2009 Francis P. Venable Fellowship in Chemistry
2009 Stevens Class of 2009 Valedictorian
2009 The Priestley Prize for Excellence in Chemistry

2009 CoSIDA Academic All-American
2008 CoSIDA Academic All-American
2008 Novartis Science Scholar
2006 CRC Press Chemistry Achievement Award

DISCIPLINE, INSTITUTIONAL & COMMUNITY SERVICE

2020 – Present Member, Moravian College 5-Year Strategic Planning Team
2019 – Present Faculty Marshal
2018 – Present Member, Academic Planning & Program Committee (APPC)
2017 – Present Co-Chair, Faculty Luncheon Speaker Series
2017 – Present Member, Intellectual Property Policy Task Force
2016 – Present Chair, Arts & Lectures Committee
2016 – Present Faculty Mentor, Women's Volleyball
2016 – Present Faculty Advisor & Chapter Counselor, Sigma Phi Epsilon Fraternity
2016 – Present Judge, Pennsylvania Junior Academy of Science (PJAS) Competition
2019 – Present Member, Search Committee (Associate Director of Residence Life & Greek Life)
2019 – Present Member, Search Committee (Director of Academic Support)
2017 – 2018 Member, Honors Committee
2016 – 2018 Member, Discipline Review Committee
2018 Member, Faculty Search Committee (Biology)
2017 Member, Faculty Search Committee (Public Health)
2017 Member, Faculty Search Committee (Master of Athletic Training)
2020 Guest Editor, *Peptide Science* (Special Issue on Young Investigators)
2020 Reviewer, Chemical Science
2020 Reviewer, RSC Chemical Biology
2020 Reviewer, RSC Medicinal Chemistry
2019 Reviewer, ACS Chemical Biology
2020 Reviewer, ACS Infectious Disease
2017 & 2018 Reviewer, Current Topics in Medicinal Chemistry
2017 & 2018 Reviewer, Molecules
2017 Chair of "Biologically Active Molecules & Processes" session at 254th National Meeting of the American Chemical Society
2017 Judge, American Peptide Society Young Investigator Competition

PROFESSIONAL MEMBERSHIPS & LEADERSHIP ROLES

Present Member & Co-Chair of Student Activities Committee, American Peptide Society (APS)
Present Member, American Chemical Society (ACS)
Present Member, Pennsylvania Academy of Science (PAS)
Present Member & Organic Scholarship Exam Coordinator, Lehigh Valley American Chemical Society (LVACS)
Present Selected Participant, Lehigh Valley Association of Independent Colleges (LVAIC) Higher Education Leaders Institute
Present Argonaut, UNC Order of the Golden Fleece
2015 - 2017 Volunteer Assistant Coach, Lehigh University Women's Volleyball
2015 Volunteer Assistant Coach, Hartwick College Women's Volleyball
2012 – 2014 President, Frank Porter Graham Graduate Honor Society
2010 – 2014 President, Chief of Staff, Transportation & Safety Chair, Graduate School Orientation Chair, UNC Graduate & Professional Student Federation (GPSF); *University Committee Appointments*: Applied Sciences Committee, Chancellor Search Committee, Dean of the Grad School Review Committee, Tuition & Fees Advisory Task Force, Student Fee Advisory Subcommittee, Student Fee Audit Committee, Student Grievance Committee, Chancellor's Advisory Committee on Transportation
2009 – 2014 Member, UNC Association of Chemistry Graduate Students (ACGS)
2009 – 2014 Communications Director; Fall Coalition Chair, Student Advocates for Graduate Education (SAGE)
2009 – 2013 Coach, UNC Men's Club Volleyball