

Emily P. Balskus, Ph.D.

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Professional Positions Held

- 2021–present** **Investigator, Howard Hughes Medical Institute**
- 2018–present** **Thomas Dudley Cabot Professor of Chemistry and Chemical Biology
Harvard University**, Cambridge, MA
Institute Member, Broad Institute of Harvard and MIT
Faculty Associate, Harvard Microbial Sciences Initiative
Member, Harvard Digestive Diseases Center
Member, MIT Center for Microbiome Informatics and Therapeutics
- 2015–2018** **Morris Kahn Associate Professor of Chemistry and Chemical Biology
Harvard University**, Cambridge, MA
Associate Member, Broad Institute of Harvard and MIT
Faculty Associate, Harvard Microbial Sciences Initiative
Member, Harvard Digestive Diseases Center
Member, MIT Center for Microbiome Informatics and Therapeutics
- 2011–2015** **Assistant Professor of Chemistry and Chemical Biology
Harvard University**, Cambridge, MA
Associate Member, Broad Institute of Harvard and MIT
Faculty Associate, Harvard Microbial Sciences Initiative
Member, Harvard Digestive Diseases Center

Education and Training

- Summer of 2009** **Microbial Diversity Summer Course (June 13–July 30, 2009)
Marine Biological Laboratory**, Woods Hole, MA
Independent research project title: “Searching for small molecule-mediated extracellular redox in terrestrial and marine microorganisms”
- 2008–2011** **NIH NRSA Postdoctoral Fellow
Harvard Medical School**, Department of Biological Chemistry and Molecular Pharmacology, Boston, MA
Research advisor: Prof. Christopher T. Walsh
- 2003–2008** **Ph.D. in Chemistry, Harvard University**, Cambridge, MA
NSF Predoctoral Fellow
Research advisor: Prof. Eric N. Jacobsen
- 2002–2003** **M.Phil. in Chemistry, University of Cambridge**, Cambridge, UK
Winston Churchill Scholar
Research advisor: Prof. Steven V. Ley

1998–2002

B.A. with Highest Honors in Chemistry, *summa cum laude*, valedictorian, Williams College, Williamstown, MA
Research advisor: Prof. Thomas E. Smith

Other undergraduate research experience:

University of Cambridge, UK (2000–2001): Prof. Steven V. Ley
The Ohio State University (summer of 2000): Prof. Leo A. Paquette
Leiden University, NL (summer of 1999): Prof. Dr. Jan Reedijk

Awards and Honors

- **Richard A. Smith Excellence in Biomedical Research Alumni Prize (2022)**
- **Bruce Merrifield Distinguished Lecture, The Rockefeller University (2021)**
- **Alan T. Waterman Award, National Science Foundation (2020)**
- **Commendation for Extraordinary Teaching, Harvard University (Spring Semester 2020)**
- **Tetrahedron Young Investigator Award (2019)**
- **Laureate in Chemistry, Blavatnik Award for Young Scientists (2019)**
- **Saltman Award Lecture, Metals in Biology Gordon Research Conference (2019)**
- **SN10 Scientists to Watch (2018)**
- **Finalist, Blavatnik Award for Young Scientists (2018)**
- **Eli Lilly Grantee Award (2018)**
- **Arthur C. Cope Scholar Award (2018)**
- **Pfizer Award in Enzyme Chemistry (2017)**
- **Hirata Award, Nagoya University and the Hirata Foundation (2016)**
- **Howard Hughes Medical Institute (HHMI)-Gates Faculty Scholar (2016)**
- **Chemical and Engineering News Talented Twelve (2015)**
- **Camille Dreyfus Teacher-Scholar Award (2015)**
- **Cottrell Scholar Award (2015)**
- **NSF CAREER Award (2015)**
- **MIT Technology Review Innovator Under 35 (2014)**
- **Amgen Young Investigator's Award (2014)**
- **Natural Products Reports Emerging Investigator Lectureship (2014)**
- **Sloan Research Fellowship (2014)**
- **Thieme Chemistry Journal Awardee (2014)**
- **Damon Runyon–Rachleff Innovation Award (2014)**
- **George W. Merck Fellowship (2013)**
- **Kavli Fellow, National Academy of Sciences (2013)**
- **Packard Fellowship for Science and Engineering (2013)**
- **Levenson Teaching Award Nominee (2013)**
- **NIH Director's New Innovator Award (2012)**
- **Searle Scholars Program (2012)**
- **Eli Lilly New Faculty Award (2012)**
- **Smith Family Award for Excellence in Biomedical Research (2011)**
- **Milton Fund Award (2011)**
- **Poster Award, Gordon Research Conference in Biocatalysis (2010)**
- **NIH NRSA Postdoctoral Fellowship (2008–2011)**
- **ACS Division of Organic Chemistry Fellowship (2006–2007)**

- **Student Poster Award** at Pacificchem Conference (2005)
- **CUE Certificate of Distinction in Teaching, Harvard University** (Spring 2004)
- **National Science Foundation Predoctoral Fellowship** (2003–2006)
- **Winston Churchill Scholarship** (2002–2003)
- **John Sabin Adriance Prize** in Chemistry, Williams College (2002)
- **Baxter Scholarship**, Williams College (2001–2002)
- **Departmental Prize in Part II Chemistry**, highest score on the Tripos Exam, University of Cambridge (2001)
- **Scholarship, *honoris causa***, Magdalene College, University of Cambridge (2001)
- **Bernard F. Saunders Prize** in Natural Sciences, University of Cambridge (2001)
- **Pfizer Undergraduate Summer Research Fellowship** (2001)
- **Barry M. Goldwater Scholarship** (2001–2002)
- **Harold H. Warren Prize** in Organic Chemistry, Williams College (1999)
- **Tyng Scholarship**, Williams College (1998–2002)

Peer-Reviewed Publications

Independent Research: * = undergraduate co-author

104. Dong, Xueyang; Guthrie, Ben G. H.; Alexander, Margaret; Noecker, Cecilia; Ramirez, Lorenzo; Glasser, Nathaniel R.; Turnbaugh, Peter J.; **Balskus, Emily P.** “Genetic manipulation of the human gut bacterium *Escherichia coli* reveals a widespread family of transcriptional regulators” *Nature Communications* **2022**, *13*, 7624.

103. Velilla, José A.; Volpe, Matthew R.; Kenney, Grace E.; Walsh Jr, Richard M.; **Balskus, Emily P.**; Gaudet, Rachele. “Structural basis of colibactin activation by the ClbP peptidase.” *Nat. Chem. Biol.* *published online.* doi.org/10.1038/s41589-022-01147-8

102. Volpe, Matthew R.; Velilla, José A.; Daniel-Ivad, Martin; Yao, Jenny J.; Stornetta, Alessia; Villalta, Peter W.; Huang, Hsin-Che; Bachovchin, Daniel A.; Balbo, Silvia; Gaudet, Rachele; **Balskus, Emily P.** “A small molecule inhibitor prevents gut bacterial genotoxin production.” *Nat. Chem. Biol.* *published online.* doi.org/10.1038/s41589-022-01142-z

101. Fu, Beverly; Nazemi, Azadeh; Levin, Benjamin J.; Yang, Zhongyue; Kulik, Heather J.; **Balskus, Emily P.** “Mechanistic Studies of a Skatole-Forming Glycyl Radical Enzyme Suggest Reaction Initiation via Hydrogen Atom Transfer.” *J. Am. Chem. Soc.* **2022**, *144*, 11110–11119.

100. Martins, Teresa P.; Glasser, Nathaniel R.; Kountz, Duncan J.; Oliveira, Paulo; **Balskus, Emily P.**; Leão, Pedro N. “Biosynthesis of the unusual carbon skeleton of nocuolin A.” *ACS Chem. Bio.* **2022**, *17*, 2528–2537.

99. Reed, Amber D; Fletcher, Joshua R.; Huang, Yolanda Y.; Thanissery, Rajani; Rivera, Alissa J.; Parsons, Ruth J.; Stewart, Alison K.; Kountz, Duncan J.; Shen, Aimee; **Balskus, Emily P.**; Theriot, Casey M. “The Stickland reaction precursor *trans*-4-hydroxy-L-proline differentially impacts the metabolism of *Clostridioides difficile* and commensal Clostridia.” *mSphere* **2022**, *27*, e0092621.

98. Le, Chip C.; Bae Minwoo; Kiamehr, Sina*; **Balskus, Emily P.** “Emerging chemical diversity and potential applications of enzymes in the DMSO reductase superfamily.” *Ann. Rev. Biochem.* **2022**, *91*, 475–504.

97. Bloom, Seth M.; Mafunda, Nomfuneko A.; Woolston, Benjamin M.; Hayward, Matthew R.; Frempong, Josephine F.; Abai, Aaron B.; Xu, Jiawu; Mitchell, Alissa, J.; Westergaard, Xavier; Hussain, Fatima, A.; Xulu, Nondumiso; Dong, Mary; Dong, Krista L.; Gumbi, Thandeka; Ceasar, F. Xolisile; Rice, Justin K.; Choksi, Namit; Ismail, Nasreen; Ndung'u, Thumbi; Ghebremichael, Musie S.; Relman, David A.; **Balskus, Emily P.**; Mitchell, Caroline M.; Kwon, Douglas, S. "Cysteine dependence of *Lactobacillus iners* is a potential therapeutic target for vaginal microbiota modulation." *Nat. Microbiol.* **2022**, *7*, 434–450.
96. Braffman, Nathaniel R.; Ruskoski, Theresa B.; Davis, Katherine M.; Glasser, Nathaniel R.; Johnson, Cassidy*; Okafor, C. Denise; Boal, Amie, K.; **Balskus, Emily P.** "Structural basis for an unprecedented enzymatic alkylation in cylindrocyclophane biosynthesis." *Elife* **2022**, *11*, e75761.
95. Silpe, Justin E.; Wong, Joel W. H.; Owen, Siân V.; Baym, Michael; **Balskus, Emily P.** "The bacterial toxin colibactin triggers prophage induction" *Nature* **2022**, *603*, 315–320.
94. Eusebio, Nadia; Rego, Adriana; Glasser, Nathaniel R.; Castelo-Branco, Raquel; **Balskus, Emily P.**; Leão, Pedro N. "Distribution and diversity of dimetal-carboxylate halogenases in cyanobacteria" *BMC Genomics* **2021**, *22*, 633.
93. Rajakovich, Lauren J.; Fu, Beverly; Bollenbach, Maud; **Balskus, Emily P.** "Elucidation of an anaerobic pathway for metabolism of L-carnitine derived γ -butyrobetaine to trimethylamine in human gut bacteria." *Proc. Natl. Acad. Sci. U.S.A.* **2021**, *18*, e2101498118.
92. Kountz, Duncan J.; **Balskus, Emily P.** "Leveraging microbial genomes and genomic context for chemical discovery." *Acc. Chem. Res.* **2021**, *54*, 2788–2797.
91. Dawson, Christopher D.; Irwin, Stephania M.; Backman, Lindsey R. F.; Le, Chip; Vennelakanti, Vyshnavi; Yang, Zhongyue; Kulik, Heather J.; Drennan, Catherine L.; **Balskus, Emily P.** "Molecular basis of C–S bond cleavage in the glycol radical enzyme isethionate sulfite-lyase." *Cell Chem. Biol.* **2021**, *28*, 1–14.
90. Murray, Kevin J.; Carlson, Erik S.; Stornetta, Alessia; **Balskus, Emily P.**; Villalta, Peter W.; Balbo, Silvia. "Extension of diagnostic fragmentation filtering for automated discovery in DNA adductomics." *Anal. Chem.* **2021**, *93*, 5754–5762.
89. McBride, Molly J.; Pope, Sarah R.; Hu, Kai; Okafor, C. Denise; **Balskus, Emily P.**; Bollinger, Jr., J. Martin; Boal, Amie K. "Structure and assembly of the diiron cofactor in the heme-oxygenase-like domain of the *N*-nitrosourea-producing enzyme SznF." *Proc. Natl. Acad. Sci. U.S.A.* **2021**, *118*, e2015931118.
88. Silpe, Justin E.; **Emily P. Balskus.** "Deciphering human microbiota–host chemical interactions." *ACS Cent. Sci.* **2020**, *7*, 20–29.
87. McBride, Molly J.; Sil, Debangsu; Ng, Tai L.; Crooke, Anne Marie; Kenney, Grace E.; Tysoe, Christina R.; Zhang, Bo; **Balskus, Emily P.**; Boal, Amie K.; Krebs, Carsten; Bollinger Jr., J. Martin. "A peroxodiiron(III/III) intermediate mediating both *N*-hydroxylation steps in biosynthesis of the *N*-nitrosourea pharmacophore of streptozotocin by the multi-domain metalloenzyme SznF." *J. Am. Chem Soc.* **2020**, *142*, 11818–11828. Co-corresponding author.
86. Kenny, Douglas J., Plichta, Damian R.; Shungin, Dimitry; Koppel, Nitzan; Hall, A. Brantley; Fu, Beverly; Vasan, Ramachandran S.; Shaw, Stanley Y.; Vlamakis, Hera; **Balskus, Emily P.**; Xavier, Ramnik J. "Cholesterol metabolism by uncultured human gut bacteria influences host cholesterol level." *Cell Host Microbe* **2020**, *28*, 245–257. Co-corresponding author.
85. Fu, Beverly; **Balskus, Emily P.** "Discovery of C–C bond-forming and bond-breaking radical enzymes: enabling transformations for metabolic engineering." *Current Opinion in Biotechnology* **2020**, *65*, 94–101.

84. Bisanz, Jordan E.; Soto-Perez, Paola; Noecker, Cecilia; Aksenov, Alexander A.; Lam, Kathy N.; Kenney, Grace E.; Bess, Elizabeth N.; Haiser, Henry J.; Kyaw, Than S.; Yu, Feiqiao B.; Rekdal, Vayu M.; Ha, Connie, W. Y.; Devkota, Suzanne; **Balskus, Emily P.**; Dorrestein, Pieter C.; Allen-Vercoe, Emma; Turnbaugh, Peter J. "A genomic toolkit for the mechanistic dissection of intractable human gut bacteria." *Cell Host & Microbe* **2020**, *27*, 1001–1013.
83. Bollenbach, Maud; Ortega, Manuel; Orman, Marina; Drennan, Catherine L.; **Balskus, Emily P.** "Discovery of a cyclic choline analog that inhibits anaerobic choline metabolism by human gut bacteria." *ACS Med. Chem. Lett.* **2020**, *11*, 1980–1985.
82. Backman, Lindsey R. F.; Huang, Yolanda Y.; Andorfer, Mary C.; Gold, Brian; Raines, Ronald T.; **Balskus, Emily P.**; Drennan, Catherine L. "Molecular basis for catabolism of the abundant metabolite *trans*-4-hydroxy-L-proline by a microbial glycol radical enzyme." *eLife* **2020**, *9*, e51420. Co-corresponding author.
81. Maini Rekdal, Vayu; Bernardino, Paola. N; Luescher, Michael U.; *Kiamehr, Sina; Turnbaugh, Peter J.; Bess, Elizabeth N.; **Balskus, Emily P.** "A widely distributed metalloenzyme class enables gut microbial metabolism of host- and diet-derived catechols." *eLife* **2020**, *9*, e50845.
80. Ng, Tai L.; McCallum, Monica E.; *Zheng, Christine R.; Wang, Jennifer X.; *Wu, Kelvin J. Y.; **Balskus, Emily P.** "The L-alanosine gene cluster encodes a pathway for diazeniumdiolate biosynthesis." *ChemBioChem* **2020**, *21*, 1155–1160.
79. Carlson, Erik S.; **Balskus, Emily P.** "The mysteries of macrocyclic colibactins." *Nature Chemistry* **2019**, *11*, 867–869. *Invited commentary.*
78. Chen, Sifan; Henderson, Ayana; Petriello, Michael; Romano, Kymberleigh A.; Gearing, Mary; Miao, Ji; Schell, Mareike; Sandoval-Espinola, Walter J.; Tao, Jiahui; Sha, Bingdong; Graham, Mark; Croke, Rosanne; Kleinriders, Andre; **Balskus, Emily P.**; Rey, Federico E.; Morris, Andrew; Biddinger, Sudha B. "Trimethylamine *N*-oxide binds and activates PERK to promote metabolic dysfunction." *Cell Metab.* **2019**, *30*, 1141–1151.e5.
77. Jiang, Yindi; Stornetta, Alessia; Villalta, Peter W.; Wilson, Matthew R.; Boudreau, Paul D.; Zha, Li; Balbo, Silvia; **Balskus, Emily P.** "Reactivity of an unusual amidase may explain colibactin's DNA cross-linking activity." *J. Am. Chem. Soc.* **2019**, *141*, 11489–11496.
76. McCallum, Monica E.; **Balskus, Emily P.** "Enzymes that detoxify marine toxins." *Nature* **2019**, *570*, 315–316. *Invited commentary.*
75. Maini Rekdal, Vayu; Bess, Elizabeth N.; Bisanz, Jordan E.; Turnbaugh, Peter J.; **Balskus, Emily P.** "Discovery and inhibition of an interspecies gut bacterial pathway for Levodopa metabolism." *Science* **2019**, *364*, eaau6323.
74. Volpe, Matthew R.; Wilson, Matthew R.; Brotherton, Carolyn A.; Winter, Ethan S.; *Johnson, Sheila E.; **Balskus, Emily P.** "*In vitro* characterization of the colibactin-activating peptidase ClbP enables development of a fluorogenic activity probe." *ACS Chem. Biol.* **2019**, *14*, 1097–1101.
73. Martins, Teresa P.; Rouger, Caroline; Glasser, Nathaniel R.; Freitas, Sara; de Fraisinette, Nelly B.; **Balskus, Emily P.**; Tasdemir, Deniz; Leao, Pedro N. "Chemistry, bioactivity and biosynthesis of cyanobacterial alkylresorcinols." *Nat. Prod. Rep.* **2019**, *36*, 1437–1461.
72. Rajakovich, Lauren J.; **Balskus, Emily P.** "Metabolic functions of the human gut microbiota: The role of metalloenzymes." *Nat. Prod. Rep.* **2019**, *36*, 593–625.

71. Peck, Spencer C.; Denger, Karin; Burrichter, Anna; Irwin, Stephania M.; **Balskus, Emily P.**; Schleheck, David. "A glycyl radical enzyme enables hydrogen sulfide production by the human intestinal bacterium *Bifidobacterium wadsworthia*." *Proc. Natl. Acad. Sci. USA* **2019**, *116*, 3171–3176. Co-corresponding author.
70. Wilson, Matthew R.; Jiang, Yindi; Villalta, Peter W.; Stornetta, Alessia; Boudreau, Paul D.; Carrá, Andrea; Brennan, Caitlin A.; Chun, Eumyong; Ngo, Lizzie; Samson, Leona D.; Engelward, Bevin P.; Garrett, Wendy S.; Balbo, Silvia; **Balskus, Emily P.** "The human gut bacterial genotoxin colibactin alkylates DNA." *Science* **2019**, *363*, eaar7785.
69. Ng, Tai L.; Rohac, Roman; Mitchell, Andrew J.; Boal, Amie K.; **Balskus, Emily P.** "An N-nitrosating metalloenzyme constructs the pharmacophore of streptozotocin." *Nature* **2019**, *566*, 94–99.
68. Orman, Marina; Bodea, Smaranda; Funk, Michael A.; Martínez-del Campo, Ana; Bollenbach, Maud; Drennan, Catherine L.; **Balskus, Emily P.** "Structure-guided identification of a small molecule that inhibits anaerobic choline metabolism by human gut bacteria." *J. Am. Chem. Soc.* **2019**, *141*, 33–37.
67. Schultz, Erica E.; Braffman, Nathaniel R.; Luescher, Michael U.; *Hager, Harry H.; Balskus, Emily P. "Biocatalytic Friedel-Crafts alkylation using a promiscuous biosynthetic enzyme." *Angew. Chem. Int. Ed.* **2019**, *58*, 3151–3155.
66. Chittim, Carina L.; Martínez-del Campo, Ana; **Balskus, Emily P.** "Gut bacterial phospholipase Ds support disease-associated metabolism by generating choline." *Nat. Microbiol.* **2018**, *4*, 155–163.
65. Wang, Kwo-Kwang A.; Ng, Tai L.; Wang, Peng; Huang, Zedu; **Balskus Emily P.**; van der Donk, Wilfred A. "Glutamic acid is a carrier for hydrazine during the biosyntheses of fosfazinomycin and kanamycin." *Nat. Commun.* **2018**, *9*, 3687. Co-corresponding author.
64. Levin, Benjamin J.; **Balskus, Emily P.** "Discovering radical-dependent enzymes in the human gut microbiota." *Curr. Opin. Chem. Biol.* **2018**, *47*, 86–93. *Invited commentary.*
63. Waldman, Abraham J.; **Balskus, Emily P.** "Discovery of a diazo-forming enzyme in cremeomycin biosynthesis." *J. Org. Chem.* **2018**, *83*, 7539–7546.
62. Koppel, Nitzan; Bisanz, Jordan E.; Pandelia, Maria-Eirini; Turnbaugh, Peter J.; **Balskus, Emily P.** "Discovery and characterization of a prevalent human gut bacterial enzyme sufficient for the inactivation of a family of plant toxins." *eLife* **2018**, *7*, e33953.
61. Chittim, Carina L.; Irwin, Stephania M.; **Balskus, Emily P.** "Deciphering human gut microbiota-nutrient interactions: A role for biochemistry." *Biochemistry* **2018**, *57*, 2567–2577. *Perspective article.*
60. Maini Rekdal, Vayu; **Balskus, Emily P.** "Gut microbiota: Rational manipulation of gut bacterial metalloenzymes provides insights into dysbiosis and inflammation." *Biochemistry* **2018**, *57*, 2291–2293. *Viewpoint article.*
59. Schneider, Benjamin A.; **Balskus, Emily P.** "Discovery of small molecule protease inhibitors by investigating a widespread human gut bacterial biosynthetic pathway." *Tetrahedron* **2018**, *74*, 3215–3230.
58. Levin, Benjamin J.; **Balskus, Emily P.** "Characterization of 1,2-propanediol dehydratases reveals distinct mechanisms for B₁₂-dependent and glycyl radical enzymes." *Biochemistry* **2018**, *57*, 3222–3226.

57. Huang, Yolanda Y.; Martínez-del Campo, Ana; **Balskus, Emily P.** "Anaerobic 4-hydroxyproline utilization: Discovery of a new glycy radical enzyme in the human gut microbiome uncovers a widespread microbial metabolic activity." *Gut Microbes* **2018**, *9*, 437–451.
56. Waldman, Abraham J.; **Balskus, Emily P.** "The human microbiota, infectious disease, and global health: Challenges and opportunities" *ACS Infect. Dis.* **2018**, *4*, 14–26. *Invited commentary.*
55. Kenny, Douglas J.; **Balskus, Emily P.** "Engineering chemical interactions in microbial communities." *Chem. Soc. Rev.* **2018**, *47*, 1750–1729. *Review article.*
54. Romano, Kymberleigh A.; Martínez-del Campo, Ana; Kasahara, Kazuyuki; Chittim, Carina L.; Vivas, Eugenio I.; Amador-Noguez, Daniel; **Balskus, Emily P.**; Rey, Federico E. "Metabolic, epigenetic, and transgenerational effects of gut bacterial choline consumption." *Cell Host Microbe* **2017**, *22*, 279–290.e7. Co-corresponding author.
53. Zha, Li; Jiang, Yindi; Henke, Matthew T.; Wilson, Matthew R.; Wang, Jennifer X.; Kelleher, Neil L.; **Balskus, Emily P.** "Colibactin assembly line enzymes use S-adenosylmethionine to build a cyclopropane ring." *Nat. Chem. Biol.* **2017**, *13*, 1063–1065.
52. Nakamura, Hitomi; Schultz, Erica E.; **Balskus, Emily P.** "A new strategy for aromatic ring alkylation in cylindrocyclophane biosynthesis." *Nat. Chem. Biol.* **2017**, *13*, 916–921.
51. Koppel, Nitzan; Maini Rekdal, Vayu; **Balskus, Emily P.** "Chemical transformation of xenobiotics by the human gut microbiota." *Science* **2017**, *356*, eaag2770. *Review article.*
50. Wilson, Matthew R.; Zha, Li; **Balskus, Emily P.** "Natural product discovery from the human microbiome." *J. Biol. Chem.* **2017**, *292*, 8546–8552. *Minireview.*
49. Waldman, Abraham J.; Ng, Tailun; Wang, Peng; **Balskus, Emily P.** "Heteroatom–heteroatom bond formation in natural product biosynthesis." *Chem. Rev.* **2017**, *17*, 5784–5863. *Review article.*
48. Wang, Peng; *Hong, Gloria J.; Wilson, Matthew R.; **Balskus, Emily P.** "Production of stealthin C involves an S–N-type Smiles rearrangement." *J. Am. Chem. Soc.* **2017**, *139*, 2864–2867.
47. Levin, Benjamin J.; Huang, Yue Y.; Peck, Spencer C.; Wei, Yifeng; Martínez-del Campo, Ana; *Marks, Jonathan A.; Franzosa, Eric A.; Huttenhower, Curtis; **Balskus, Emily P.** "A prominent glycy radical enzyme in human gut microbiomes metabolizes *trans*-4-hydroxy-L-proline." *Science* **2017**, *355*, aai8386.
46. Bodea, Smaranda; Funk, Michael A.; **Balskus, Emily P.**; Drennan, Catherine L. "Molecular basis of C–N bond cleavage by the glycy radical enzyme choline trimethylamine-lyase." *Cell Chem. Biol.* **2016**, *23*, 1206–1216. Co-corresponding author.
45. **Balskus, Emily P.** "Addressing infectious disease challenges by investigating microbiomes." *ACS Infect. Dis.* **2016**, *2*, 453–455. *Editorial.*
44. Martínez-del Campo, Ana; Romano, Kymberleigh A.; Rey, Federico E.; **Balskus, Emily P.** "The plot thickens: Diet microbe interactions may modulate thrombosis risk." *Cell Metab.* **2016**, *23*, 573–575. *Preview article.*
43. Wallace, Stephen; **Balskus, Emily P.** "Designer micelles accelerate flux through engineered metabolism in *E. coli* and support biocompatible chemistry." *Angew. Chem. Int. Ed.* **2016**, *55*, 6023–6027.
42. Zha, Li; Wilson, Matthew R.; Brotherton, Carolyn A.; **Balskus, Emily P.** "Characterization of polyketide synthase machinery from the *pk*s island facilitates isolation of a candidate precolibactin." *ACS*

Chem. Biol. **2016**, *11*, 1287–1295.

41. Koppel, Nitzan; **Balskus, Emily P.** “Exploring and understanding the biochemical diversity of the human microbiota.” *Cell Chem. Biol.* **2016**, *23*, 18–30. *Invited commentary.*

40. Unified Microbiome Initiative Consortium. “A unified initiative to harness Earth's microbiomes.” *Science* **2015**, *350*, 507–508. *Policy forum.*

39. **Balskus, Emily P.** “Colibactin: Understanding an elusive gut bacterial genotoxin.” *Nat. Prod. Rep.* **2015**, *32*, 1534–1540. *Invited commentary.*

38. Waldman, Abraham J.; *Pechersky, Yakov; Wang, Peng; Wang, Jennifer X.; **Balskus, Emily P.** “The cremeomycin biosynthetic gene cluster encodes a pathway for diazo formation.” *ChemBioChem* **2015**, *16*, 2172–2175.

37. Medema, Marnix H. *et al.* “Minimum information about a biosynthetic gene cluster.” *Nat. Chem. Biol.* **2015**, *11*, 625–631. *Commentary.*

36. Leão, Pedro N.; Nakamura, Hitomi; Costa, Margarida; Pereira, Alban R.; Martins, Rosário; Vasconcelos, Vitor; Gerwick, William H.; **Balskus, Emily P.** “Biosynthesis-assisted structural elucidation of the bartolosides, chlorinated aromatic glycolipids from Cyanobacteria.” *Angew. Chem. Int. Ed.* **2015**, *54*, 11063–11067.

35. Brotherton, Carolyn A.; **Balskus, Emily P.** “Shedding light on sunscreen biosynthesis in zebrafish.” *eLife* **2015**, *4*, e07961. *Insight article.*

34. Wallace, Stephen; **Balskus, Emily P.** “Interfacing microbial styrene production with a biocompatible cyclopropanation reaction.” *Angew. Chem. Int. Ed.* **2015**, *54*, 7106–7109.

33. Brotherton, Carolyn A.; Wilson, Matthew; Byrd, Gary; **Balskus, Emily P.** “Isolation of a metabolite from the *pks* island provides insights into colibactin biosynthesis and activity.” *Org. Lett.* **2015**, *17*, 1545–1548.

32. Martínez-del Campo, Ana; Bodea, Smaranda; Hamer, Hilary A.; *Marks, Jonathan A.; Haiser, Henry J.; Turnbaugh, Peter J.; **Balskus, Emily P.** “Characterization and detection of a widely distributed gene cluster that predicts anaerobic choline utilization by human gut bacteria.” *mBio* **2015**, *6*, e00042-15.

31. Nakamura, Hitomi; Wang, Jennifer X.; **Balskus, Emily P.** “Assembly line termination in cylindrocyclophane biosynthesis: Discovery of an editing type II thioesterase in a type I polyketide synthase.” *Chem. Sci.* **2015**, *6*, 3816–3822.

30. Wallace, Stephen; Schultz, Erica E.; **Balskus, Emily P.** “Using non-enzymatic chemistry to influence microbial metabolism.” *Curr. Op. Chem. Biol.* **2015**, *25*, 71–79. *Invited commentary.*

29. **Balskus, Emily P.** “Sponge symbionts play defense.” *Nat. Chem. Biol.* **2014**, *10*, 611–612. *News and views.*

28. Sirasani, Gopal; Tong, Liuchuan; **Balskus, Emily P.** “A biocompatible alkene hydrogenation merges organic synthesis with microbial metabolism.” *Angew. Chem. Int. Ed.* **2014**, *53*, 7785–7788.

27. Craciun, Smaranda; *Marks, Jonathan A.; **Balskus, Emily P.** “Characterization of choline trimethylamine-lyase expands the chemistry of glyceryl radical enzymes.” *ACS Chem. Biol.* **2014**, *9*, 1408–1413.

26. Wallace, Stephen; **Balskus, Emily P.** "Opportunities for merging chemical and biological synthesis." *Curr. Opin. Biotechnol.* **2014**, *30*, 1–8. *Invited commentary.*

25. Janso, Jeffrey E.; Haltli, Brad A.; Eustáquio, Alessandra S.; Kulowski, Kerry; Waldman, Abraham J.; Zha, Li; Nakamura, Hitomi; Bernan, Valerie S.; He, Haiyin; Carter, Guy T.; Koehn, Frank E.; **Balskus, Emily P.** "Discovery of the lomaiviticin biosynthetic gene cluster in *Salinispora pacifica*." *Tetrahedron* **2014**, *70*, 4156–4164. *Special issue honoring Sarah Reisman's 2014 Tetrahedron Young Investigator Award.*

24. Haiser, Henry J.; Seim, Kristen L.; **Balskus, Emily P.**; Turnbaugh, Peter J. "Mechanistic insight into digoxin inactivation by *Eggerthella lenta* augments our understanding of its pharmacokinetics." *Gut Microbes* **2014**, *5*, 233–238.

23. Waldman, Abraham J.; **Balskus, Emily P.** "Lomaiviticin biosynthesis employs a new strategy for starter unit generation." *Org. Lett.* **2014**, *16*, 640–643.

22. Lee, Yunmi; *Umeano, Afoma; **Balskus, Emily P.** "Rescuing auxotrophic microorganisms with non-enzymatic chemistry." *Angew. Chem. Int. Ed.* **2013**, *52*, 11800–11803.

21. Haiser, Henry J.; Gootenberg, David B.; Chatman, Kelly; Sirasani, Gopal; **Balskus, Emily P.**; Turnbaugh, Peter J. "Predicting and manipulating cardiac drug inactivation by the human gut bacterium *Eggerthella lenta*." *Science* **2013**, *341*, 295–298.

20. Nakamura, Hitomi; **Balskus, Emily P.** "Using chemical knowledge to uncover new biological function: Discovery of the cylindrocyclophane biosynthetic pathway." *Synlett* **2013**, *24*, 1464–1470. *Invited commentary.*

19. Brotherton, Carolyn A.; **Balskus, Emily P.** "A prodrug resistance mechanism is involved in colibactin biosynthesis and cytotoxicity." *J. Am. Chem. Soc.* **2013**, *135*, 3359–3362.

18. Craciun, Smaranda; **Balskus, Emily P.** "Microbial conversion of choline to trimethylamine requires a glycy radical enzyme." *Proc. Natl. Acad. Sci. USA* **2012**, *109*, 21307–21312.

17. Nakamura, Hitomi; Hamer, Hilary A.; Sirasani, Gopal; **Balskus, Emily P.** "Cylindrocyclophane biosynthesis involves functionalization of an unactivated carbon center." *J. Am. Chem. Soc.* **2012**, *134*, 18518–18521.

Postdoctoral, Graduate, and Undergraduate Research:

16. **Balskus, Emily P.**; Case, Rebecca J.; Walsh, Christopher T. "The biosynthesis of cyanobacterial sunscreen scytonemin in microbial mat communities." *FEMS Microbiol. Ecol.* **2011**, *77*, 322–332.

15. **Balskus, Emily P.**; Walsh, Christopher T. "The genetic and molecular basis for sunscreen biosynthesis in cyanobacteria." *Science* **2010**, *329*, 1653–1656.

14. **Balskus, Emily P.**; Walsh, Christopher T. "An enzymatic cyclopentyl[*b*]indole formation involved in scytonemin biosynthesis." *J. Am. Chem. Soc.* **2009**, *131*, 14648–14649.

13. **Balskus, Emily P.**; Walsh, Christopher T. "Investigating the initial steps in the biosynthesis of cyanobacterial sunscreen scytonemin." *J. Am. Chem. Soc.* **2008**, *130*, 15260–15261.

12. Groll, Michael; **Balskus, Emily P.**; Jacobsen, Eric N. "Structural analysis of spiro β -lactone proteasome inhibitors." *J. Am. Chem. Soc.* **2008**, *130*, 14981–14983.

11. Smith, Thomas E.; Kuo, Wen H.; **Balskus, Emily P.**; Bock, Victoria D.; Roizen, Jennifer L.; Theberge, Ashleigh B.; Carroll, Kathleen A.; Kurihara, Tomoki; Wessler, Jeffrey D. "Total synthesis of (–)-hennoxazole A." *J. Org. Chem.* **2008**, *73*, 142–150.
10. **Balskus, Emily P.**; Jacobsen, Eric N. "Asymmetric catalysis of the transannular Diels-Alder reaction." *Science* **2007**, *317*, 1736–1740.
9. Bull, James A.; **Balskus, Emily P.**; Horan, Richard A. J.; Langner, Martin; Ley, Steven V. "Total synthesis of potent antifungal marine bisoxazole natural products bengazoles A and B." *Chem.-Eur. J.* **2007**, *13*, 5515–5538.
8. Smith, Thomas E.; Kuo, Wen-Hsin; Bock, Victoria D.; Roizen, Jennifer L.; **Balskus, Emily P.**; Theberge, Ashleigh B. "Total synthesis of (–)-hennoxazole A." *Org. Lett.* **2007**, *9*, 1153–1155.
7. Bull, James A.; **Balskus, Emily P.**; Horan, Richard A. J.; Langner, Martin; Ley, Steven V. "Stereocontrolled total synthesis of bengazole A: A marine bisoxazole natural product displaying potent antifungal properties." *Angew. Chem. Int. Ed.* **2006**, *45*, 6714–6718.
6. **Balskus, Emily P.**; Jacobsen, Eric N. "Development of α,β -unsaturated, β -silyl imide substrates for enantioselective conjugate additions: Application to the total synthesis of (+)-lactacystin and the discovery of a new proteasome inhibitor." *J. Am. Chem. Soc.* **2006**, *128*, 6810–6811.
5. Ley, Steven V.; Antonello, Alessandra; **Balskus, Emily P.**; Booth, David T.; Christensen, Søren B.; Cleator, Ed; Gold, Helen; Högenauer, Klemens; Hüniger, Udo; Myers, Rebecca M.; Oliver, Steven F.; Simic, Oliver; Smith, Martin D.; Søhoel, Helmer; Woolford, Alison J. A. "Synthesis of the thapsigargin." *Proc. Natl. Acad. Sci. USA* **2004**, *101*, 12073–12078.
4. MacCoss, Rachel N.; **Balskus, Emily P.**; Ley, Steven V. "A sequential tetra-*n*-propylammonium perruthenate (TPAP)-Wittig oxidation olefination protocol." *Tet. Lett.* **2003**, *44*, 7779–7781.
3. Smith, Thomas E.; **Balskus, Emily P.** "Synthetic studies toward hennoxazole A. Use of a selective bisoxazole alkylation as the key fragment coupling." *Heterocycles* **2002**, *57*, 1219–1225.
2. **Balskus, Emily P.**; Méndez-Andino, José; Arbit, Ruslan M.; Paquette, Leo A. "Intercalation of multiple carbon atoms between the carbonyls of α -diketones." *J. Org. Chem.* **2001**, *66*, 6695–6704.
1. Roubreau, Olivier; Alcazar Gomez, José M.; **Balskus, Emily P.**; Kolnaar, Jeroen J. A.; Haasnoot, Jaap G.; Reedijk, Jan. "Spin-transition behavior in chains of Fe(II) bridged by 4-substituted 1,2,4-triazoles carrying alkyl tails." *New J. Chem.* **2001**, 144–150.

Patents

1. Volpe, Matthew R.; Wilson, Matthew R.; **Balskus, Emily P.** Methods and compositions relating to genotoxin colibactin. US Patent WO 11,040,951, June 22, 2021.

Other Writing

Book Chapters:

- Bodea, Smaranda; **Balskus, Emily P.** "Purification and characterization of the choline trimethylamine-lyase (CutC)-activating protein CutD." In *Radical SAM Enzymes; Methods in Enzymology* **2018**, *606*, 73–94. Ed. Vahe Bandarian. Elsevier.

Balskus, Emily P. “Deciphering the chemistry of the human gut microbiome.” In *The Chemistry of Microbiomes: Proceedings of a Seminar Series* **2017** doi:10.17226/24751. Washington, D.C.: The National Academies Press, National Academies of Sciences, Engineering, and Medicine. *Perspective*.

Wallace, Stephen; **Balskus, Emily P.** “Interfacing biocompatible reactions with engineered *Escherichia coli*.” In *Heterologous Gene Expression in E. coli: Methods and Protocols; Methods in Molecular Biology* **2017**, 1586, 409–421. Ed. Nicola A. Burgess-Brown. New York: Springer.

Scientific Writing for the General Public:

Balskus, Emily P. “Harnessing the amazing work of the 40 trillion chemists in your gut microbiome.” September 14, 2016. <https://www.statnews.com/2016/09/14/chemists-gut-microbiome/>

Professional Activities

Editorial Boards and Positions: Editorial Advisory Board, *Journal of the American Chemical Society*, since 2021; Editorial Advisory Board, *Cell Chemical Biology*, since 2016; Editorial Board, *Annual Reviews in Biochemistry* (since 2023); Guest member, Editorial Board, *Annual Reviews in Biochemistry* (2002); Guest Editor, *Biochemistry*, special issue ‘Microbiome’ (2021–2022); Guest Editor, *Accounts of Chemical Research*, special issue ‘Chemistry of Microbiomes’ (2020–2021); Guest Editor, *Bioorganic and Medicinal Chemistry*, special Symposium In Print for the Tetrahedron Young Investigator Award, 2019–2020; Guest Editor, *ACS Infectious Diseases* special issue on the human microbiota, 2016–2017; Guest Editor, *Chemical Society Reviews*, special issue ‘Chemical Signaling at the Eukaryotic/ Prokaryotic Interface’, 2016–2017.

Reviewer – Publications: Journals: *ACS Bio & Med Chem Au*, *ACS Central Science*, *ACS Catalysis*, *ACS Chemical Biology*, *Analytical Chemistry*, *Angewandte Chemie International Edition*, *Applied and Environmental Microbiology*, *Biochemistry*, *Bioorganic and Medicinal Chemistry*, *Cell*, *Cell Metabolism*, *ChemBioChem*, *Chemical Reviews*, *Chemical Science*, *Critical Reviews in Biochemistry and Molecular Biology*, *eLife*, *Environmental Microbiology*, *Israel Journal of Chemistry*, *Journal of Natural Products*, *Journal of Photochemistry and Photobiology*, *Journal of the American Chemical Society*, *Marine Drugs*, *mBio*, *Natural Product Reports*, *Nature*, *Nature Chemical Biology*, *Nature Catalysis*, *Nature Chemistry*, *Nature Communications*, *Nature Microbiology*, *Nature Reviews Microbiology*, *Organic Letters*, *Plant Cell*, *PLoS Pathogens*, *PLoS Biology*, *Proceedings of the National Academy of Sciences U.S.A.*, *Science*, *Science Translational Medicine*, *Structure*, *Tetrahedron*, *Trends in Biochemical Sciences*; Books: *University of Chicago Press*.

Reviewer – Grants: National Institutes of Health, Standing Member of Synthetic and Biological Chemistry B Study Section, 2020–2026; National Science Foundation, Chemistry of Life Processes, February 2022; National Institutes of Health, Ad Hoc Member of Macromolecular Structure and Function A Study Section, June 2020; DeLogi Science and Technology Grants, Caltech, May-June 2019; Star-Friedman Challenge for Promising Scientific Research, Harvard University, April 2019; National Institutes of Health, Ad Hoc Member of Special Emphasis Panel, March 2019; National Science Foundation, CAREER awards, Chemistry of Life Processes, Summer 2018; National Science Foundation, Systems and Synthetic Biology, March 2017; National Institutes of Health, Ad Hoc Member of Synthetic and Biological Chemistry B Study Section, February 2017; National Institutes of Health, Member of Review Panel for National Cancer Institute’s Provocative Questions Initiative, March 2016; National Science Foundation, CAREER awards, Chemistry of Life Processes and Physiological and Structural Systems, Spring 2016; National Science Foundation, Division of Chemistry, March 2015; National Institutes of Health, Ad Hoc Member of Synthetic and Biological Chemistry A Study Section, October 2013; Medical Research Council, UK, 2013; Biotechnology and Biological Sciences Research Council, UK, 2012.

Reviewer – Fellowships and Awards: Winston Churchill Scholarship, Selection Committee, 2020; Smith Family Foundation Odyssey Awards, Reviewer, 2020-present; Schmidt Science Fellows, 2019–2020; Pfizer Award for Enzyme Chemistry, ACS Division of Biological Sciences, 2018–2019; Howard Hughes Medical Institute International Predoctoral Fellowships, 2016; ETH Postdoctoral Fellowship Program Application, 2015; Cottrell Scholar Awards, 2015, 2018, 2020, 2022.

Professional Society Memberships: American Chemical Society, member since 2003; American Society for Microbiology, member since 2010; Society for Industrial Microbiology and Biotechnology, member since 2013; International Society for Microbial Ecology, member since 2017.

Additional Professional Service: Facilitator, Scialog Fellows Workshop ‘Microbiome, Neurobiology and Disease’ (2021); Participant, NSF Deciphering Microbiomes Workshop (December 2019); Co-organizer, “Microbiome: Chemical Mechanisms and Biological Consequences” Keystone Symposium, March 2019; Advisor, human microbiota research, Bill and Melinda Gates Foundation, June 5th, 2017; Participant, Microbiome Innovation: Roadmap to the Future Forum, White House Office of Science and Technology Policy, September 25th, 2015; Scientific Organizing Committee and Session Organizer, American Society for Pharmacognosy Annual Meeting, 2015; Nature Index Physical Sciences Advisory Panel, 2015; Participant, Kavli Futures Symposium, Microbiome Discussion: Decoding Microbial Networks, January 21st, 2015.

Consulting: Adelyx (2020-2021); Novartis (2017); Kintai Therapeutics (2017-2020); Merck & Co (2016–2020); Pfizer (2016); Boehringer Ingelheim (2013–2015); Scifluor (2013).

Invited Lectures (Since 2012)

Completed (239 total):

- Invited talk, 4th International Conference on Natural Product Discovery and Development, San Diego, CA, January 9th, 2022.
- EPFL, Lausanne, Switzerland, December 9th, 2022.
- Basel Chemical Society Lecture, Basel, Switzerland, December 8th, 2022.
- Syngenta, Stein, Switzerland, December 7th, 2022.
- Laboratory of Organic Chemistry, ETH Zurich, Zurich, Switzerland, December 5th, 2022.
- World Minds Symposium, Zurich, Switzerland, December 1st, 2022.
- Department of Health Sciences and Technology, ETH Zurich, Zurich, Switzerland, November 29th, 2022.
- Lucy Pickett Lecture, Mt. Holyoke College, South Hadley, MA, November 10th, 2022.
- Tsujimoto Lecture, Department of Plant and Microbial Biology, UC Berkeley, November 2nd, 2022.
- Pathology, Microbiology, and Immunology Seminar Series, Vanderbilt University, September 26th, 2022.
- Chemistry-Biology Interface Symposium, UNC Chapel Hill, September 21st, 2022.
- Birthday Symposium for Wolfgang Buckel, Max Planck Institute for Terrestrial Microbiology, Marburg, Germany, September 9th, 2022.
- VAAM Workshop, The Biology of Bacteria Producing Natural Products, Dortmund, Germany, September 8th, 2022.
- Chemical Biology 2022, EMBO Workshop, Heidelberg, Germany, September 7th, 2022.
- Microbial Diversity Course 50th Anniversary Symposium, Marine Biological Laboratory, Woods Hole, MA, July 30th, 2022.
- Max Planck Frontiers Symposium, Berlin, Germany, July 12th, 2022.
- National Organic Symposium, San Diego, CA, June 29th, 2022.

- From Next-Generation Chemistry to Human Tissue Biology Symposium, Broad Institute, June 22nd, 2022.
- Frontiers in Biology Seminar, Stanford University, May 18th, 2022.
- NIH Symposium, At the Crossroads of the Microbiome, Metabolism, and Glycoscience, April 29th, 2022 (held virtually).
- NIH Workshop, Precision Probiotic Therapies: Challenges and Opportunities, April 27th, 2022 (held virtually).
- Broad Institute Broad Institute Metabolism Program Joint Seminar Series, February 15th, 2022 (held virtually).
- Broad Institute Infections Disease and Microbiome Program Seminar Series, January 21st, 2022 (held virtually).
- Invited talk, 27th Enzyme Mechanisms Conference, Tucson, AZ, January 3rd, 2022.
- Pacificchem Conference, three invited talks, Honolulu, HI, December, 2021 (held virtually).
- 20th Center for Synthesis and Chemical Biology Symposium, Dublin, Ireland, December 10th, 2021 (held virtually).
- Keynote Speaker, Global Priorities in Vaginal Health, Keystone Symposium, November 12th, 2021 (held virtually).
- Carleton College, Department of Chemistry, November 5th, 2021 (held virtually).
- University of Wisconsin-Madison, Department of Bacteriology, November 4th, 2021 (held virtually).
- Stony Brook University, Department October 1st, 2021 (held virtually).
- Michigan State University, Department of Biochemistry and Molecular Biology, September 2nd, 2021 (held virtually).
- Bristol Myers Squibb, Cambridge Chemistry Seminar Series, July 27th, 2021 (held virtually).
- 33rd Fanconi Anemia Scientific Symposium, Fanconi Anemia Research Fund, July 22nd, 2021 (held virtually).
- 15th International Symposium on Biocatalysis and Biotransformations (Biotrans 2021), University of Graz, Austria, July 20th, 2021 (held virtually).
- MolTag Doctoral Training Program, University of Vienna, Austria, July 1st, 2021 (held virtually).
- Tetrahedron Young Investigator Award Lecture, 21st Tetrahedron Symposium, June 21st, 2021 (held virtually).
- Bruce Merrifield Distinguished Lecture, The Rockefeller University, May 28th, 2021 (held virtually).
- Grand Rounds, Department of Pathology, Brigham and Women's Hospital, May 24th, 2021 (held virtually).
- EurJOC / French Chemical Society, Division of Organic Chemistry sponsored Symposium, March 23rd, 2021 (held virtually).
- Department of Chemistry, Tufts University, March 17th, 2021 (held virtually).
- AAAS Annual Meeting, February 8th, 2021 (held virtually).
- The Microbiome: From Mother to Child, Keystone Symposium, January 11th, 2021 (held virtually).
- Annual Biomedical Research Conference for Minority Students (ABRCMS), November 10th, 2020 (held virtually).
- Genome Integrity and Cancer Therapy Symposium, Dana-Farber / Harvard Cancer Center, November 6th, 2020 (held virtually).
- American Society of Pharmacognosy Webinar, November 5th, 2020.
- The Microbiome in Neurodegenerative Disease Virtual Workshop, Cummings Foundation, October 12-13th, 2020 (held virtually).
- Food and Drug Administration, Microbiome Working Group Seminar Series, August 11th 2020 (held virtually).
- Gilead Sciences, Colloquium Series, August 4th, 2020 (held virtually).

- Human Microbiome Bioactives Symposium, Harvard Chan School of Public Health, May 8th, 2020 (held virtually).
- Microbiome Research Initiative Biennial Symposium, Seattle, WA, April 10th, 2020, (held virtually).
- Natural Products: From Discovery to Therapeutic Applications meeting, New York Academy of Sciences, March 18th, 2020 (held virtually).
- Gut Microbiota for Health Summit, Madrid, Spain March 8th, 2020, (participated virtually).
- American Association for Cancer Research Special Meeting on The Microbiome and Viruses, Orlando, FL, February 23rd, 2020.
- Keynote Speaker, 8th Texas Enzyme Mechanisms Conference, Austin, TX, January 4th, 2020.
- Speaker, NSF Workshop on 'Deciphering the Microbiome: Empowering theory, cross-system analyses, and innovative analytics to propel advances in microbiome science', December 20th, 2019.
- Merck West Point, December 6th, 2019.
- North Carolina State University, Microbiome Seminar Series, December 2nd, 2019.
- Ragon Institute of MGH, MIT, and Harvard, Seminar Series, November 19th, 2019.
- Fuson Lectures, University of Illinois at Urbana-Champaign, Department of Chemistry, November 11th-12th, 2019.
- Closs Lecture, University of Chicago, Department of Chemistry, November 8th, 2019.
- MIT Department of Chemistry and Broad Institute, November 4th, 2019.
- Institute of Microbiology, Chinese Academy of Sciences, Beijing, China, October 18th, 2019.
- Peking University, Department of Chemistry, Beijing, China, October 17th, 2019.
- Keynote Speaker, Scientific Oktoberfest, CISP^M, Munich, Germany, September 19th, 2019.
- ACS Fall National Meeting, San Diego, CA, August 27th, 2019. Keynote Speaker for ACS Infections Diseases Young Investigator Award Symposium.
- Keynote Speaker, Microbiome Meeting, Cold Spring Harbor Laboratory, NY, July 18th, 2019.
- BASF, Tarrytown, NY, July 17th, 2019.
- Blavatnik Science Symposium, New York Academy of Sciences, July 15th, 2019.
- Bioorganic Chemistry Gordon Research Conference, Andover, NH, June 12th, 2019.
- Webinar, Environmental Chemicals, the Human Microbiome, and Health Risk: Continuing the Conversations, National Academies of Sciences, Engineering and Medicine, Washington, D. C., June 5th, 2019.
- Boston University Bioinformatics Student-Organized Symposium, Boston, MA, June 5th, 2019.
- Copenhagen Biosciences Conference, Natural Products – Discovery, Biosynthesis and Application, May 8th, 2019.
- HHMI Janelia Meeting, Chemical Tools for Complex Biological Systems II, Ashburn, VA, April 29th, 2019.
- American Physiological Society/ American Society for Pharmacology and Experimental Therapeutics, Joint Presidential Symposium, Experimental Biology Meeting, Orlando, FL, April 8th, 2019.
- ACS Spring National Meeting, Orlando, FL, April 1st, 2019. Symposium in honor of M. Christina White's ACS Award for Creative Work in Synthetic Organic Chemistry.
- Novartis Lecturship, University of California at Berkeley, Department of Chemistry, March 19th, 2019.
- Chemical Biology Colloquium Series, University of Minnesota, March 18th, 2019.
- Microbiome: Chemical Mechanisms and Biological Consequences Keystone Symposium, Montreal, Canada, March 11th, 2019.
- Walsh Symposium, Harvard Medical School, Boston, MA, March 7th, 2019.
- Vertex Pharmaceuticals, Boston, MA, February 27th, 2019.
- Metals in Biology Gordon Research Conference, Ventura, CA, January 27th, 2019.
- John Innes Center, Norwich, UK, January 18th, 2019.
- University of Colorado at Boulder, 29th MCDB Grad Student Symposium, January 11th, 2019.

- GlaxoSmithKline, Upper Providence, PA, December 3rd, 2018.
- New York University, Department of Microbiology, New York, New York, November 29th, 2018.
- Frontiers in Microbiology 2018, Max Planck Institute for Terrestrial Microbiology Marburg, Frankfurt, Germany, November 21st, 2018.
- The Scripps Research Institute, Jupiter, FL, November 5th, 2018.
- Boston Symposium on Organic and Bioorganic Chemistry, Keynote Speaker, Boston, MA, October 25th, 2018.
- Transforming Nutrition Science for Better Health, Wellcome Trust and WHO, London, UK, October 16th, 2018.
- Land O' Lakes Drug Metabolism and Applied Pharmacokinetics Conference, Madison, WI, September 19th, 2018.
- Frontiers in Metabolism Meeting, Morgridge Institute for Research, Madison, WI, September 18th, 2018.
- Scripps Institute of Oceanography, La Jolla, CA, September 10th, 2018.
- ACS Fall National Meeting, Boston, MA, August 20th, 2018.
- Stereochemistry Gordon Research Conference, Newport, RI, July 24th, 2018.
- Beneficial Microbes Conference, Madison, WI, July 10th, 2018.
- Biocatalysis Gordon Research Conference, Biddeford, ME, July 8th, 2018.
- 7th International Human Microbiome Congress, Killarney, Ireland, June 26th, 2018.
- Heterocycles Gordon Conference, Newport, RI, June 21st, 2018.
- Rowett-INRA 2018 Gut Microbiology Conference, Aberdeen, Scotland, June 14th, 2018.
- HHMI SEA-PHAGES Symposium, Janelia Research Campus, Ashburn, VA, June 8th, 2018.
- Frontiers in Metallobiochemistry Symposium, Penn State University, State College, PA, June 8th, 2018.
- University of Michigan, Novartis Symposium, Department of Chemistry, June 5th, 2018.
- Massachusetts Institute of Technology, Department of Biological Engineering, Cambridge, MA, May 10th, 2018.
- Notre Dame University, IMPACT Lecturer, Department of Chemistry, May 3rd, 2018.
- Texas A&M University, Department of Chemistry, College Station, TX, April 26th, 2018.
- ACS Spring National Meeting, New Orleans, LA, March 18th and 20th, 2018.
- Dow AgroSciences, Indianapolis, IN, March 13th, 2018.
- Eli Lilly Grantee Symposium, Indianapolis, IN, March 12th, 2018.
- Manipulation of the Gut Microbiota for Metabolic Health, Keystone Symposium, Banff, Alberta, Canada, March 6th, 2018.
- Massachusetts Institute of Technology, Department of Biology, Cambridge, MA, February 6th, 2018.
- Natural Products and Synthetic Biology Keystone Symposium, Olympic Valley, CA, January 22nd, 2018.
- Tufts University, Department of Microbiology, Medford, MA, December 13th, 2017.
- Brandeis University, Department of Biochemistry and Biophysics, December 8th, 2017.
- University of Pennsylvania Chemistry-Biology Interface Program Symposium, University of Pennsylvania, Philadelphia, PA, December 1st, 2017.
- Frontiers Lecturer, Case Western Reserve University, Cleveland, OH, November 30th, 2017.
- Mitchum E. Warren, Jr. Lecture, Vanderbilt University, Department of Chemistry, Nashville, TN, November 6th, 2017.
- Yale University, Department of Chemistry, New Haven, CT, October 25th, 2017.
- Max Planck Institute of Molecular Physiology, Dortmund, Germany, October 16th, 2017.

- Oxford University, Department of Chemistry, Oxford, UK, October 12th, 2017.
- Medical Research Council Laboratory of Molecular Biology, Cambridge, UK, October 11th, 2017.
- University of Cambridge, Department of Chemistry, Cambridge, UK, October 10th, 2017.
- Grand Challenges Annual Meeting, Washington, D. C., October 2nd, 2017.
- Merck, Rahway, NJ, September 29th, 2017.
- Chemical Biology in the HUB Symposium, AstraZeneca, Waltham, MA, September 19th, 2017.
- Cell Press LabLinks 'Metabolites as Signalling Molecules' Symposium, September 11th, 2017.
- Pfizer Award Symposium, ACS Fall Meeting, Washington, D. C., August 22nd, 2017.
- Kern Lipid Conference, Vail, CO, August 7th, 2017.
- Multiomics for Microbiomes – EMSL Integration Conference, Pasco, WA, August 3rd, 2017.
- Microbial Diversity Course Symposium, Marine Biology Lab, Woods Hole, MA, July 22nd, 2017.
- High Throughput Chemistry and Chemical Biology Gordon Research Conference, Andover, NH, June 26th, 2017.
- High Throughput Chemistry and Chemical Biology Gordon Research Seminar, Andover, NH, June 24th, 2017. Keynote speaker.
- Towards Interventions for Durable Promotion of a Healthy or Health-promoting Vaginal Microbiome, Bill and Melinda Gates Foundation, Seattle, WA, June 5th, 2017.
- ASM Microbe National Meeting, New Orleans, LA, June 4th, 2017.
- US-Japan Biosynthesis Meeting, Lake Arrowhead, CA, May 31st, 2017.
- Stanford University, Department of Chemistry, Palo Alto, CA, May 22nd, 2017.
- ESC Microbiome Symposium, Merck Research Laboratories, Boston, MA, May 9th, 2017.
- Massachusetts Institute of Technology, Department of Chemistry, Cambridge, MA, May 8th, 2017.
- 2017 Annual Meeting of the American Society of Biochemistry & Molecular Biology (ASBMB), Chicago, IL, April 24th, 2017.
- University of Illinois at Chicago, Department of Medicinal Chemistry and Pharmacognosy, Chicago, IL, April 21st, 2017.
- Paul Dowd Lectures, University of Pittsburgh, Department of Chemistry, Pittsburgh, PA, April 19th–20th, 2017.
- R. Bryan Miller Symposium, University of California at Davis, Department of Chemistry, Davis, CA, March 17th, 2017.
- Quantitative Biology Speaker Series, University of California San Francisco, Chemistry and Chemical Biology Program, San Francisco, CA, March 16th, 2017.
- Novartis Institutes for Biomedical Research, Emeryville, CA, March 15th, 2017.
- Microbial Pathogenesis Seminar Series, University of California San Francisco, Microbial Pathogenesis and Host Defense Program, San Francisco, CA, March 14th, 2017.
- Caltech Bioengineering Lecture Series, Caltech, Pasadena, CA, January 12th, 2017.
- University of Texas Southwestern Medical Center, Immunology Department, Dallas, TX, January 11th, 2017.
- 12th Hirata Award Lecture, University of Nagoya, Nagoya, Japan, December 12th, 2016.
- University of Tokyo, Faculty of Pharmaceutical Sciences, Tokyo, Japan, December 9th, 2016.
- RIKEN Center for Sustainable Resource Science, Tokyo, Japan, December 8th, 2016.
- Columbia University, Department of Chemistry, New York, NY, December 1st, 2016.
- Chemical Sciences Roundtable, The Chemistry of Microbiomes: Humans, National Academies of Sciences, Engineering and Medicine, Washington, D. C., November 9th, 2016.
- Pennsylvania State University, Department of Biochemistry and Molecular Biology, State College, PA, November 8th, 2016.
- Merck, Rahway, NJ, October 27th, 2016.

- 11th Dorothy Crowfoot Hodgkin Symposium, University of Zurich, Zurich, Switzerland, October 3rd, 2016.
- ETH Zurich, Department of Health Sciences and Technology, Zurich, Switzerland, September 30th, 2016.
- Novartis, Basel, Switzerland, September 29th, 2016.
- Center for Microbiome Informatics & Therapeutics Symposium, Massachusetts Institute of Technology, Cambridge, MA, September 12th, 2016.
- The Microbiome in Health and Disease, American Chemical Society Webinar, August 16th, 2016.
- “Mechanistic Understanding of the Human and Mammalian Microbiome” session, International Symposium on Microbial Ecology (ISME), Montreal, Canada, August 23rd, 2016.
- Natural Products Gordon Research Conference, Andover, NH, August 2nd, 2016.
- Molecular Basis of Microbial One-Carbon Metabolism Gordon Research Conference, Waterville Valley, NH, August 1st, 2016.
- Eli Lilly and Company, Indianapolis, IN, July 18th, 2016.
- Balticum Syntheticum Organicum Conference, Riga, Latvia, July 6th, 2016.
- The CIIMAR Interdisciplinary Centre of Marine and Environmental Research, University of Porto, Porto, Portugal, June 22nd, 2016.
- Max Planck Institute for Chemical Ecology, Jena, Germany, June 20th, 2016.
- Boston Area Antibiotic Resistance Network (BAARN) Meeting, Cambridge, MA, June 15th, 2016.
- Merck Chemistry Summit, Skytop, PA, June 5th, 2016.
- Chemistry and Biology Interface Training Program Lecturer, University of Chicago, Chicago, IL, May 5th, 2016.
- Microbial and Plant Systems Modulated by Secondary Metabolites Meeting, Department of Energy Joint Genome Institute, Walnut Creek, CA, May 3rd, 2016.
- University of North Carolina at Chapel Hill, Eshelman School of Pharmacy, Chapel Hill, NC, April 13th, 2016.
- Oregon State University, Department of Chemistry, Corvallis, OR, April 7th, 2016.
- Haverford College, Department of Chemistry, Haverford, PA, March 31st, 2016.
- Infectious Disease Program Meeting, Broad Institute, Cambridge, MA, March 18th, 2016.
- Marine Natural Products Gordon Research Conference, Ventura, CA, March 8th, 2016.
- Amgen-UCLA Lectureship, University of California Los Angeles, Department of Chemistry, Los Angeles, CA, March 3rd, 2016.
- Chemical Biology Seminar Series, Memorial Sloan Kettering Cancer Center, New York, NY, February 9th, 2016.
- Harvard Medical School, Department of Microbiology and Immunobiology, Boston, MA, January 12th, 2016.
- Pacifichem Conference, Honolulu, HI, December 17th, 2015.
- University of Wisconsin-Madison, Department of Bacteriology, Madison, WI, December 3rd, 2015.
- Gut Microbiome in Health and Disease Symposium, Harvard Digestive Diseases Center, Harvard Medical School, Boston, MA, November 4th, 2015.
- ACS National Meeting, Boston, MA, August 18th, 2015. Invited speaker in a session for the Division of Chemical Toxicology (‘The Role of the Gut Microbiota in Carcinogenesis’).
- New England Biolabs, Ipswich, MA, August 6th, 2015.
- American Society for Pharmacognosy Annual Meeting, Copper Mountain, CO, July 27th, 2015.
- Organic Reactions and Processes Gordon Research Conference, Lewiston, ME, July 21st, 2015.
- Chirality 2015 Conference, Boston, MA, July 1st, 2015.
- Tetrahedron Symposium, Berlin, Germany, June 18th, 2015.

- Friedrich-Schiller-University, Hans Knoll Institute and Chemistry Department, Jena, Germany, June 15th, 2015.
- Digestive Diseases Week 2015 Conference, American Gastroenterological Association, Washington, D.C., May 16th, 2015.
- University of California at Irvine, Department of Chemistry, Irvine, CA, May 14th, 2015.
- Procter and Gamble, Cincinnati, OH, May 12th, 2015.
- Paquette Legacy Symposium, Ohio State University, Columbus, OH, May 8th, 2015.
- American Society for Biochemistry and Molecular Biology Annual Meeting, Boston, MA, April 1st, 2015. Invited Speaker in 'Gut Microbes, Drugs, and Toxins' session.
- American Society for Investigative Pathology Annual Meeting, Boston, MA, March 30th, 2015. Invited speaker in 'Intestinal Microbiome: Lessons From Comparative Medicine' session.
- Directing Biosynthesis IV Conference, Norwich, UK, March 26th, 2015.
- ACS National Meeting, Denver, CO, March 22nd, 2015. Invited speaker in sessions for the Medicinal Chemistry ('Targeting the Human Microbiota') and Biological Chemistry ('Complex Enzymatic Transformations') Divisions.
- Boehringer Ingelheim, Ridgefield, CT, February 24th, 2015.
- University of Illinois at Urbana-Champaign Chemical Biology Training Program Seminar, Urbana, IL, February 16th, 2015.
- Georgia Institute of Technology, Department of Chemistry, Atlanta, GA, February 12th, 2015.
- University of Pennsylvania, Biochemistry and Molecular Biophysics Department, January 29th, 2015.
- Enzyme Mechanisms Conference, Galveston, TX, January 11th, 2015.
- Immunology and Infectious Diseases Seminar Series, Harvard School of Public Health, Boston, MA, December 3rd, 2014.
- Center for the Study of Inflammatory Bowel Disease, 24th Annual Workshop on Microbes, Metabolism, and Mucosal Circuits, Massachusetts General Hospital, Boston, MA, November 7th, 2014.
- Amgen Young Investigators' Symposium, Thousand Oaks, CA, October 15th, 2014.
- Individualizing Medicine Conference, Mayo Clinic, Rochester, MN, October 8th, 2014.
- emTech Conference, Cambridge, MA, September 23rd, 2014.
- American Society for Pharmacognosy Annual Meeting, Oxford, MS, August 3rd, 2014.
- Stereochemistry Gordon Research Conference, Newport, RI, July 28th, 2014.
- Washington University, Chemistry Department, St. Louis, MO, July 24th, 2014.
- Society for Industrial Microbiology and Biotechnology Annual Meeting, St. Louis, MO, July 21st, 2014.
- The Synthetic Biology, Engineering, Evolution & Design (SEED) Conference, Los Angeles, CA, July 17th, 2014.
- Bioorganic Chemistry Gordon Research Conference, Andover, NH, June 12th, 2014.
- Cubist Pharmaceuticals, Lexington, MA, May 30th, 2014.
- Novartis Institute for Biomedical Research, Cambridge, MA, May 28th, 2014.
- Procter and Gamble, Cincinnati, OH, May 27th, 2014.
- Boston University, Department of Chemistry, Boston, MA, May 12th, 2014.
- Yale Chemical Biology Symposium, Yale University, New Haven, CT, May 9th, 2014.
- Exploiting and Understanding Chemical Biotransformations in the Human Microbiota Keystone Conference, Big Sky, MT, April 2nd, 2014.
- WarpDrive Bio, Cambridge, MA, March 27th, 2014.
- The Forsyth Institute, Cambridge, MA, January 9th, 2014.

- Monell Chemical Senses Center, Philadelphia, PA, December 10th, 2013.
- Boehringer Ingelheim's "Microbiome Experts" Meeting, New York, NY, November 18th, 2013.
- Phi Lambda Upsilon Award Lecture, University of Nebraska, Chemistry Department, October 11th, 2013.
- Society for Industrial Microbiology and Biotechnology Annual Meeting, San Diego, CA, August 15th, 2013.
- Enzymes, Coenzymes, and Metabolic Pathways Gordon Research Conference Poster Talk, Waterville Valley, NH, June 16th, 2013.
- High Throughput Chemistry and Chemical Biology Gordon Research Conference, New London, NH, June 2nd, 2013.
- East Cambridge Drug Discovery Working Group, Cambridge, MA, May 22nd, 2013.
- University of Utah, Department of Medicinal Chemistry, Salt Lake City, UT, April 18th, 2013.
- Targets, Therapeutics, and Discovery Seminar Series, Harvard Medical School, Boston, MA, January 4th, 2013.
- University of Pennsylvania, Chemistry Department, Philadelphia, PA, November 8th, 2012.
- Molecular and Cellular Biology Departmental Retreat, Harvard University, Woods Hole, MA, October 13th, 2012.
- Biocatalysis Gordon Research Conference, Smithfield, RI, July 11th, 2012.
- Structural Genomics Consortium, Oxford University, Oxford, UK, May 11th, 2012.
- Exploring Human Host-Microbiome Interactions in Health and Disease Conference, Wellcome Trust, Cambridge, UK, May 9th, 2012.

Teaching and Outreach

Chemistry 27: Organic Chemistry of Life, Harvard University (Spring Semesters 2013, 2014, 2020, 2021, 2022). Updated and taught an undergraduate organic chemistry course that integrates biochemistry and mechanistic organic chemistry for premedical students and life sciences concentrators. Changes made include incorporating topics from modern medicine (e.g. human microbiota) and adding videos.

Chemistry 171: Biological Synthesis, Harvard University (Spring Semester 2012, Fall Semesters 2014 and 2015, Spring Semester 2019). Designed and taught a new advanced undergraduate- and graduate-level course covering natural product biosynthesis, biocatalysis, and metabolic engineering.

Freshman Seminar 50Q: Gut Reactions: Discovering Chemistry from the Human Microbiota, Harvard University (Spring Semesters 2017, 2018, 2022). Designed and taught the first experimental lab-based Freshman Seminar offered by the Department of Chemistry and Chemical Biology. Students worked with members of my research group and I to discover enzymes from the human gut microbiota.

Life Sciences 100r: Experimental Research in the Life Sciences, Harvard University (Spring Semester 2016). Contributed a research project to this experimental course. Six students worked with my research group to use functional metagenomics for discovering new enzymes from the human gut microbiome.

Co-instructor, Microbiome Nanocourse, Harvard Medical School (Spring 2015).

Guest Lecturer: Chemistry 170, Life Sciences 1A, Organismal and Evolutionary Biology 290, Molecular and Cellular Biology 293, Microbiome Nanocourse, Biological Chemistry and Molecular Pharmacology 234, Harvard University (October 2012, October 2013, February 2015, April 2015,

February 2016, April 2016, February 2017, February 2018, February 2019). Delivered lectures on microbial natural products chemistry and functions of the human microbiota.

Lecturer: Microbial Diversity Summer Course, Marine Biology Laboratory, Woods Hole, MA (August 2014 and 2015). Taught course participants about strategies for discovering microbial metabolic pathways and enzymes using genome mining.

Life Sciences 110: A Microbial World, Harvard University (Spring semester 2010). Designed curriculum covering microbial metabolism, antibiotic modes of action, and antibiotic resistance.

Resident and Non-Resident Tutor Cabot House, Harvard University (2005–2008).

Supervisor for Part IA Natural Sciences, University of Cambridge (2002–2003).

Teacher at Summerbridge Cincinnati, summer enrichment program for academically talented at-risk middle school students (summers of 1996–1998). Authored introductory high school chemistry textbook 'Summerbridge Chemistry'.

Teaching Assistant for Introductory Organic Chemistry, Williams College (1999–2000).

Teaching Fellow for Chem 206, Advanced Organic Chemistry, Harvard University (Fall semester 2004).

Teaching Fellow for Chem 20, Advanced Introductory Organic Chemistry, Harvard University (Spring semester 2004).

Selected Science Outreach and Mentoring Activities Mentor, Harvard Graduate Women in Science and Engineering (2011-present), Science Storytellers, 2016; Science by the Pint, Aeronaut Brewery, 2017; EXPLORATIONS Outreach Program, Harvard Medical School, 2012-2016; various talks about my research and career path for the Broad Institute's Diversity Initiative in Scientific Research, High School Research Conference, 'Harvard Women Think Big' symposium, and undergraduate/graduate groups for women and underrepresented minority students in science at Harvard.