CURRICULUM VITAE

Albert A. Bowers, Ph.D.

A) PERSONAL INFORMATION

Division of Chemical Biology and Medicinal Chemistry
Eshelman School of Pharmacy
3107 Marsico Hall
125 Mason Farm Rd.
Chapel Hill, NC 27599

Phone: 919-962-4336
Email : abower2@email.unc.edu
Web: http://bowerslab.web.unc.edu
Twitter: @BowersRangers

B) EDUCATION

2007 Doctor of Philosophy (Ph.D.) in Chemistry
The University of Illinois at Chicago, Chicago, IL.

2001 Bachelor of Arts (B.A.) in Art History
University of Chicago, Chicago, IL.

C) PROFESSIONAL EXPERIENCE

06/2018-present **Associate Professor & Vice-Chair,** Division of Chemical Biology and Medicinal Chemistry, UNC Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, NC

Adjunct appointments: UNC Department of Chemistry, UNC Biochemistry and Biophysics, Lineberger Comprehensive Cancer Center

08/2012-05/2018 **Assistant Professor,** Division of Chemical Biology and Medicinal Chemistry, UNC Eshelman School of Pharmacy, University of North Carolina at Chapel Hill, Chapel Hill, NC

08/2011-07/2012 **Assistant Professor,** Department of Medicinal Chemistry and Molecular Pharmacology, Purdue University, West Lafayette, IN

2011 **Visiting scholar**, National Institutes of Health, Bethesda, MD
Host: Dr. David L. Levens

2005 **Visiting scholar**, Kyoto University, Kyoto, Japan
Host: Prof. Jun-Ichi Yoshida

01/2009-07/2011 **Post-doctoral Fellow**, Dept. of Biological Chemistry & Molecular Pharmacology, Harvard Medical School, Boston, MA.
Advisor: Prof. Christopher T. Walsh

08/2007-12/2008 **Post-doctoral Fellow**, Dept. of Chemistry, Colorado State University, Fort Collins, CO.
Advisor: Prof. Robert M. Williams

D) HONORS AND AWARDS

2018 U. Tokyo/Japan Society for the Promotion of Science Tateshina Young Investigator Award
2016 Boulder Peptide Society Young Investigator Award
2014 Beckman Young Investigator Award
2013 American Association of Colleges of Pharmacy New Investigator Award
2013 Junior Faculty Development Award (UNC)
2008 NIH (NCI) Ruth L Kirschstein Postdoctoral Fellowship (F32)

2006 Robert M. Moriarty Graduate Fellowship

2005 NSF/Japan Society for the Promotion of Science East Asia and Pacific Summer Institute Fellowship

E) BIBLIOGRAPHY & PRODUCTS OF SCHOLARSHIP

REFEREED PAPERS

Citation statistics from Google Scholar: *h-index: 34 (24 since 2018); Citations: 4767 (2579 since 2018)*

Published

1. M. C. Fleming, M. M. Bowler, R. Park, K. I. PopovC. Vaziri, **A. A. Bowers**,* Tyrosinase-Catalyzed Peptide Macrocyclization for mRNA Display, *J. Am. Chem. Soc.*, articles ASAP.

2. S. E. Iskandar, J. M. Pelton, E. T. Wick, D. L. Bolhuis, A. S. Baldwin, M. J. Emanuele, N. G. Brown, **A. A. Bowers**,* Enabling Genetic Code Expansion and Peptide Macrocyclization in mRNA Display via a Promiscuous Orthogonal Aminoacyl-tRNA Synthetase, *J. Am. Chem. Soc.*, *145*(3), 1512-1517, **2023**.

3. R. Park, C. Ongpipattanakul, S. K. Nair, **A. A. Bowers**,* B. Kuhlman,* Designer installation of a substrate recruitment domain to tailor enzyme specificity, *Nat. Chem. Bio.*, *19*, 460-467, **2023**.

4. M. M. Bowler, M. Glavatskikh, C. V. Pecot, D. Kireev, **A. A. Bowers**,* Enzymatic Macrolactamization of mRNA Display Libraries for Inhibitor Selection, *ACS Chem. Bio.*, *18*(1), 166-175, **2022**.

5. A. J. Rice, J. M. Pelton, N. J. Kramer, D. S. Catlin, S. K. Nair, T. V. Pogorelov, D. A. Mitchell,* **A. A. Bowers**,* Enzymatic Pyridine Aromatization during Thiopeptide Biosynthesis, *J. Am. Chem. Soc.*, *144*, 21116-21124, **2022**

6. S. E. Iskandar, **A. A. Bowers**,* mRNA Display Reaches for the Clinic with New PCSK9 Inhibitor, *ACS Med. Chem. Lett.*, *13*, 1379-1383, **2022**

7. M. C. Fleming, L. F. Chiou, P. P. Tumbale, G. N. Droby, J. Lim, J. L. Norris-Drouin, J. G. Williams, K. H. Pearce, R. S. Williams, C. Vaziri, **A. A. Bowers**,* Discovery and Structural-Basis of Selectivity of Potent Cyclic Peptide Inhibitors of MAGE-A4, *J. Med. Chem.*, *65*, 7231-7245, **2022**.

8. V. A. Haberman, S. R. Fleming, T. M. Leisner, A. C. Puhl, E. Feng, L. Xie, X. Chen, Y. Goto, H. Suga, L. V. Parise, D. Kireev, K. H. Pearce, **A. A. Bowers**,* Discovery and Development of Cyclic Peptide Inhibitors of CIB1**,** *ACS Med. Chem. Lett.*, *12*(11), 1832-1839, **2021**.

9. S. E. Iskandar, V. A. Haberman, **A. A. Bowers**,* Expanding the Chemical Diversity of Genetically Encoded Libraries. *ACS Comb. Sci.*, *22*, 712–733, **2020**.

10. K. E. Bird, C. Xander, S. Murcia, A. A. Schmalstig, X. Wang, M. J. Emanuele, M. Braunstein,* **A. A. Bowers**,* Thiopeptides Induce Proteasome-Independent Activation of Cellular Mitophagy. *ACS Chem. Bio.*, *15*(8), 2164–2174, **2020**.

11. J. W. Bogart, N. J. Kramer, A. Turlik, R. M. Bleich, D. S. Catlin, F. C. Schroeder, S. K. Nair, R. T. Williamson, K. N. Houk, **A. A. Bowers*** Interception of the Bycroft-Gowland Intermediate in the Enzymatic Macrocyclization of Thiopeptides. *J. Am. Chem. Soc., 142*(30), 13170–13179, **2020**.

12. A. C. Puhl, J. W. Bogart, V. A. Haberman, J. E. Larson, A. S. Godoy, J. L. Norris-Drouin, S. H. Cholensky, T. M. Leisner, S. V. Frye, L. V. Parise, **A.A. Bowers**,* K. H. Pearce,* Discovery and Characterization of Peptide Inhibitors for Calcium and Integrin Binding Protein 1. *ACS Chem. Bio.*, *15*(6), 1505–1516, **2020**.

13. S. R. Fleming, P. M. Himes, S. V. Ghodge, Y. Goto, H. Suga, **A. A. Bowers**,* Exploring the Post-translational Enzymology of PaaA by mRNA Display. *J. Am. Chem. Soc., 142*(11), 5024–5028, **2020**.

14. J. W. Bogart, **A. A, Bowers,*** Dehydroamino acids: Chemical multi-tools for late-stage diversification *Org. Biomol. Chem., 17*, 3653-69, **2019**.

15. A. R. Gutgsell, S. V. Ghodge, **A. A, Bowers,*** S. B. Neher, Mapping the sites of the lipoprotein lipase (LPL)-angiopoietin-like protein 4 (ANGPTL4) interaction provides mechanistic insight into LPL inhibition, *J. Bio. Chem.*, *294*, 2678-89, **2019**.

16. S. Farag, R. M. Bleich, E. A. Shank, O. Isayev, **A. A, Bowers,*** A. Tropsha, Inter-Modular Linkers play a crucial role in governing the biosynthesis of non-ribosomal peptides, *Bioinformatics*, *35*, 3584-91, **2019**.

17. J. W. Bogart, **A. A, Bowers,*** Thiopeptide Pyridine Synthase TbtD Catalyzes an Intermolecular Formal Aza-Diels-Alder Reaction, *J. Am. Chem. Soc., 141*, 1842-46, **2019**.

18. S. R. Fleming, T. E. Bartges, A. A. Vinogradov, C. L. Kirkpatrick, Y. Goto, H. Suga, L. M. Hicks, **A. A, Bowers,*** Flexizyme-Enabled Benchtop Biosynthesis of Thiopeptides, *J. Am. Chem. Soc., 141*, 758-62, **2019**

19. K. J. Grubbs, R. M. Bleich, K. Santa Maria, S. E. Allen, J. R. Henriksen, V. Beilinson, D. J. Tomso, E. A. Shank,* **A. A. Bowers,*** Large-scale bioinformatics analysis uncovers conserved roles of natural products in Bacillus physiology, *mSystems*, *2*, e00040–17, **2017**.

20. T. L. Grove, P. M. Himes, S. Hwang, J. Bonnani, H. Yumerefendi, B. Kuhlman, S. Almo, **A. A, Bowers,*** Structural Insights into Thioether Bond Formation of a Sactionine Synthase. *J. Am. Chem. Soc.*, 139, 11734-44, **2017**

21. J. G. Gober, S. V. Ghodge, W. J. Wever, R. Watkins, E. M. Brustad,* **A. A. Bowers,*** Extending P450 carbene transfer to natural product modification: TbtJ1 and J2 mediated cyclopropanation of dehydroalanines in thiopeptide biosynthesis, *ACS Chem. Bio.*, 12, 1726-31, **2017**

22. X. Wang, A. Arceci, K. E. Bird, C. A. Mills, R. Choudhury, J. L. Kernan, C. Zhou, V.L. Bae-Jump, **A. A. Bowers**, M. J. Emanuele*****, VprBP/DCAF1 Regulates the Degradation and Non-proteolytic Activation of the Cell Cycle Transcription Factor FoxM1, *Mol. Cell Biol.*, 37, 1-15, **2017**

23. L. Lauinger, J. Li, I. Cemel, N. Ha, Y. Zhang, P. Merkl, S. Obermeyer, N. Stankovic-Valentin, T. Schafmeier, W. J. Wever, **A. Bowers**, K. Carter, A. Palmer, H. Tschochner, F. Melchior, R. Deshaies, A. Diernfellner, The dithiolopyrrolone thiolutin is a zinc chelator that inhibits the proteasomal de-ubiquitinase RPN11 and other JAMM metalloproteases, *Nat. Chem. Biol.,* 13, 709-14, **2017**

24. W. J. Wever, J. W. Bogart, **A. A. Bowers*,** Identification of Pyridine Synthase Recognition Sequences Allows Modular Solid-Phase Route to Thiopeptide Variants. *J. Am. Chem Soc.***,** 138, 13461–4, **2016**

25. P. M. Himes, S. E. Allen, S. Hwang, **A. A. Bowers***, Production of Sactipeptides in *Escherichia coli*: Probing the Substrate Promiscuity of Subtilosin A Biosynthesis, *ACS Chem. Biol.,* 11, 1737-44, **2016**

26. S. V. Ghodge, K. A. Biernat, S. J. Basset, M. R. Redinbo, **A. A. Bowers*,** Post-Translational Claisen Condensation and Decarboxylation en Route to Bicyclic Core of Pantocin A, *J. Am. Chem. Soc.,* 138, 5487-90, **2016**

27. S. E. Allen, N. V. Dokholyan, **A. A. Bowers***, Dynamic docking of conformationally constrained macrocycles: methods and applications, *ACS Chem. Biol.,* 11, 10-24, **2015**

28. W. J. Wever, J. W. Bogart, J. A. Bacile, A. N. Chan, F. C. Schroeder, and **A. A. Bowers*,** Chemoenzymatic Synthesis of Thiazolyl Peptide Natural Products Featuring an Enzyme-Catalyzed Formal [4+2] Cycloaddition, *J. Am. Chem. Soc.,* 137, 3494-7, **2015**

29. M. J. Powers, E. Sanabria-Valentin, **A. A. Bowers**, E. A. Shank,***** Inhibition of Cell Differentiation in *Bacillus Subtilis* by *Pseudomonas protegens*, *J. Bacteriol.*, 197, 2129-38, **2015**

30. Z. D. Dunn, W. J. Wever, N. J. Economou, **A. A. Bowers**, and B. Li,***** Enzymatic Basis of 'Hybridity' in Thiomarinol Biosynthesis, *Angew. Chem. Int. Ed.,* 54, 5137-41, **2015**

31. R. M. Bleich, J. D. Watrous, P. C. Dorrestein, **A. A. Bowers**, E. A. Shank,***** Thiopeptide antibiotics stimulate biofilm formation in *Bacillus subtilis, Proc. Nat. Acad. Sci. USA,* 112, 3086-91, **2015**

32. X. Du, D. Wojtowicz, **A. A. Bowers**, D. Levens, C. Benham, and T. M. Przytycka,***** Genome-wide distribution of non-B DNA motifs is shaped by operon structure and suggests transcriptional importance of non-B DNA structures in *Escherichia coli*, *Nuc. Acid. Res.*, 41, 5965-77, **2013**

33. W. Wever, M. A. Cinelli, **A. A. Bowers***, Visible Light Mediated Activation and O-Glycosylation of Thioglycosides*, Org. Lett.,* 15, 30-3, **2013**

34. Arnison, P. *et al.*, Ribosomally Synthesized and Post-Translationally Modified Peptide Natural Products: Overview and Recommendations for a Universal Nomenclature, *Nat. Prod. Rep.*, 30, 108-60, **2013**

35. A. A. Bowers*, Preparation of natural product-like cyclic peptide libraries, *MedChemCom*, 3, 905 **2012**

(From Graduate and Postdoctoral Research)

36. B. Li, W. Wever, C. T. Walsh, and **A. A. Bowers**, Dithiolopyrrolones: Biosynthesis, Synthesis, and Activity of a Unique Class of Disulfide-Containing Natural Products, *Nat. Prod. Rep.*, 31, 905-23, **2014**

37. J. M. Guerra-Bubb, **A. A. Bowers**, W. B. Smith, R. Paranal, G. Estiu, O. Wiest, J. E. Bradner, R. M. Williams, Synthesis and HDAC inhibitory activity of isosteric thiazoline-oxazole largazole analogs, *Bioorg. Med. Chem. Lett.*, 23, 6025-8, **2013**

38. A. A. Bowers, M. G. Acker, T. S. Young, and C. T. Walsh, Generation of Thiocillin Ring Size Variants by Prepeptide Gene Replacement and In Vivo Processing by *Bacillus cereus, J. Am. Chem. Soc.*, 134, 10313-6, **2012**

39. B. Li, R. R. Forseth, **A. A. Bowers**, F. C. Schroeder, C. T. Walsh, A Backup Plan for Self-protection: S-Methylation of Holomycin Biosynthetic Intermediates in *Streptomyces clavuligerus*, *ChemBioChem*, 13, 2521-6, **2012**

40. C. T. Walsh, M. G. Acker, **A. A. Bowers**, Thiazolyl peptide antibiotic biosynthesis: a cascade of posttranslational modifications on ribosomal nascent proteins, *J. Biol. Chem.*, **2010**, *285*, 27525-31

41. A. A. Bowers, C. T. Walsh, M. G. Acker, Genetic Interception and Structural Characterization of Thiopeptide Cyclization Precursors from Bacillus cereus*, J. Am. Chem. Soc.*, 132, 12182-4, **2010**

42. A. A. Bowers, M. G. Acker, C. T. Walsh, In vivo Manipulation of Thiocillin: Structure, Conformation, and Activity of Heterocycle Substitution Mutants*, J. Am. Chem. Soc.*, 132, 7319-27, **2010**

43. M. G. Acker, **A. A. Bowers**, C. T. Walsh, Generation of Thiocillin Variants by Prepeptide Gene Replacement and In Vivo Processing by *B. cereus, J. Am. Chem. Soc.*, 131, 17563-5, **2009**

44. T. L. Newkirk, **A. A. Bowers**, R. M. Williams, Discovery, biological activity, synthesis and potential therapeutic utility of naturally occurring histone deacetylase inhibitors, *Nat. Prod. Rep.*, 26, 1293-320, **2009**

45. D. Crich, K. Sasaki, M. Sardar, **A. A. Bowers**, One-Pot Syntheses of Dissymmetric Diamides Based on the Chemistry of Cyclic Monothioanhydrides. Scope, Limitations, and Application to the Synthesis of Glycopeptides*, J. Org. Chem.*, 74, 3886-93, **2009**

46. A. A. Bowers, N. West, T. Newkirk, A. Troutman-Youngman, S. L. Schreiber, O. Wiest, J. E. Bradner, R. M. Williams, Synthesis and HDAC Inhibitory Activity of Largazole Analogs: Alteration of the Zinc-Binding Domain and Macrocyclic Scaffold*. Org. Lett.*, 11, 1301-4, **2009**

47. A. A. Bowers, T. Greshock, N. West, G. Estiu, S. L. Schreiber, O. Wiest, R. M. Williams, J. E. Bradner, Synthesis & Conformation-Activity Relationships of Peptide Isosteres of FK228 & Largazole*. J. Am. Chem. Soc.*, 131, 2900-5, **2009**

48. A. A. Bowers, N. West, J. Taunton, S. L. Schreiber, J. E. Bradner, R. M. Williams, The Total Synthesis and Biological Mode of Action of Largazole: A Potent Class I Histone Deacetylase (HDAC) Inhibitor*. J. Am. Chem. Soc.*, 130, 11219-22, **2008**

49. D. Crich, **A. A. Bowers**, Cyclic Thioanhydrides: Linchpins for Multicomponent Coupling Reactions Based on the Reaction of Thioacids with Electron-Deficient Sulfonamides and Azides, *Org. Lett.*, 9, 5323-5, **2007**

50. D. Crich, D. Grant, **A. A. Bowers**, Heterobivalent Library Expansion by "Living Radical" Processes. Thiocarbonyl Addition Elimination, and Nitroxide-Based Reactions with Fluorous Deconvolution, *J. Am. Chem. Soc.*, 129, 12106-7, **2007**

51. T. Nokami, A. Shibuya, H. Tsuyama, **A. A. Bowers**, D. Crich, S. Suga, J-I. Yoshida, Electrochemical Generation of Glycosyl Triflates. *J. Am. Chem. Soc.* 129, 10922-8, **2007**

52. D. Crich, C. M. Pedersen, **A. A. Bowers**, D. J. Wink, Does Conformational Restriction Influence Stereoselectivity in the Formation of Arabinofuranosides? The 3,5-Di-O-benzylidene and 3,5-Di-O(di-tert-butylsilylene)-2-O-benzylarabinofuranosides as Glycosyl Donors*, J. Org. Chem.*, 72, 1553-65, **2007**

53. D. Crich, **A. A. Bowers**, Synthesis of a β-(1→3)-D-Rhamnotetraose by a One-Pot, Multiple Radical Fragmentation*, Org. Lett,* 8, 4327-30, **2006**

54. D. Crich, **A. A Bowers**, 4,6-O-[1-Cyano-2-(2-iodophenyl)ethylidene] Acetals. Improved Second Generation Acetals for the Stereoselective Formation of β-D-Mannopyranosides and Regioselective Reductive Radical Fragmentation to β-D-Rhamnopyranosides. Scope and Limitations. *J. Org. Chem.* 71, 3452-63, **2006**

55. D. Crich, Q. Yao, **A. A. Bowers**, On the regioselectivity of the Hanessian-Hullar reaction in 4,6-O-benzylidene protected galactopyranosides. *Carbohydrate Res.*, 341, 1748-52, **2006**

INVITED HIGHLIGHTS AND COMMENTARIES

1. A. A. Bowers*, Enzymology: The substrate lends a hand, *Nat. Chem. Bio.*, 14, 907-8 **2018**

2. A. A. Bowers*, Biosynthesis: Methylating mushrooms, *Nat. Chem. Bio.*, 13, 821-2 **2017**

BOOKS AND CHAPTERS

1. K. E. Bird, **A. A. Bowers**, "Chemistry and Chemical Biology of Thiopeptide Natural Products," in Comprehensive Natural Products III, H-W. Liu, T. P. Begley, eds., Elsevier, Amsterdam, NL, **2020**, 166-192.

2. D. Crich, **A. A. Bowers**, "Sulfoxides, Sulfimides, and Sulfones" in *Handbook of Chemical Glycosylation*, ed. A. Demchenko, Wiley-VCH, Weinheim, Germany, **2008**, 303-328

3. W. Kantlehner, **A. A. Bowers**. *t*-Butoxybis(dimethylamino)methane, *Encyclopedia of Reagents for Organic Synthesis* [*Online* (*e*EROS)], eds. R. M. Coates and S. E. Denmark, John Wiley & Sons, Ltd

INVITED ORAL PRESENTATIONS AT COMPANIES, UNIVERSITIES, AND CONFERENCES

1. Enanta Pharmaceuticals, Watertown, MA, December 6, 2022

2. "Exploring post-translational enzymology by mRNA display," ACS National Meeting, Chicago, IL, August 24, 2022

3. Brandeis University, Department of Chemistry, Waltham, MA, March, 7, 2022

4. University of North Carolina at Wilmington, Wilmington, NC, February 25, 2022

5. "Improving Enzymatic Efficiency through Designer Incorporation of a Substrate Recognition Domain," 27th Enzyme Mechanisms Conference, Tuscon, AZ, January 2-6, 2022

6. "Exploring post-translational enzymology by mRNA display," PacifiChem 2021, December 16-21, 2021.

7. "P450-mediated non-natural cyclopropanation of dehydroalanine-containing natural products," PacifiChem 2021, December 16-21, 2021.

8. Georgia Institute of Technology, Department of Chemistry and Biochemistry, Atlanta, GA, September 23, 2020

9. "Flexizyme-Enabled Benchtop Biosynthesis of Thiopeptides," Society for Industrial Microbiology and Biotechnology Annual Meeting and Exhibition, Washington, DC, July 21-24, 2019

10. Vanderbilt University, Department of Chemistry, Nashville, TN, March 6, 2019

11. University of Hokkaido, Sapporo, Japan, November 15, 2018

12. University of Tokyo, Tokyo, Japan, November 13, 2018

13. University of Shizuoka, Shizuoka, Japan, November 8, 2018

14. National Institute of Advanced Industrial Science and Technology (AIST), Tsukuba, Japan, November 7, 2018

15. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," 18th Tateshina Conference on Organic Chemistry, Nagano, Japan, November 9-11, 2018

16. Queen's University, Department of Chemistry, May 7, 2018

17. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," Keynote Speaker, Great Lakes Natural Products, Kingston, ON, May 5-6, 2018

18. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," Greater Atlanta Chemical Biology Symposium, Atlanta, GA, April 21, 2018.

19. "Kinetic Insights into the Mechanisms of Thiopepetide Pyridine Synthases," Southeast Enzymes Conference, Atlanta, GA, April 7, 2018.

20. North Carolina State University, Department of Chemistry, November 21, 2017

21. University of Alberta, Department of Chemistry, September 5, 2017

22. Cornell University, Department of Chemistry, July 31, 2017

23. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," Enzymes, Co-Enzymes, & Metabolic Pathways Gordon Research Conference, Waterville Valley, NH, July 16-21, 2017.

24. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," High-Throughput Chemistry & Chemical Biology Gordon Research Conference, New London, NH, June 25-30, 2017.

25. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," American Peptide Symposium, Whistler, BC, June 17 – 22, 2017

26. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," 9th US-Japan Seminar on Biosynthesis of Natural Products, Los Angeles, CA, May 30 - June 4, 2017

27. University of Minnesota, St. Paul, MN, Department of Chemistry, April 22, 2017

28. University of Washington, Seattle, WA, April 18, 2017

29. New York University, Department of Chemistry, April 8, 2017

30. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," Directing Biosynthesis V, Warwick, UK, March 23, 2017

31. The Scripps Research Institute, Department of Chemistry, March 14, 2017

32. University of California at San Diego, Department of Chemistry, March 13, 2017

33. Stanford University, Department of Chemistry, March 8, 2017

34. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," 2nd Japan-US Seminar on Biosynthesis of Natural Products for Young Researchers, Tokyo, Japan, March 4-5, 2017

35. Vanderbilt University, Department of Chemistry, Nashville, TN, February 27, 2017

36. University of Illinois at Chicago, Department of Chemistry, February 21, 2017

37. University of Illinois at Urbana-Champaign, Department of Chemistry, February 20, 2017

38. University of Florida, Department of Chemistry, Gainesville, FL, October 28, 2016

39. Duke University, Department of Chemistry, October 20, 2016

40. "Chemoenzymatic Platforms for the Discovery of New Peptide Therapeutics," Boulder Peptide Symposium, Boulder, CO, September 27, 2016

41. Wayne State University, Department of Chemistry, September 20, 2016

42. Western Carolina University, Department of Chemistry, February 12, 2016

43. “Chemoenzymatic Synthesis of Thiazolyl Peptide Natural Products Featuring an Enzyme-Catalyzed Formal [4+2] Cycloaddition,” Gordon Research Conference in Enzymes, Coenzymes, and Metabollic Pathways, Waterville Valley, NH, July 12-17, 2015.

44. “Harnessing Biosynthetic Pathways,” University of North Carolina Board of Visitors, Chapel Hill, NC, November 19, 2014

45. “Harnessing the Evolvability of Peptide-Derived Natural Products to Target Oncogenic Transcription Factor FoxM1,” American Association of Colleges of Pharmacy (AACP) Annual Meeting, Grapevine, TX, July 26-30, 2014

46. “Genome Mining in Bacilli: Connecting New Biosynthetic Pathways with Phenotypes." Society for Industrial Microbiology and Biotechnology Annual Meeting and Exhibition, St. Louis, MO, July 20-24, 2014.

47. "Bacterially-Encoded, Post-Translationally Modified Peptidomimetics for Drug Discovery,” High-Throughput Chemistry and Chemical Biology Gordon Research Conference, New London, NH, June 2-7, 2014

48. East Carolina University, Department of Chemistry, November 22, 2013

49. North Carolina Agricultural & Technical State University, Department of Chemistry, February 21, 2013

50. “Total Synthesis and Biological Mode of Action of Macrocyclic Histone Deacetylase Inhibitors.” Discovery on Target, Boston, MA, November 2, 2009

F) TEACHING ACTIVITIES

LECTURES

Year	Course name	Course No.	Lectures	Enrolled	Course type	Eval
2013 S	Pharmaceutical Biochemistry II	PHCY 422	5	172	Professional	2.92
2013 S	Biochemical Foundations of Chemical Biology	CBMC 804	2	5	Graduate	--
2013 S	Chemical Biology	CHEM 730	2	9	Graduate	N/A
2013 F	Medicinal Chemistry I - **Course Director**	PHCY 423	14	172	Professional	4.02
2014 S	Pharmaceutical Biochemistry II	PHCY 422	5	162	Professional	3.40
2014 S	Biochemical Foundations of Chemical Biology	CBMC 804	2		Graduate	4.29
2014 F	Medicinal Chemistry I - **Course Director**	PHCY 423	14	162	Professional	4.04
2014 F	Macromolecular Structure and Function	CHEM 732	3	9	Graduate	N/A
2015 S	Pharmaceutical Biochemistry II	PHCY 422	5	158	Professional	3.05
2015 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	6	Graduate	4.52
2015 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	156	Professional	4.25
2015 F	Medicinal Chemistry I - **Course Director**	PHCY 423	14	158	Professional	4.38
2015 F	Molecular Foundations of Chemical Biology	CBMC 807	5	13	Graduate	3.89
2015 F	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	23	Graduate	N/A
2016 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	7	Graduate	4.33
2016 S	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	22	Graduate	N/A
2016 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	142	Professional	4.41
2016 F	Molecular Foundations of Chemical Biology	CBMC 807	3	14	Graduate	4.64
2016 F	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	21	Graduate	N/A
2017 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	6	Graduate	4.20
2017 S	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	19	Graduate	N/A

2017 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	156	Professional	4.39
2017 F	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	24	Graduate	N/A
2017 F	Molecular Foundations of Chemical Biology	CBMC 807	3	17	Graduate	4.79
2018 S	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	23	Graduate	N/A
2018 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	10	Graduate	4.80
2018 S	Metabolic Chemistry & Cellular Regulatory Networks	CHEM 432	3	72	Undergrad	N/A
2018 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	145	Professional	4.58
2018 F	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	31	Graduate	N/A
2018 F	Molecular Foundations of Chemical Biology	CBMC 807	3	8	Graduate	4.63
2019 S	Seminars in Chemical Biology - **Course Director**	PHRS 899	15	27	Graduate	N/A
2019 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	12	Graduate	N/A
2019 S	Metabolic Chemistry & Cellular Regulatory Networks	CHEM 432	3	86	Undergrad	N/A
2019 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	136	Professional	4.28
2019 F	Molecular Foundations of Chemical Biology	CBMC 807	4	15	Graduate	4.93
2020 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	11	Graduate	4.55
2020 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	124	Professional	4.37
2020 F	Molecular Foundations of Chemical Biology	CBMC 807	4	12	Graduate	4.33
2021 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	8	Graduate	4.50
2021 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	144	Professional	4.05
2021 F	Molecular Foundations of Chemical Biology	CBMC 807	4	12	Graduate	N/A
2022 S	Metabolic Chemistry & Cellular Regulatory Networks	CHEM 432	30	59	Undergrad	4.40
2022 S	Biochemical Foundations of Chemical Biology	CBMC 804	3	11	Graduate	N/A
2022 F	Pharmacy Bridging Course - Organic Module	PBC 500	6	137	Professional	4.46
2022 F	Molecular Foundations of Chemical Biology	CBMC 807	4	13	Graduate	4.31

CURRENT GRADUATE STUDENTS

1. Sabrina E. Iskandar, since 2019
   B.S. Emory University
2. Matthew M. Bowler, since 2019
   B.S. Salisbury University
3. Jarrett M. Pelton, since 2020
   B.S. St. John Fisher College
4. Emma Chow, since 2023
   B.S. Rhodes College

CURRENT UNDERGRADUATE STUDENTS

1. Emma G. Steude, since 2022
   Major: Chemistry

F) GRANTS

ONGOING GRANT SUPPORT

Source of Support:	NIH/NIGMS: Maximizing Investigators' Research Award (R35)
Principal Investigator:	A. Bowers (sole PI)
Total Direct Funding:	$1,320,187
Total Period of Support:	09/01/22-08/31/27

Project Title:	Chemoenzymatic Synthesis, Mode of Action and Evolution of Natural Product-based Macrocycles

Source of Support:	Enanta Therapeutics
Principal Investigator(s):	A. Bowers
Total Direct Funding:	$187,687
Total Period of Support:	07/01/23-06/30/24
Project Title:	mRNA Display Selection Against Enanta Targets

Source of Support:	National Science Foundation (NSF)
Principal Investigator(s):	A. Bowers
Total Direct Funding:	$495,000
Total Period of Support:	06/01/22-05/31/25
Project Title:	Controlling Protein Post-translational Modification by Separating Affinity and Catalysis in Designer Enzymes

Source of Support:	UNC Lineberger Comprehensive Cancer Center Pilot Grant
Principal Investigator(s):	C. Pecot, A. Bowers
Total Direct Funding:	$200,000
Total Period of Support:	9/01/2021-8/31/2023
Project Title:	EGFR-directed Chimeric siRNAs for Dual KRAS+Myc Targeting

Source of Support:	NIH/NCI PA-18-484: NIH Research Project Grant (Parent R01)
Principal Investigator:	C. Vaziri (PI), K. Pearce (Co-I), A. Bowers (Co-I)
Total Direct Funding:	$1,305,785
Total Period of Support:	04/02/19-03/31/24
Project Title:	Establishing MAGE-A4/Rad18 as a Novel Cancer-Specific Chemotherapeutic Target

G) PROFESSIONAL SERVICE

PROFESSIONAL SERVICE TO THE DISCIPLINE

Reviewer

1. Grant Proposals:
   NSF CAREER *ad hoc*., NIH-NHLBI RFA HL-14-001 "Centers for Advanced Diagnostics and Experimental Therapeutics in Lung Diseases Stage II" (CADET II) study section (UH2/UH3), NIH Drug Discovery and Molecular Probes (DMP) study section (R01).

2. Journal Submissions:
   Accounts of Chemical Research; ACS Biochemistry; ACS Catalysis; ACS Chemical Biology; ACS Medicinal Chemistry Letters; Angewandte Chemie; Bioorganic and Medicinal Chemistry; Bioorganic and Medicinal Chemistry Letters; Cell Chemical Biology; ChemBioChem; Chemical Reviews; Chemical Science; Journal of Chemical Information and Modeling; Journal of Medicinal Chemistry; Journal of Organic Chemistry; Journal of the American Chemical Society; MedChemComm; Nature Chemical Biology; Nature Chemistry; Nature Communications; Organic and Biomolecular Chemistry; Organic Letters; Proceedings of the National Academy of Sciences of the U.S.A., Science; Scientific Reports; Tetrahedron: Asymmetry

UNIVERSITY SERVICE:

School of Pharmacy/CBMC Committees:

2012-present	CBMC Representative, Facilities Advisory Committee
2012-2014	Member of CBMC Cumulative Examination Committee
2014-present	Member of CBMC Graduate Program Admission Committee
2014-present	Member of ESOP Conflict of Interest Committee

2014-present ESOP PharmD Candidates Day interviewer

Institutional/UNC Campus:

2013-present Interviewed/hosted candidates for MD-PhD and BBSP program

2020-present BBSP Structural Biology, Chemical and Pharmaceutical Sciences (SCPS) admissions committee

Public:

2013 Participated in the Postbaccalaureate Research Education Program (PREP), where we train students with a Bachelor's degree to strengthen skills with the goal of enabling entry into PhD programs across the nation.

2015-2017 Participated in the Young Innovators Program (YIP) to provide bright and eager high school students with early immersive experiences in laboratory research.

Ph.D. Thesis Committees:

CBMC students: David Shirley, Jiwoong Lim, Jacob Larson, Kim Barnash; Stephen Capuzzi; Sherif Farag; Po-Hung Hsieh; Nicholas Klus; Timothy O'Leary; Michael Perfetti; Jake Stuckey; Rachel Zhou;

Chemistry students: Jacob Robins, Cody Padgett; Kristen Biernat; Kayla Bloom; Zachary Dunn; Joshua Gober; Kevin Santa Maria; Richard Watkins; Tessa Bartges; Jeff Erhardt; Patric Sadecki; Kevin Culver

Other students: Aspen Gutgsell, Rodney Park (Biochemistry/Biophysics); Sarah Barr; Chris Shelby