

VIRGINIA W. CORNISH

Department of Chemistry
Department of Systems Biology
Columbia University
Havemeyer Hall, MC 3111
3000 Broadway
New York, NY 10027
(212) 854-5209 (office)
(212) 932-1289 (fax)
vc114@columbia.edu

Born 11/6/69
Louisville, KY

Three children:
1/25/03
2/15/05
6/11/09

Education

1991-1996 **Ph.D. Bio-Organic Chemistry**
University of California, Berkeley, CA

1987-1991 **B.A. Biochemistry, *summa cum laude***
Columbia University, New York, NY

Academic and Research Experience

2012-present **Helena Rubinstein Professor, Department of Systems Biology,
Columbia University, New York, NY**

2011-present **Helena Rubinstein Professor, Department of Chemistry, Columbia
University, New York, NY**

2007-2011 **Professor of Chemistry, Department of Chemistry, Columbia
University, New York, NY**

2004-2007 **Associate Professor of Chemistry, Department of Chemistry,
Columbia University, New York, NY**

1999-2004 **Assistant Professor of Chemistry, Department of Chemistry, Columbia
University, New York, NY**

1996-1998 **National Science Foundation Post-Doctoral Fellow, Department of
Biology, Massachusetts Institute of Technology, Cambridge, MA**
Advisor: Professor Robert T. Sauer
Independently initiated "chemical complementation" and program in yeast
synthetic biology now ongoing in my laboratory.

1991-1996 **National Science Foundation Pre-Doctoral Fellow, Department of
Chemistry, University of California, Berkeley, CA**
Advisor: Professor Peter G. Schultz
Development of "unnatural amino acid mutagenesis" technology for
expanding the chemistry of the genetic code via misacylated tRNAs.

1990-1991 **Undergraduate Research Assistant, Department of Chemistry,
Columbia University, New York, NY**
Advisor: Professor Ronald C. Breslow
Synthesis photo-affinity label used to identify the biological receptor of a
first-in-class histone deacetylase inhibitor/cancer therapeutic.

Fellowships and Awards

2021	HHMI Gilliam Fellowship
2011	Helena Rubinstein Chair Columbia University
2009	Protein Society Irving Sigal Young Investigator Award
2009	ACS Pfizer Award in Enzyme Chemistry
2009	Rutgers University Wyeth/Douglass Lecturer
2007	Lenfest Distinguished Columbia Faculty Award
2007	Ott Lectureship, Grand Valley State University
2006	Academy Fellow, New York Academy of Sciences
2006	Lucy Pickett Lectureship, Mt. Holyoke College
2005	John Jay Award, Columbia College
2004	Paul Dowd Lectureship, University of Pittsburgh
2003	Sloan Foundation Fellowship
2001	BIMO Class of 1960 Speaker, Williams College
2001	Columbia College Young Alumni Achievement Award
2000	Beckman Young Investigator Award
2000	Burroughs-Wellcome Fund New Investigator Award
2000	National Science Foundation Career Award
1999	Camille and Henry Dreyfus New Faculty Award
1999	Columbia College Alumna Achievement Award
1996	National Science Foundation Post-Doctoral Fellow
1995	Howard Hughes Medical Institute Graduate Fellowship
1995	Outstanding Graduate Student Instructor Award
1994	American Chemical Society Division of Organic Chemistry Graduate Fellowship
1993	Outstanding Graduate Student Instructor Award
1991	National Science Foundation Predoctoral Fellowship
1990	Phi Beta Kappa

Honor Societies and Professional Affiliations

American Chemical Society
Protein Society
New York Academy of Sciences
American Association for the Advancement of Science
Phi Beta Kappa

Publications

1. H.H. Chung, D.R. Benson, V.W. Cornish, P.G. Schultz. "Probing the Role of Loop 2 in Ras Function with Unnatural Amino Acids." *Proc. Natl. Acad. Sci. USA*, **90**, 10145-10149 (1993).
2. V.W. Cornish, D.R. Benson, C.A. Altenbach, K. Hideg, W.L. Hubbel, P.G. Schultz. "Site-Specific Incorporation of Biophysical Probes into Proteins." *Proc. Natl. Acad. Sci. USA*, **91**, 2910-2914 (1994).
3. V.W. Cornish, P.G. Schultz. "A New Tool for Studying Protein Structure and Function." *Curr. Opin. Struct. Biol.*, **4**, 601-607 (1994). (Invited Review).
4. V.W. Cornish, M.I. Kaplan, D.L. Veenstra, P.A. Kollman, P.G. Schultz. "Stabilizing and Destabilizing Effects of Placing β -Branched Amino Acids in Protein α -Helices." *Biochemistry*, **33**, 12022-12031 (1994).
5. D. Mendel, V.W. Cornish, P.G. Schultz. "Site-Directed Mutagenesis with an Expanded Genetic Code." *Ann. Rev. Biophys. Biomol. Struct.*, **24**, 435-462 (1995). (Invited Review).
6. V.W. Cornish, D. Mendel, P.G. Schultz. "Probing Protein Structure and Function with an Expanded Genetic Code." *Angew. Chem. Int. Ed. Engl.*, **34**, 621-633 (1995). (Invited Review).
7. V.W. Cornish, K.M. Hahn, P.G. Schultz. "Site-Specific Protein Modification Using a Ketone Handle." *J. Am. Chem. Soc.*, **118**, 8150-8151 (1996).
8. J.T. Koh, V.W. Cornish, P.G. Schultz. "An Experimental Approach to Evaluating the Role of Backbone Interactions in Proteins Using Unnatural Amino Acid Mutagenesis." *Biochemistry*, **36**, 11314-11322 (1997).
9. J.S. Thorson, V.W. Cornish, J.E. Barrett, S.T. Cload, T. Yano, P.G. Schultz. "Insertion of Unnatural Amino Acids Using Chemical Acylation Techniques." *Methods in Molecular Biology: Protein Synthesis: Methods and Protocols*, **77**, 43-73 (1998). (Methods).
10. Y. Webb, X. Zhou, L. Ngo, V.W. Cornish, J. Stahl, H. Erdjument-Bromage, P. Tempst, R. Rifkind, P. Marks, R. Breslow and V. Richon. "Photoaffinity Labeling and Mass Spectrometry Identify Ribosomal Protein S3 as a Potential Target for Hybrid Polar Cytodifferentiation Agents." *J. Biol. Chem.*, **274**, 14280-14287 (1999).

(independent publications)

11. H. Lin, W. Abida, R.T. Sauer, V.W. Cornish. "Dexamethasone-Methotrexate: An Efficient Chemical Inducer of Protein Dimerization *In Vivo*." *J. Am. Chem. Soc.*, **122**, 4247-4248 (2000). Featured in *Chem. & Eng. News*, **78**, 52 (2000).
12. H. Lin, V.W. Cornish. "*In Vivo* Protein-Protein Interaction Assays: Beyond Proteins." *Angew. Chem.*, **114**, 895-899 (2001); *Ang. Chem. Int. Ed.*, **40**, 871-875 (2001). (Invited Review).
13. V.W. Cornish. "Probing Enzyme Complexity." *Chem. & Eng. News*, **79**, 64 (2001). *Young Investigator Featured in 125th Year Anniversary Issue*. (Invited Review).
14. B.T. Carter, V.W. Cornish. Book Review: Two-Hybrid Systems Methods and Protocols. Edited by Paul N. MacDonald. *ChemBioChem*, **3**, 476-477 (2002). (Invited Review).

15. B.T. Carter, H. Lin, V.W. Cornish. "Yeast n-Hybrid Systems for Molecular Evolution." In *Directed Molecular Evolution of Proteins*, S. Brakmann, K. Johnsson, Eds. Wiley-VCH Verlag, Weinheim, 2002. (Invited Review).
16. E.A. Althoff, V.W. Cornish. "A Bacterial Small-Molecule Three-Hybrid System." *Angew. Chem.*, **114**, 2433-2436 (2002); *Angew. Chem. Int. Ed.*, **41**, 2327-2330 (2002).
17. W. Abida, B. Carter, E. Althoff, H. Lin, V.W. Cornish. "Receptor-Dependence of the Transcription Read-Out in a Small-Molecule Three-Hybrid System." *ChemBioChem*, **3**, 887-895 (2002).
18. H. Lin, V.W. Cornish. "Screening and Selection Methods for the Large Scale Analysis of Protein Function." *Angew. Chem.*, **114**, 4580-4606 (2002); *Angew. Chem. Int. Ed.*, **41**, 4402-4425 (2002). (Invited Review).
19. H. Tao, V.W. Cornish. "Milestones in Directed Enzyme Evolution." *Curr. Opin. Chem. & Biol.*, **6**, 858-864 (2002). (Invited Review).
20. K. Baker, C. Bleczynski, H. Lin, G. Salazar-Jimenez, D. Sengupta, S. Krane, V.W. Cornish. "Chemical Complementation: A Reaction-Independent, High-Throughput Genetic Assay for Enzyme Catalysis." *Proc. Natl. Acad. Sci. USA*, **99**, 16537-16542 (2002). Featured in a commentary in *Proc. Natl. Acad. Sci. USA*, **99**, 16513-16515 (2002) and in *Chem. & Eng. News*, **81**, 24 (2003).
21. K. Baker, D. Sengupta, G. Salazar-Jimenez, V.W. Cornish. "An Optimized Dexamethasone-Methotrexate Yeast 3-Hybrid System for High-Throughput Screening of Small Molecule-Protein Interactions." *Anal. Biochem.*, **315**, 134-137 (2003).
22. A. Forster, Z. Tan, M.N.L. Nalam, H. Lin, H. Qu, V.W. Cornish, S. Blacklow. "Programming Peptidomimetic Syntheses by Translating Genetic Codes Designed *De Novo*." *Proc. Natl. Acad. Sci. USA*, **100**, 6353-6357 (2003). Featured in *Chem. Biol.*, **10**, 586-587 (2003) and in *Chem. & Eng. News*, **82**, 64-68 (2004).
23. S. Goldberg, W. Iannuccilli, T. Nguyen, J. Ju, V.W. Cornish. "Identification of Residues Critical for Catalysis in a Class C β -Lactamase by Combinatorial Scanning Mutagenesis." *Protein Science*, **12**, 1633-1645 (2003).
24. L. Miller, J. Sable, P. Goelet, M. Sheetz, V.W. Cornish. "Methotrexate Conjugates: A Molecular *In Vivo* Protein Tag." *Angew. Chem.*, **116**, 1704-1707 (2004); *Angew. Chem. Int. Ed.*, **43**, 1672-1675 (2004).
25. B.F. Gherman, S.D. Goldberg, V.W. Cornish, R.A. Friesner. "Mixed Quantum Mechanical/Molecular Mechanical (QM/MM) Study of the Deacylation Reaction in a Penicillin Binding Protein (PBP) Versus in a Class C β -Lactamase." *J. Am. Chem. Soc.*, **126**, 7652-7664 (2004).
26. D. Sengupta, H. Lin, S. Goldberg, J. Mahal, V.W. Cornish. "Correlation Between Catalytic Efficiency and the Transcription Read-Out in Chemical Complementation, a High-Throughput Assay for Enzyme Catalysis." *Biochemistry*, **43**, 3570-3581 (2004).
27. S. Lefurgy, V.W. Cornish. "Finding Cinderella After the Ball: a Three-Hybrid Approach to Drug Target Identification." *Chem. Biol.*, **11**, 151-153 (2004). (Invited Commentary).
28. K. Suwwan deFelipe, E.A. Althoff, B.T. Carter, V.W. Cornish. "Correlation Between Ligand-Receptor Affinity and the Transcription Readout in a Yeast Three-Hybrid System." *Biochemistry*, **43**, 10353-10363 (2004).

29. A.C. Forster, V.W. Cornish, S.C. Blacklow. "Pure Translation Display." *Anal. Biochem.*, **333**, 358-364 (2004).
30. Z. Tan, A. Forster, S. Blacklow, V.W. Cornish. "Amino Acid Backbone Specificity of the *E. coli* Translation Machinery." *J. Am. Chem. Soc.*, **126**, 12752-12753 (2004).
31. H. Lin, H. Tao, V.W. Cornish. "Directed Evolution of a Glycosynthase Via Chemical Complementation." *J. Am. Chem. Soc.*, **126**, 15051-15059 (2004). Featured in *Chem. & Eng. News*, **82:46**, 32 (2004).
32. L. Miller, V.W. Cornish. "Selective Chemical Labeling of Proteins in Living Cells." *Curr. Opin. Chem. Biol.*, **9**, 1-6 (2005). (Invited Review).
33. L. Miller, Y. Cai, M. Sheetz, V.W. Cornish. "In Vivo Labeling with Trimethoprim Conjugates: A Flexible Chemical Tag." *Nature Methods*, **2**, 255-257 (2005).
34. B.T. Carter, H. Lin, S.D. Goldberg, E.A. Althoff, J. Raushel, V.W. Cornish. "Investigation of the Mechanism of Resistance to Third-Generation Cephalosporins by Class C β -Lactamases Using Chemical Complementation." *ChemBioChem*, **6**, 2055-2067 (2005).
35. Z. Tan, S.C. Blacklow, V.W. Cornish, A.C. Forster. "De Novo Genetic Codes and Pure Translation Display." *Methods*, **36**, 279-90 (2005).
36. S. Lefurgy, V.W. Cornish. "Chemical Complementation." In *Enzyme Assays: High-throughput Screening, Genetic Selection and Fingerprinting*, J-L. Reymond, Ed. Weinheim, Germany: Wiley-VCH Verlag GmbH & Co. KGaA, pp. 183-219 (2006). (Invited Review).
37. V.W. Cornish. "Biological Chemistry: Catalytic Competition for Cells." *Nature*, **440**, 156-157 (2006). (Invited News and Views).
38. P. Peralta-Yahya, V.W. Cornish. "Bringing the Power of Genetics to Chemistry." In *Chemical Biology*, S.L. Schreiber, T. Kapoor, G. Weiss, Eds. Weinheim, Germany: Wiley-VCH Verlag GmbH & Co. KGaA, vol. 1, pp. 199-226 (2006). (Invited Review).
39. H. Tao, P. Peralta-Yahya, H. Lin, V.W. Cornish. "Optimized Design and Synthesis of Chemical Dimerizer Substrates for Detection of Glycosynthase Activity via Chemical Complementation." *Bioorg. Med. Chem.*, **14**, 6940-6953 (2006).
40. S. Gallagher, L.W. Miller, V.W. Cornish. "An Orthogonal Dexamethasone-Trimethoprim Yeast Three-Hybrid System." *Anal. Biochem.*, **363**, 160-162 (2006).
41. N.T. Calloway, M. Choob, A. Sanz, M.P. Sheetz, L.W. Miller, V.W. Cornish. "Optimized Fluorescent Trimethoprim Derivatives for In Vivo Protein Labeling." *ChemBioChem.*, **8**, 767-774 (2007).
42. B. Zhang, Z. Tan, L.G. Dickson, M.N.L. Nalam, V.W. Cornish, A. Forster. "Specificity of Translation for *N*-Alkyl Amino Acids." *J. Am. Chem. Soc.*, **129**, 11316-11317 (2007).
43. S.T. Lefurgy, R.M. de Jong, V.W. Cornish. "Saturation Mutagenesis of Asn152 Reveals a Substrate Selectivity Switch in P99 Cephalosporinase." *Protein Science*, **16**, 2636-2646 (2007).
44. J.E. Bronson, W.W. Mazur, V.W. Cornish. "Transcription Factor Logic Using Chemical Complementation." *Molecular BioSystems*, **4**, 56 (2008).

45. H. Tao, P. Peralta-Yahya, J. Decatur, V.W. Cornish. "Characterization of a New Glycosynthase Cloned by Using Chemical Complementation." *ChemBioChem*, **9**, 681-684 (2008).
46. J.L. Czapinski, M.W. Schelle, L.W. Miller, S.T. Laughlin, J.J. Kohler, V.W. Cornish, C.R. Bertozzi. "Conditional Glycosylation in Eukaryotic Cells Using a Biocompatible Chemical Inducer of Dimerization." *J. Am. Chem. Soc.*, **130**, 13186-13187 (2008).
47. P. Peralta-Yahya, B. T. Carter, H. Lin, H. Tao, V.W. Cornish. "A High-Throughput Selection for Cellulase Catalysts Using Chemical Complementation." *J. Am. Chem. Soc.*, **130**, 17446-17452 (2008).
48. V.W. Cornish, S.S. Gallagher. "Fluorescence in Living Systems: Applications in Chemical Biology." In *Wiley Encyclopedia of Chemical Biology*, T.P. Begley, Editor. 2009, John Wiley & Sons, Inc.: Hoboken. pp. 28-38 (2009).
49. S.S. Gallagher, J.E. Sable, M.P. Sheetz, V.W. Cornish. "An *In Vivo* Covalent TMP-Tag Based on Proximity-Induced Reactivity." *ACS Chem. Biol.*, **4**, 547-556 (2009).
50. M. Pavlov, R. Watts, Z. Tan, V.W. Cornish, M. Ehrenberg, A. Forster. "Slow Peptide Bond Formation by Proline and Other N-alkylamino Acids in Translation." *Proc. Natl. Acad. Sci.*, **106**, 50-54 (2009).
51. P.R. Effraim, J. Wang, M.T. Englander, J. Avins, T.S. Leyh*, R.L. Gonzalez*, Jr., V.W. Cornish*. "Natural Amino Acids Do Not Require Their Native tRNAs for Efficient Selection by the Ribosome." *Nature Chem. Biol.*, **5**, 947-953 (2009).
52. Y. Cai, O. Rossier, N.C. Gauthier, N. Biais, M.A. Fardin, X. Zhang, L.W. Miller, B. Ladoux, V.W. Cornish, M.P. Sheetz. "Cytoskeletal Coherence Requires Myosin-IIA Contractility." *J. Cell Sci.*, **123**, 413-423 (2010).
53. S.S. Gallagher, C. Jing, D.S. Peterka, M. Konate, R. Wombacher, L.J. Kaufman, R. Yuste, V.W. Cornish. "A Trimethoprim-Based Chemical Tag for Live Cell Two-Photon Imaging." *ChemBioChem*, **11**, 782-784 (2010).
54. R. Wombacher, M. Heidbreder, S. van de Linde, M.P. Sheetz, M. Heilemann*, V.W. Cornish*, M. Sauer*. "Live Cell Super-Resolution Imaging with Trimethoprim Conjugates." *Nature Methods*, **7**, 717-719 (2010).
55. N. Pirakitikulr*, N. Ostrov*, P. Peralta-Yahya, V.W. Cornish. "PCRless Library Mutagenesis via Oligonucleotide Recombination in Yeast." *Protein Science*, **19**, 2336-2346 (2010).
56. L.M. Wingler, V.W. Cornish. "A Library Approach for the Discovery of Customized Yeast Three-Hybrid Counter Selections." *ChemBioChem*, **12**, 715-717 (2011).
57. A.A. Hoskins, L.J. Friedman, S.S. Gallagher, D.J. Crawford, E.G. Anderson, R. Wombacher, N. Ramirez, V.W. Cornish, J. Gelles*, M.J. Moore*. "Ordered and Dynamic Assembly of Single Spliceosomes." *Science*, **331**, 1289-1295 (2011).
58. R. Wombacher V.W. Cornish. "Chemical Tags: Applications in Live Cell Fluorescence Imaging." *J. Biophotonics*, **4**, 391-402 (2011). (Invited Review).

59. L.M. Wingler*, V.W. Cornish*. "Reiterative Recombination for the *In Vivo* Assembly of Libraries of Multi-Gene Pathways." *Proc. Natl. Acad. Sci. USA*, **4**, 391-402 (2011).
60. C. Jing, V.W. Cornish. "Chemical Tags for Labeling Proteins Inside Living Cells." *Acc. Chem. Res.*, **44**, 784-792 (2011). (Invited Review).
61. D.W. Romanini, V.W. Cornish. "Protein Labeling: Playing Tag with Proteins." *Nat. Chem.*, **4**, 248-250 (2012). (Invited Commentary).
62. E. Gatzogiannis, Z. Chen, L. Wei, R. Wombacher, Y.T. Kao, G. Yefremov, V.W. Cornish, W. Min. "Mapping Protein-Specific Micro-Environments in Live Cells by Fluorescence Lifetime Imaging of a Hybrid Genetic-Chemical Molecular Rotor Tag." *Chem. Commun.*, **48**, 8694-8696 (2012).
63. Z. Chen, C. Jing C, S.S. Gallagher, M.P. Sheetz, V.W. Cornish. "Second-Generation Covalent TMP-Tag for Live Cell Imaging." *J. Am. Chem. Soc.*, **134**, 13692-13699 (2012).
64. Ruble JF, Lefurgy ST, V.W. Cornish, Powers RA. "Structural Analysis of the Asn152Gly Mutant of P99 Cephalosporinase." *Acta Crystallogr D Biol Crystallogr.*, **68**, 1189-1193 (2012).
65. D.W. Romanini, P. Peralta-Yahya, V. Mondol, V.W. Cornish. "A Heritable Recombination System for Synthetic Darwinian Evolution in Living Cells." *ACS Synth. Biol.*, **1**, 602-609 (2012). Featured in *Chem. & Eng. News*, **90**, 10 (2012).
66. A. Anzalone, Z. Chen, T. Wang, V.W. Cornish. "A Common Diaryl Ether Intermediate for the Gram-Scale Synthesis of Oxazine and Xanthene Fluorophores." *Angew. Chem.*, **52**, 650-654 (2013).
67. A.R. Shepard, R.E. Conrow, M. Rezwan, K. Rutschmann, I.-H. Pang, D. Auerbach, R.P. SriRamaratnam, V.W. Cornish. "Identification of PDE6D as a Molecular Target of Anecortave Acetate Via Methotrexate-Anchored Yeast Three-Hybrid Screen." *ACS Chem. Biol.*, **8**, 549-558 (2013).
68. N. Ostrov, L.M. Wingler, V.W. Cornish. "Gene Assembly and Combinatorial Libraries in *S. cerevisiae* via Reiterative Recombination." *Methods Mol. Biol.*, **978**, 187-203 (2013).
69. C. Jing, V.W. Cornish. "A Fluorogenic TMP-tag for High Signal-to-Background Intracellular Live Cell Imaging." *ACS Chem. Biol.*, **8**, 1704-1712 (2013).
70. Z. Chen, V.W. Cornish, W. Min. "Chemical Tags: Inspiration for Advanced Imaging Techniques." *Curr. Opin. Chem. Biol.*, **17**, 637-643 (2013).
71. C. Jing, V.W. Cornish. "Design, Synthesis and Application of the Trimethoprim Based Chemical Tag for Live-Cell Imaging." *Curr. Protoc. Chem. Biol.*, **5**, 131-155 (2013).
72. M.D. Harton, L.M. Wingler, V.W. Cornish. "Transcriptional Regulation Improves the Throughput of Three-Hybrid Counter Selections in *Saccharomyces cerevisiae*." *Biotechnol. J.*, **8**, 1485-1491 (2013).
73. T.Y. Wang, L.J. Friedman, J. Gelles, W. Min, A.A. Hoskins, V.W. Cornish. "The Covalent Trimethoprim Chemical Tag Facilitates Single Molecule Imaging with Organic Fluorophores." *Biophys. J.*, **106**, 272-278 (2014).

74. W.S. Yang, R. SriRamaratnam, M.E. Welsch, K. Shimada, R. Skouta, V.W. Viswanathan, J.H. Cheah, P.A. Clemons, A.F. Shamji, C.B. Clish, L.M. Brown, A.W. Girotti, V.W. Cornish, S.L. Schreiber, B.R. Stockwell. "Regulation of Ferroptotic Cancer Cell Death by GPX4." *Cell*, **156**, 317-331 (2014).
75. M.T. Englander, J.L. Avins, R.C. Fleisher, B. Liu, P.R. Effraim, J. Wang, K. Schulten, T.S. Leyh, R.L. Gonzalez Jr.*, V.W. Cornish*. "The Ribosome Can Discriminate the Chirality of Amino Acids Within Its Peptidyl Transferase Center." *Proc. Natl. Acad. Sci. USA*, **112**, 6038-6039 (2015).
76. A.V. Anzalone*, A.J. Lin, S. Zairis, R. Rabadan, V.W. Cornish*. "Reprogramming Eukaryotic Translation with Ligand-Responsive Synthetic RNA Switches." *Nature Methods*, **13**, 453-458 (2016).
77. X. Hu, C. Jing, X. Xu, N. Nakazawa, V.W. Cornish, F.M. Margadant, M.P. Sheetz. "Cooperative Vinculin Binding to Talin Mapped by Time-Resolved Super Resolution Microscopy." *Nano Lett.*, **16**, 4062-4068 (2016).
78. J.D. Boeke, G. Church, A. Hessel, N.J. Kelley, *et al.* (V.W. Cornish). "GENOME ENGINEERING. The Genome Project-Write." *Science*, **353**, 126-127 (2016).
79. A.V. Anzalone, Z. Chen, V.W. Cornish. "Synthesis of Photoactivatable Azido-Acyl Caged Oxazine Fluorophores for Live-Cell Imaging." *Chem. Commun.*, **52**, 9442-9445 (2016).
80. I.V. Sergeyev, R. Rogawski, Y. Li, Ottaviani MF, V.W. Cornish, A.E. McDermott. "Dynamic Nuclear Polarization Signal Enhancement with High-Affinity Biradical Tags." *J. Phys. Chem. B*, **121**, 1169-1175 (2017).
81. L. Wei, Z. Chen, L. Shi, R. Long, A.V. Anzalone, L. Zhang, F. Hu, R. Yuste, V.W. Cornish, W. Min. "Super-Multiplex Vibrational Imaging." *Nature*, **544**, 465-470 (2017).
82. N. Ostrov[†], M. Jimenez[†], S. Billerbeck[†], J. Brisbois, J. Matragrano, A. Ager, V.W. Cornish. "A Modular Yeast Biosensor for Low-Cost Point-of-Care Pathogen Detection." *Science Advances*, **3**, e1603221 (2017).
83. Y.Z. Ng, P.A. Baldera-Aguayo, V.W. Cornish. "Fluorescence Polarization Assay for Small Molecule Screening of FK506 Biosynthesized in 96-Well Microtitre Plates." *Biochemistry*, **56**, 5260-5268 (2017).
84. V.W. Cornish. "Ronald Breslow (1931-2017)." *Nature*, **552**, 176 (2017).
85. E. Herbst, P.A. Baldera-Aguayo, H. Lee, V.W. Cornish. "A Yeast Three Hybrid Assay for Metabolic Engineering of Tetracycline Derivatives." *Biochemistry*, **57**, 4726-4734 (2018).
86. R.C. Fleisher, V.W. Cornish, R.L. Gonzalez, Jr. "D-Amino Acid Mediated Translation Arrest Is Modulated by the Identity of the Incoming Aminoacyl-tRNA." *Biochemistry*, **57**, 4241-4246 (2018).
87. S. Billerbeck, J. Brisbois, N. Agmon, M. Jimenez, J. Temple, M. Shen, J. Boeke, V.W. Cornish. "A Scalable Peptide-GPCR Language for Engineering Multicellular Communication." *Nat. Commun.*, **9**, 5057 (2018).

88. A.V. Anzalone, S. Zairis, A.J. Lin, R. Rabadan, V.W. Cornish. "Interrogation of Eukaryotic Stop Codon Readthrough Signals by *In Vitro* RNA Selection." *Biochemistry*, **58**, 1167-1168 (2019).
89. M.A. Shandell, J.R. Quejada, M. Yazawa, V.W. Cornish, R.S. Kass. "Detection of Nav1.5 Conformational Change in Mammalian Cells Using the Noncanonical Amino Acid ANAP." *Biochemistry*, **117**, 1352-1363 (2019).
90. J Gerke, D Schneider, A Poehlein, G Braus, V.W. Cornish. "Draft Genome Sequence of *Saccharomyces cerevisiae* LW2591Y, a Laboratory Strain for *In Vivo* Multigene Assemblies." *Microbiology Resource Announcements*, **10**, e01418-20 (2021).
91. A.V. Anzalone*, M. Jimenez*, V.W. Cornish*. "FRAME-tags: Genetically Encoded Fluorescent Markers for Multiplexed Barcoding and Time-Resolved Tracking of Live Cells." *bioRxiv*, **04.09.436507** (2021).
92. E. Herbst, A. Lee, Y. Tang, S.A. Snyder, V.W. Cornish. "Heterologous Catalysis of the Final Steps of Tetracycline Biosynthesis by *Saccharomyces cerevisiae*." *ACS Chem. Bio.*, **16**, 1425-1434 (2021).
93. M.A. Shandell*, Z. Tan*, V.W. Cornish*. "Genetic Code Expansion: A Brief History and Perspective." *Biochemistry* **60**, **46**, 3455-69 (2021).
94. S. Billerbeck*, V.W. Cornish*. "Peptide-Dependent Growth in Yeast Via Fine-Tuned Peptide/GPCR-Activated Essential Gene Expression." *Biochemistry*, **61**, 150–159 (2022).
95. P.A. Baldera-Aguayo*, A. Lee, V.W. Cornish*. "High-Titer Production of the Fungal Anhydrotetracycline, TAN-1612, in Engineered Yeasts." *ACS Synth. Biol.*, **11**, 2429-2444 (2022). Featured in Derek Lowe blog *In the Pipeline* "Let the Yeast Do It" in *Science*, July 7 (2022).
96. T. Crnković, B. Bokor, M. Lockwood, V.W. Cornish*. "Variant Detection by a Living Yeast Biosensor via an Epitope-Selective Protease." *BioDesign Research*, **5**, Article 0003 (2023).
97. S. Billerbeck* and V.W. Cornish*,. "Creating and Understanding New-to-Nature Chemistry." *Curr. Opin. Chem. Biol.*, *Invited Editorial and Section Editor, Submitted*.
98. D.M. Rios*, T. Crnković*, C.I. Aneke, J.-H. Joun, A. Seyedmousavi, and V.W. Cornish,. "A Living Yeast Biosensor for Rapid Diagnosis of *Aspergillus fumigatus* Infection." *Submitted*.
99. D.M. Rios, T. Crnković, T. Briese, and V.W. Cornish,. "Directed Evolution of a Living Yeast Biosensor for SARS-CoV-2." *In Preparation*.
100. T. Crnković and V.W. Cornish,. "Playing with Nature's Chemistry." *J. Am. Chem. Soc.*, *Invited Review, In Preparation*.
101. A. Jafariyan, A. Skowronski, J. Qi, K. Garakani, E. Abaci, C. Leduc, V.W. Cornish*. "Living Yeast Dressings Engineered Via Synthetic Biology to Deliver Protein Factors to Diabetic Wounds." *In Preparation*.

Patents

Issued

US Patent #7,083,918 B2 (8/1/06) V.W. Cornish, A. Althoff. Bacteria Small-Molecule Three-Hybrid System.

US Patent #7,419,780 (9/2/08) V.W. Cornish. Methods and Assays for Screening Protein Targets.

US Patent #7,575,866 (8/18/09) V.W. Cornish. Ligand/Binding Partner Bio-Labeling Systems.

US Patent #9,169,481 (10/27/15) V.W. Cornish. Cell-Mediated Directed Evolution.

US Patent #10,302,650 (5/28/19) V.W. Cornish. High-Throughput Fluorescence Polarization Microorganism Screening Assay.

US Patent # 10,725,036 and EP3221464 (7/28/2020) V.W. Cornish. Detection of Analytes Using Live Cells.

US Patent #11,899,014 (2/13/24) V.W. Cornish. Detection of Analytes Using Live Cells.

DE Patent #3,221,464 (2/23/22) V.W. Cornish. Detection of Analytes Using Live Cells.

EP Patent #3,221,464 (2/23/22) V.W. Cornish. Detection of Analytes Using Live Cells.

FR Patent #3,221,464 (2/23/22) V.W. Cornish. Detection of Analytes Using Live Cells.

GB Patent #3,221,464 (2/23/22) V.W. Cornish. Detection of Analytes Using Live Cells.

IT Patent #3,221,464 (2/23/22) V.W. Cornish. Detection of Analytes Using Live Cells.

Filed

US Patent Application #10/056,874 (2/23/01), V.W. Cornish. Covalent Chemical Inducers of Protein Dimerization and Their Uses in High Throughput Binding Screens.

US Patent Application # 09/768,479 (1/10/02) V.W. Cornish. An In Vivo Screen Using Chemical Inducers of Dimerization.

US Patent Application # 61/038,599 (11/10/03) V.W. Cornish. An In Vivo Screen Using Chemical Inducers of Dimerization.

US Patent Application# 11/219506 (9/1/05) M. Sheetz, L. Miller, V. Cornish. Ligand/Binding Partner Bio-Labeling Systems.

US Patent Application # PCT/US06/037919 (9/29/06), V.W. Cornish, L. Miller. Targeting Ligand with Binding Sensitive Fluorescence.

US Patent Application #PCT/US07/70142 (5/31/07) V.W. Cornish, L. Gartenmann Dickson. Ribosome And RNA Display of Biologically Active Small Molecules (RRDBASM).

US Patent Application #PCT/US07/15568 (7/5/07) V.W. Cornish, P. Peralta-Yahya, J. Bronson. Cell-Mediated Directed Evolution.

US Patent Application # 61/063,032 (1/31/08) V.W. Cornish, S. Gallagher. Imaging Of Messenger RNA In Vivo Using An RNA Aptamer/Ligand Pair.

US Patent Application # 61/038,599 (3/21/08) V.W. Cornish, S. Gallagher. In Vivo Protein Imaging by Covalent Labeling of Fusion Proteins.

US Patent Application # 12/221,180 (7/30/08), V.W. Cornish. An In Vivo Screen Using Chemical Inducers of Dimerization

US Patent Application # 61/827,066 (5/24/13) V.W. Cornish. Quorum Sensor-Based Cholera Detection.

US Patent Application # 61/992,793 (5/13/14) V.W. Cornish. Directed Evolution of RNA Using RNA-Peptide Fusion.

US Patent Application # 61/993,210 (5/14/14) V.W. Cornish. An In Vitro Selection for Translation Reprogramming.

US Patent Application # 62/115,222 (2/12/15) V.W. Cornish. Combined Biosynthetic and Total Synthetic Production of a Taxol Intermediate.

US Patent Application # 62/387,306 (12/23/15) V.W. Cornish. Fluorescence Polarization Assay for High-Throughput Screening of FK506 Produced in Microtiter Plates.

PCT Publication WO/2020/124093 (12/16/19) A.V. Anzalone, M. Jimenez, V.W. Cornish. Genetically Encoded Ratiometric Fluorescent Barcodes.

PCT Publication WO/2020/251697 (4/30/20) J.R. Brisbois, J. Boeke, M. Jimenez, N. Agmon, S. Billerbeck, V.W. Cornish. Scalable Peptide-GPCR Intercellular Signaling Systems.

PCT Publication WO/2020/257794 (6/22/20) V.W. Cornish. Systems and Methods for Metabolic Engineering.

US Patent Application # 62/933,249 (11/8/2020) V.W. Cornish. Methods For Engineering Therapeutics and Uses Thereof.

PCT Publication WO/2021/092589 (11/9/20) V.W. Cornish. Methods for Engineering Therapeutics and Uses Thereof.

US Patent Application # 17/347,285 (6/14/21) A.V. Anzalone, M. Jimenez, V.W. Cornish. Genetically Encoded Ratiometric Fluorescent Barcodes.

PCT Publication WO/2022/006146 (6/29/21) V.W. Cornish. Yeast-Based Vaccines.

US Patent Application # 17/514,648 (10/29/21) J.R. Brisbois, J. Boeke, M. Jimenez, N. Agmon, S. Billerbeck, V.W. Cornish. Scalable Peptide-GPCR Intercellular Signaling Systems.

US Patent Application # 17/556,708 (12/20/21) V.W. Cornish. Systems and Methods for Metabolic Engineering.

US Patent Application # 17/738,799 (5/6/22) V.W. Cornish. Methods for Engineering Therapeutics and Uses Thereof.

PCT Publication WO/2022/246003 (5/18/22) V.W. Cornish. Live Yeast Biosensors and Methods of Use Thereof.

PCT Publication WO/2023/064638 (10/17/22) V.W. Cornish. Compositions and Methods for Treating Skin Conditions.

US Patent Application # 18/090,083 (12/28/22) V.W. Cornish. Yeast-Based Vaccines.

Companies Started

Celsyntec, Inc. formed October 4, 2022

Integral Discovery, Inc. formed February 12, 2025

Invited Presentations

- 1996 Gilead Sciences
Foster City, CA, August 23
- 1997 Columbia University, Department of Chemistry
New York, NY, February 11
- University of Delaware, Department of Chemistry
Newark, DE, April 5
- 1999 Columbia University, Department of Biochemistry and Molecular Biophysics
New York, NY, February 12
- 2000 Columbia University, Department of Pharmacology
New York, NY, March 13
- Wesleyan University, Department of Chemistry
Middletown, CT, April 5
- National Science Foundation Physical Organic Workshop
Warner Springs, CA, June 24-27
- Columbia University, National Science Foundation 50th Anniversary Celebration
New York, NY, December 8
- 2001 SUNY Stony Brook, Department of Chemistry
Stony Brook, NY, February 12
- Swarthmore College, Department of Chemistry
Swarthmore, PA, March 8
- Columbia University, R.C. Breslow Symposium
New York, NY, March 24
- Wyeth-Ayerst Research
Princeton, NJ, April 2
- Columbia University, Department of Biochemistry and Molecular Biophysics
New York, NY, April 12
- New England Biolabs
Beverly, MA, April 26
- Diadexus
Santa Clara, CA, May 14
- Bio-Organic Gordon Research Conference
Andover, NH, June 19
- Rigel Inc.
South San Francisco, CA, August 17
- American Chemical Society Meeting
Chicago, IL, August 26

Rensselaer Polytechnic Institute, Department of Chemistry
Troy, NY, September 18

New York University, Department of Chemistry
New York, NY, October 16

Columbia University, Department of Chemistry, IAP Symposium
New York, NY, November 5

Rutgers University, Department of Chemistry
Piscataway, NJ, November 27

Williams College, Department of Chemistry
BIMO Class of 1960 Speaker
Williamstown, MA, November 30

2002 Clark Atlanta University
Atlanta, GA, January 14

University of Pennsylvania, Department of Chemistry
Philadelphia, PA, January 24

Hofstra University, Department of Chemistry
New York, NY, February 6

University of Illinois, Urbana-Champaign, Department of Chemistry
Urbana, IL, February 20

Hudson-Bergen Chemical Society
Jersey City, NJ, February 22

Pharmacopeia
Princeton, NJ, March 13

University of British Columbia, Department of Chemistry
Vancouver, British Columbia, Canada, April 19

University of Alberta, Department of Chemistry
Alberta, British Columbia, Canada, April 22

Biological Chemistry Symposium, Yale University, Department of Chemistry
New Haven, CT, May 17

National Science Foundation Organic Synthesis Workshop
Squam Lake, NH, June 27-July 1

Rockefeller University, Department of Pharmacology
New York, NY, September 3

Texas A&M, Department of Biochemistry
College Station, TX, October 2

University of Texas, Austin, Department of Chemistry
Austin, TX, October 4

- Stanford University, Department of Chemistry
Stanford, CA, October 16
- 2003 Princeton University, Department of Chemistry
Princeton, NJ, April 17
- University of California, Irvine, Department of Chemistry
Irvine, CA, April 30
- Harvard University, Department of Chemistry
Cambridge, MA, May 5
- University of California, Berkeley, Department of Chemistry
Berkeley, CA, May 13
- Proteins Gordon Research Conference
Plymouth, NH, June 22-27
- Hoffman-La Roche
Nutley, NJ, July 22
- American Chemical Society Meeting
New York, NY, September 7-11
- Conference Universitaire De Suisse Occidentale 3E Cycle En Chimie
Champéry, Switzerland, September 14-18
- Boston University, Department of Chemistry
Boston, MA, September 29
- University of Michigan, Department of Chemistry
Ann Arbor, MI, October 10
- Columbia University, Cancer Center Retreat
New York, NY, October 21
- University of Pennsylvania, Department of Biochemistry and Biophysics
Philadelphia, PA, November 26
- Massachusetts Institute of Technology, Department of Chemistry
Cambridge, MA, December 8
- University of California, Berkeley, Department of Chemistry
Berkeley, CA, December 16
- 2004 University of California, San Francisco, Biophysics and CCB Program
San Francisco, CA, January 22
- University of Kentucky, Department of Molecular and Biomedical Pharmacology
Louisville, KY, February 19
- NIH Chemical Genomics Symposium
Washington, DC, March 15-16
- Duke University, Department of Chemistry
Raleigh, NC, March 26

University of Chicago, Department of Biochemistry & Molecular Biology
Chicago, IL, May 19

Northwestern University, Department of Chemistry
Evanston, IL, May 20

Beilstein Bozen Workshop "The Chemical Theatre of Biological Systems"
Bozen, Italy, May 24-28

Bio-Organic Gordon Research Conference
Andover, NH, June 13-18

Bioanalytical Sensors Gordon Research Conference
Oxford, UK, July 4-9

Protein Society Meeting
San Diego, CA, August 14-18

University of Delaware, Department of Chemistry
Newark, DE, September 27

University of Kentucky, Department of Molecular and Biomedical Pharmacology
Louisville, KY, October 14

NSF Workshop "Molecular Basis of Life Processes"
Oakridge, TN, October 28-30

University of Pittsburgh, Department of Chemistry
Paul Dowd Lectureship
Pittsburgh, PA, November 8-9

2005 Albert Einstein College of Medicine, Department of Biochemistry
New York, NY, July 28

Protein Society Symposium
Boston, MA, July 31-August 3

New York Academy of Sciences "Frontiers of Biomedical Science Conference"
Shanghai, China, October 19-20

Memorial Sloan-Kettering, Molecular Pharmacology & Chemistry Seminar
Series
New York, NY, November 22

City College of CUNY, Department of Biochemistry
New York, NY, December 7

2006 Mount Holyoke College, Department of Chemistry
Lucy Pickett Lectureship
South Hadley, MA, February 23

University of Montreal, Department of Chemistry
Montreal, Canada, March 15

University of North Carolina, Department of Chemistry
Breslow Award Symposium
 Chapel Hill, NC, March 26-30

Pennsylvania State University, Department of Chemistry
 University Park, PA, April 6

University of Wisconsin, Madison, Department of Chemistry
 Madison, WI, April 18

NSF Workshop, "Reconsidering the Textbook"
 Washington, D.C., May 24-25

Schultz Group Symposium
 San Diego, CA, June 2-4

Gordon Research Conference on Biocatalysts
 Bryant University, Smithfield, RI, July 9-14

Jane Coffin Childs Fund Symposium
 New Haven, CT, October 20-22

Wyeth, Pearl River
 Pearl River, NY, November 2

New York University, Department of Chemistry
 New York, NY, December 5

2007 Keystone Symposium on Integrative Basis of Cardiovascular Disease
 Breckenridge, CO, January 22-27

Tufts University, Department of Chemistry
 Boston, MA, January 30

Grand Valley State University, Department of Chemistry
Ott Lectureship
 Allendale, MI, April 3-4

University of Chicago, Department of Chemistry
 Chicago, IL, April 20

Columbia University, Department of Physiology
 New York, NY, May 15

Advances in Biomolecular Engineering: Protein Engineering Symposium
 New York Academy of Sciences and Polytechnic University
 Brooklyn, NY, May 22

Alcon Pharmaceuticals
 Fort Worth, TX, July 16

SUNY Buffalo, Department of Chemical and Biological Engineering
 Buffalo, NY, December 5

2008 Max Planck Institute
 Cologne, Germany, January 16

Manchester Interdisciplinary Biocentre
Manchester, United Kingdom, January 17

NIH Chemistry Interest Group
Bethesda, MD, March 20

The Scripps Research Institute, Department of Chemistry
La Jolla, CA, April 25

Protein Society Symposium
San Diego, CA, July 19-23

Federation of European Biochemical Societies Advanced Lecture Course
New Developments in Quantitative Molecular Biosciences
Spetses, Greece, September 10-17

University of Kansas, Departments of Chemistry and Molecular Biosciences
14th Annual Symposium of Dynamic Aspects of Chemical Biology
Lawrence, KS, October 24

2009 Douglass College, Rutgers University, Department of Chemistry
Wyeth/Douglass Lecturer
New Brunswick, NJ, February 23

ACS Presidential Event Symposium
Chemical Synthetic Biology: Partnering for Innovation and Competitiveness
237th ACS National Meeting
Salt Lake City, UT, March 22-26

ACS Presidential Event Symposium
Pfizer Award in Enzyme Chemistry Symposium
238th ACS National Meeting
Washington, DC, August 16-20

Evolution and Design of Biomolecular Systems Conference
Mallorca, Spain, October 18-20

2010 Albert Einstein College of Medicine, Department of Biochemistry
New York, NY, April 27

Ribosome 2010 Conference
Orvieto, Italy, May 3-7

Stereochemistry Gordon Research Conference
Newport, RI, August 1-6

Protein Society Symposium
San Diego, CA, July 31-August 5

Cornell University, Department of Chemistry
Ithaca, NY, October 14

University of Massachusetts Medical School,
Department of Biochemistry and Molecular Pharmacology
Worcester, MA, December 1

- 2011 Drexel Institute for Biotechnology & Virology Research
Doylestown, PA, January 6
- University of Michigan, Department of Chemistry
Chemical Biology Interface Annual Symposium, Keynote Speaker
Ann Arbor, OH, March 11
- EMBO Practical Course on Methods in Chemical Biology
EMBL Heidelberg, Germany, March 27-April 2
- Case Western Reserve University, Department of Chemistry
Frontiers in Chemistry Lecture
Cleveland, OH, April 14
- University of Georgia, Department of Chemistry
Athens, GA, April 21
- DuPont, Biochemical Science & Engineering *Horizons in Biotechnology* Seminar
Wilmington, DE, October 20
- Cold Spring Harbor Asia Symposium
Design and Synthesis of Biological Systems
Suzhou, China, November 6-11
- 2012 University of California, Berkeley, Department of Chemistry
Berkeley, CA, January 24
- Carnegie Mellon, Department of Chemistry
Pittsburgh, PA, February 9
- ACS National Meeting
San Diego, CA, March 25-29
- Bürgenstock Conference
Brunnen, Switzerland, April 29-May 4
- DSM Biotechnology Center
Delft, Netherlands, May 7
- AACR Chemical Systems Biology Conference
Boston, MA, June 27-30
- Protein Society Symposium
San Diego, CA, August 6-8
- ACS National Meeting
Murray Goodman Symposium
Philadelphia, PA, August 19-23
- 2013 SBE International Conference on Biomolecular Engineering
Keynote Speaker
Miami, FL, January 27-30
- Keystone Symposium Precision Genome Engineering and Synthetic Biology
Breckenridge, CO, March 17-2

The Rockefeller, Chemistry & Biology Seminar Series
New York, NY, May 8

Enzymes, Coenzymes and Metabolic Pathways Gordon Research Conference
Waterville, New Hampshire, July 14-July 19

Chicago Biomedical Consortium Symposium
Chicago, Illinois, October 11

2014 University of North Carolina, Department of Chemistry
Rice Lectureship
Chapel Hill, NC, March 13

ACS National Meeting
Division of Biological Chemistry Program Chair
San Francisco, CA, August 9-14

EMBO Conference Series on Chemical Biology
Heidelberg, Germany, August 20-24

Harvard Medical School
Armenise Symposium on the Chemical: Biology Interface
Boston, MA, November 19

2015 Cornell University
Chemistry Biology Interface Symposium
Ithaca, NY, March 7

Sloan Foundation
Engineering Biology for Science and Industry: Accelerating Progress
New York, NY, April 17

DARPA BRICS Kick-Off Meeting
New Orleans, LA, May 29

Synthetic Biology Project
New York Genome Center
New York, NY, July 14-15

Sc2.0 and Synthetic Genomes Conference
New York Genome Center
New York, NY, July 16-17

HGP2: The Human Genome Synthesis Project
NYU Institute for Systems Genetics
New York, NY, October 31

NSF Workshop: Design Principles for Engineering Biology
Tysons Corner, VA, November 11-12

DARPA BRICS PI Review Meeting
Pasadena, CA, November 12-13

American Chemical Society Pacifichem Meeting
Honolulu, Hawaii, December 16-20

2016 DARPA BRICS PI Review Meeting
Chicago, IL, May 17-19

Synthetic Biology, Engineering, Evolution, and Design Meeting
Keynote Lecture
Chicago, IL, July 18-21

Peter G. Schultz Group Reunion
La Jolla, CA, July 29-31

University of Michigan, Ann Arbor, Department of Biological Chemistry
Ann Arbor, MA, October 19

DARPA BRICS PI Review Meeting
Coronado, CA, November 2-3

Georgia Tech, Department of Chemistry
Atlanta, GA, December 1-2

2017 Biophysical Society Meeting
New Orleans, LA, February 11-15

American Chemical Society Meeting
San Francisco, CA, April 2-6

DARPA BRICS Meeting
Miami, FL, May 23-24

DARPA ELM Meeting
Miami, FL, May 25

Emory University, Department of Biochemistry
Atlanta, GA, June 21-23

Finlay Vaccine Institute and
Center for Genetic Engineering and Biotechnology
Habana, Cuba, July 23 – August 5

University of Pennsylvania, Department of Systems Pharmacology and
Translational Therapeutics
Philadelphia, PA, September 11-12

WISB SynBio Workshop
Venice, Italy, September 19-21

University of Pennsylvania, Department of Systems Pharmacology and
Translational Therapeutics
Philadelphia, PA, October 11-12

2018 Hot Topics Meeting
Havanna, Cuba, January 6-10

University of Pennsylvania, Department of Systems Pharmacology and
Translational Therapeutics
Philadelphia, PA, February 12

- DARPA ELM Meeting
Charleston, SC, May 23-24
- DARPA Ecovative Site Visit
Albany, NY, June 12
- NYU Bioengineering Meeting
New York, NY, May 25
- Live Cell Imaging Conference
Heidelberg, Germany, November 5-7
- Leibniz Institute of Plant Biochemistry, Department of Bioorganic Chemistry
Halle, Germany, November 8
- University of Pennsylvania, Chemical Biology Symposium Keynote Address
Philadelphia, PA, December 14-15
- 2019 The Scripps Research Institute, Department of Chemistry
San Diego, CA, May 3
- DARPA ELM Meeting
Arlington, VA, June 5-6
- 6th International Synthetic & Systems Biology Summer School
Pisa, Italy, July 22-26
- Oregon Health & Science University, Chemical Biology & Physiology Conference
Portland, Oregon, December 12-15
- 2020 Biophysical Society 64th Annual Meeting
San Diego, CA, February 15-19
- NYU Chemical Biology Symposium
Zoom, August 7
- EMBL Conference: Molecular Mechanisms in Evolution and Ecology
Zoom, October 2
- Cal Tech, Department of Chemistry and Chemical Engineering
Zoom, December 2
- 1st International BioDesign Research Conference
Zoom, December 3
- 2021 Google Tech Talk Seminar
Zoom, March 3
- Keystone eSymposia: Synthetic Biology: At the Crossroads of Genetic Engineering and Human Therapeutics
Zoom, May 4
- University of Pennsylvania, Chemistry Biology Interface Symposium
Zoom, July 29

EPFL Single-Molecule Localization Microscopy Symposium, Keynote Speaker
Zoom, September 1

University of Illinois, Urbana Champaign,
Chemistry-Biology Interface Training Program (CBITP), Keynote Speaker
Zoom, October 21

MD Anderson Cancer Center, Department of Systems Biology
Zoom, November 22

2022 Princeton University, Department of Chemistry
Princeton, NJ, April 14

International Genetic Code Expansion, Inaugural Webinar
Zoom, October 20

2023 Science/AAAS and Westlake University, Protein Engineering
Zoom, February 17

Chemistry at the Interface of Biology and Medicine
Columbia University
New York, NY, November 10

Innovations in Wound Healing Meeting
Key Largo, FL, December 9

2024 Columbia University, Department of Systems Biology
New York, NY, January 19

Sloan Kettering, Sanders Tri-Institutional Chemical Biology Seminar Series
New York, NY, February 5

University of Michigan, Alpha Chi Sigma Lectureship
Ann Arbor, MI, March 13

Leibniz Institute for Natural Product Research and Infection Biology
Jena, Germany, April 9

Merck – NJ/NYC Area Universities Symposium
Rahway, NJ, April 19

EMBO Workshop, Recoding and the Diversity of Genetic Decoding
Bantry, Ireland, May 13-18

Sauer Lab Alumni Gathering, MIT
Cambridge, MA, June 2-3

DARPA Tellus Meeting,
Arlington, VA, July 15-16

2025 Emory University, Department of Chemistry
Atlanta, GA, February 11

Pittcon 2025, Synthetic Biology-Based Sensing
Boston, MA, March 3-5

Tufts University, Department of Chemistry
Cambridge, MA, March 5

DARPA Tellus Meeting,
Arlington, VA, April 25

(scheduled)

Optical Probes Conference
Scottsdale, AZ, July 20-24

Genome Sciences Symposium
Seattle, WA, September 19

Pacificchem, Koji Nakanishi Symposium
Honolulu, HI, December 15-20

Research Group (current group: 3 Post-Doc, 3 Ph.D., 3 Rotation, 1 Visiting Student, 1 Lab Manager, and 10 Undergrad)

Post-Doctoral Associates	Parmanand Ahirwar Adriana Di Nanni Davida Rios
Ph.D. Students	Kiavash Garakani (MD/PhD) Jiaming Qi (Chemistry) Yiwen Wang (Chemistry)
Rotation Students	Matthew Dennen (Integrated) Aryaman Saksena (Biological Sciences) Thomas Tao (Biological Sciences)
Visiting Student	Gabriel Sandu
Lab Manager	Qianna Wilson
Undergraduate Students	Maurice Chakour Irene Ghobriel Ahmed Hamdan Raelee D. Hollier Evan Jones Enrique Salazar Christopher Sizemore Tonxgin Wu Teresa Xiao Alex Yeun

Previously, I have successfully trained 40 pre-doctoral fellows and 13 post-doctoral fellows. On average, I have a lab size of 15 full-time researchers. I have a deep commitment to promoting diversity in the sciences and on average many as half of the students in my laboratory represent DEI. Five representative trainees are listed below, along with their current positions.

Hening Lin, PhD – Pre-doctoral Fellow

Current Position: HHMI and Professor, University of Chicago, Department of Chemistry and Department of Medicine

Richard Wombacher, PhD – Post-doctoral Fellow

Current Position: Group Leader, Max Planck Institute for Medical Research, Department for Chemical Biology, Heidelberg

Pamela Peralta-Yahya, PhD – Pre-doctoral Fellow

Current Position: Professor, Georgia Tech, Department of Chemistry & Biochemistry and Department of Chemical Engineering

Sonja Billerbeck, PhD – Post-doctoral Fellow

Current Position: Associate Professor, Department of Bioengineering, Imperial College London

Laura Wingler, PhD – Pre-doctoral Fellow

Current Position: Assistant Professor, Duke University, Department of Pharmacology and Cancer Biology

Teaching Experience

Department of Chemistry, Columbia University, New York, NY
SCNC C1000: Frontiers of Science Co-Lecturer (Fall 2011)

Department of Chemistry, Columbia University, New York, NY
SCNC C1100: Frontiers of Science Seminar Leader (Fall 2011)

Department of Chemistry, Columbia University, New York, NY
W4510-4511: Molecular Systems Biology I and II (co-taught Fall 2007, Fall 2008 and Spring 2008)

Department of Chemistry, Columbia University, New York, NY
C3443: Organic Chemistry for Undergraduates (Fall 1999, Fall 2000, Fall 2001, Fall 2002, Fall 2003, Fall 2004, Fall 2005, Fall 2006, Fall 2007, Fall 2008, Fall 2010, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2021, Fall 2023)

Department of Chemistry, Columbia University, New York, NY
W4312: Chemical Biology (Fall 2004, Fall 2006, Fall 2010, Fall 2011, Fall 2012, Fall 2013, Fall 2014, Fall 2015, Fall 2016, Fall 2017, Fall 2018, Fall 2020, Fall 2022, Fall 2023, Fall 2024)

Department of Chemistry, Columbia University, New York, NY
G8312: Current Topics in Protein Chemistry (Spring 2001, Fall 2001, Fall 2002)

Department of Chemistry, Columbia University, New York, NY
C3046: Intensive Organic Chemistry for Undergraduates (Spring 1999)

Department of Chemistry, University of California, Berkeley, CA
Teaching Assistant, graduate course in Physical-Organic Chemistry
Teaching Assistant, undergraduate course in Organic Chemistry

Department of Chemistry, Columbia University, New York, NY
Teaching Assistant, undergraduate course in General Chemistry

Collaborations

Professor Alastair Ager (Director, Institute of Global Health and Development, Queen Margaret University, Edinburgh)—living yeast biosensors

Professor Thomas Briese (Associate Professor Epidemiology, Center for Infection and Immunity, Columbia University Medical Center)—living yeast biosensors

Professor Charles LeDuc (Assistant Professor, Department of Pediatrics, Columbia University Medical Center)—living yeast for wound healing

Professor Erbil Abaci (Assistant Professor, Department of Dermatology, Columbia University Medical Center)—living yeast for wound healing

Professor Peter Kwong (Chief Structural Biology Center, Virology Research Center, National Institutes of Health)—living yeast vaccines

Professor Larry Shapiro (Professor of Biochemistry and Molecular Biophysics, Columbia University Medical Center)—living yeast vaccines

Professor Moriya Tsuji (Professor of Medicine, Aaron Diamond AIDS Research Center, Columbia University Medical Center)—living yeast vaccines

Professor Scott Snyder (Department of Chemistry, University of Chicago)—metabolic engineering small molecule therapeutics in yeast

Professor Yi Tang (Department of Chemical and Biomolecular Engineering, University of California, Los Angeles)—metabolic engineering small molecule therapeutics in yeast

Professor Harris Wang (Department of Systems Biology, Columbia University)—synthetic yeast communities

Professor Ken Shepard (Department of Electrical Engineering, Columbia University)—synthetic yeast communities

Current Support

HR001123S0027 (PI Cornish, Co-PI Shepard, 10 Additional Co-PIs) 7/18/2024 – 8/31/2025
 DARPA Tellus \$431,876 (annual direct cost Cornish Lab)
 \$7,377,315 (total direct cost)

“MEBES: Modular Engineered Biosensors for Environmental Sensing”

The overarching objective of this proposal is to develop methodology that will make it possible to rapidly deliver biological biosensors that are tolerant to a wide range of field conditions, that can sense virtually any threat, and that deliver a remote physical readout.

R35 AABT2642 (PI Cornish) 5/1/2024 – 3/31/2029
 NIH MIRA \$362,000 (annual direct cost Cornish Lab)
 \$1,810,000 (total direct cost)

“Living Yeast Sense-Respond Therapeutic Communities Engineered with Synthetic Biology”

The goal of this application is to develop broadly enabling synthetic biology tools and strategies for engineering yeast biosensors, yeast therapeutics, and yeast sense-respond communities. To meet this goal, we plan to develop yeast that can sense different bacterial infections in wounds, secrete different antibiotics in wounds, and finally can secrete specific antibiotics in response to the bacteria present in the wound.

Pending Support

2452596 (PI Cornish, Co-PI Shepard, 3 Additional Co-PI's) 1/15/2025 – 1/16/2028
 NSF

Convergence Accelerator Phase I Track L \$5,000,000 (total direct cost)

“NSF Convergence Accelerator Track L: Engineered Microbial Sensors for Monitoring Polyfluoroalkyl Substances in Drinking Water”

The project seeks the convergence of synthetic biology, bioelectronics, and machine learning approaches to provide point-of-use sensors for assessing water quality and specifically polyfluoroalkyl substances with broad implications for public health and environmental protection.

Project recommended for funding, project funding pending.

Support Completed in Past Three Years

ITE 23-44359 (PI Cornish, Co-PI Shepard, 5 Additional Co-PI's) 1/15/2024 – 12/31/2024
 NSF \$85,475 (annual direct cost Cornish Lab)
 Convergence Accelerator Phase I Track L \$435,089 (total direct cost)

“Engineered Microbial Sensors for Assessing Water Quality”

The project seeks the convergence of synthetic biology, bioelectronics, and machine learning approaches to provide point-of-use sensors for assessing water quality with broad implications for public health and environmental protection.

5UL 1TR001873-08 (PI Cornish, Co-PI Tsuji) 6/1/2023 – 5/31/2024
 NIH Collaborative and Multidisciplinary Pilot Research \$10,000 (annual direct cost Cornish Lab)
 Columbia University Medical Center

“Immunological Testing of a Yeast Candida Vaccine”

This project aims to develop a novel synthetic biology living yeast-based vaccine platform.

Pilot and Feasibility Grant (PI Cornish, Co-PI Leduc) 2/1/2023 – 1/31/2024
 Columbia University \$35,000 (annual direct cost Cornish Lab)

“Treatment of Diabetic Foot Ulcers Via Live Yeast Secreting Wound Healing Factors”

This project aims to develop recombinant yeast that produce wound-healing factors for the treatment of diabetic foot ulcers. Here we propose to design and engineer yeast strains that secrete bioactive wound-healing protein factors in high titers, assess the secretion level and the bioactivity of the secreted factors assess the wound-healing properties of the live recombinant

Pilot and Feasibility Grant (PI Cornish, Co-PI Leduc) 2/1/2022 – 1/31/2023
Columbia University \$50,000 (annual direct cost Cornish Lab)
“Treatment of Diabetic Foot Ulcers Via Live Yeast Secreting Wound Healing Factors”

This project aims to develop recombinant yeast that produce wound-healing factors for the treatment of diabetic foot ulcers. Here we propose to design and engineer yeast strains that secrete bioactive wound-healing protein factors in high titers, assess the secretion level and the bioactivity of the secreted factors assess the wound-healing properties of the live recombinant yeast strains, construct and assess simple live-yeast hydrogel dressings, assess the properties of the engineered dressings in animal models, assess the wound-healing mechanism of action of the recombinant yeast strains by studying the activated pathways in the wound bed.

BiomedX Accelerator Award (PI Cornish, Co-PIs Ager, Briese) 7/1/2021 – 6/30/2022
Columbia University \$100,000 (annual direct cost Cornish Lab)
“A Living Yeast Biosensor for Diagnostic Applications”

This project will create low-cost, sensitive, specific, simple, and rapid diagnostics to efficiently identify viral infections, such as SARS-CoV-2, that can be performed at home and at scale. The At-Home Antigen Lateral Flow Assays diagnostics can be used at home but remain >\$10/test because of manufacturing, shipping, and storing antibodies.

R01 GM134293-01A1 (PI Cornish, Co-PI Snyder) 4/1/2020 – 3/31/2025
NIH \$280,625 (annual direct cost Cornish Lab)
“General and High-Throughput Small Molecule Screens and Selections for Metabolic Engineering”

This project will create general and high-throughput screens/selections for small molecules - overcoming the current bottleneck to metabolic engineering. If successful, these technologies will enable powerful directed evolution approaches to be routinely applied for the biosynthesis of natural products, analogs and beyond.

BTO-BRICS (PI Schaak, Ecovative, Co-PI Cornish) 4/1/2017 - 6/21/2021
DARPA. \$435,491 (annual direct cost Cornish Lab)
“Sustainable Biologically Active Modular Building Materials”

This project will create a prototype for a living, responsive, regenerating fungal composite building material that can be shipped across the globe at a tiny fraction of the cost of standard building materials. The material will remain biologically active through its intended usable life, and will retain both its native and engineered living properties.

Consulting

International Flavors and Fragrances, NY

Merck, Rahway, NJ

Pfizer, Cambridge, MA

Acidophil, LLC, Baltimore, MD

Gibbons Law, NY, 2016

Perkins Coie LLP, 2024

Service to Department

After receiving tenure, I consciously chose to focus on hiring at all levels—Ph.D. students, faculty, etc. guided by a dual emphasis on excellence and diversity. As Chair of Ph.D. Admissions, I successfully recruited top Ph.D. classes every year of my leadership. Also, I took the Ph.D. class from almost 0 to over 10% Ph.D. class students of color. For faculty recruitment, I served officially on faculty search committees but even more proactively recruited and mentored faculty regardless of official searches or mandates but driven rather by faculty quality. I played a significant role in the recruitment of Ruben Gonzalez in the Department of Chemistry and led the recruitment of Harris Wang in the Department of Systems Biology. I actively supported Brent Stockwell, Ruben Gonzalez, Laura Kaufman, and Wei Min when they were Assistant Professors as evidenced by joint grants and/or publications. Although we did not make offers, in recent years I advocated for hiring Livia Eberlin, Baylor College of Medicine, Dirk Trauner, University of Pennsylvania, and Mandë Holford, Harvard University. Finally, I call out that I participate not only in the Department of Chemistry on the Morningside Campus, but am also a bona fide, active member of the Department of Systems Biology at CUIMC (the Medical Campus).

Admissions Committee, 1999-2002

Security Committee, 2000-2002

Language Committee, 1999-2001, 2003-2005

Colloquium Coordinator, Spring 2001, Spring 2006

Undergraduate Committee, 2005-2006, 2017-present

Graduate Committee, 2005-2006

Safety Committee, 2003-2004

Space & Services Committee, 2006-2008

Ad Hoc Committee on Undergraduate Curriculum, 2006-2008

Ad Hoc Committee on Gender, 2006-2008

Admissions Committee, Chair, 2008-2012

Chemical Biology Faculty Search Committee, 2014-2015

Advisor for Major in Biochemistry, 2003-2008, 2011-present

Service to University

Likewise, my service to the University has been guided by a desire to build excellence and diversity at all levels. I organically created the “Interdisciplinary BioSciences (iBIO)” group to promote and organize faculty at the chemistry-biology interface across the University to compete with our top peer Institutions. I also co-founded the Columbia Secondary School for Math Science and Engineering (CSS MSE) a joint venture between Columbia and the Department of Education to provide a college-prep level Middle and High School education for students from the Harlem neighborhood and to break through the pipeline challenge for recruiting students of color to the sciences.

A graduate of the CC'91, I also am deeply committed to Columbia College. I am the Faculty Liaison to the Columbia College Women's Board of Directors Alumni Group, served on my CC'91 Reunion Committee this year, and work actively with the College to support Outreach & Development at Columbia. This year I also served on the Columbia College Committee for Awards and Prizes and participated virtually in the College's Graduation as part of service on that Committee.

Faculty Member, Pharmacology Department Graduate Training Program, Biology Department Graduate Training Program, CUMC Integrated Graduate Training Program, Biophysics Graduate Training Program, M.D./Ph.D. Graduate Training Program

Columbia University Representative, Science Coalition "Day of Science", 2000

Speaker, Columbia College Parents Day, 2001, 2002

Speaker, Columbia College Atlanta Alumni Organization, 2002

Faculty Representative, Columbia College Alumni Association Board of Directors, 2003-2008, 2022-present

Committee on Honors, Awards, and Prizes, Columbia College, 2004-2006

Hamilton Award Selection Committee, Columbia College, 2005-2008

Days on Campus Master Class, Columbia University, 2008

Faculty Representative, Columbia Advisory Council, Columbia Math, Science & Engineering Secondary School, (a collaboration between Columbia and the NYC Department of Education which successfully created a grade 6-12 school that is majority underrepresented minorities and competitive with the elite NYC high schools), 2005-present

Faculty Representative, M.D./Ph.D. Program, Columbia University, 2007-present

Horwitz Prize Selection Committee, 2007-2011, 2025-present

Faculty Representative, Columbia College Alumni Association Board of Visitors, 2008-2011

Founder and Co-Organizer, Interdisciplinary Biosciences Program, 2007-2016

Faculty Liaison, Columbia College Women Board of Directors, 2014-present

Co-Chair, Columbia University Neurotechnology Center, 2014-2016

Columbia College, regular tours of my laboratories in Northwest Corner

CCW STEM event, Special Invitation Public Outreach Laboratory Event for Columbia College Women Alumnae, February 27, 2016

CCW 30th Anniversary of Co-Education Speaker, Columbia College, April 22, 2017

Columbia College Science Scholars Dinner, Speaker, April 24, 2017; April 9, 2018

Columbia College Days on Campus, Speaker, April 8, 2019

Columbia College Committee for Awards and Prizes including participation in Columbia College graduation, 2021-present

Faculty Representative, Columbia College Alumni Association Board of Directors, 2003-2008, 2022-present

Service to Field

In addition to traditional service like being a permanent member of my NIH study section, I co-founded and led in 2003 a NYC-wide chemical biology group initially with Tom Muir and Tarun Kapoor (both Rockefeller at time) and now sponsored by the New York Academy of Sciences. In addition, I was a founding member in 2016 and am on the Scientific Executive Committee for GP-Write, a global organization for synthetic biology. Last year I also accepted to be a member of the Board of Reviewing Editors for the journal Science.

Reviewer, *Angew. Chem.*, *ChemBioChem*, *Chem. & Biol.*, *J. Am. Chem. Soc.*, *ACS Chemical Biology*, *Nature*, *Nature Biotechnology*, *Nature Methods*, *Nature Chemical Biology*, *Science*, *Proc. Natl. Acad. Sci. USA*

Reviewer, NSF Organic Chemistry/Dynamics CAREER Panel, 2000, 2002

Ad-Hoc Reviewer, NIH BNP Study Section, 2002

Board of Governors, New York Academy of Sciences, 2004-2010

Editorial Advisory Board, *ChemBioChem*, Wiley VCH, 2004-2015

Editorial Advisory Board, *Molecular BioSystems*, 2004-2008

Protein Society, Nominating Committee, 2006-2009

Reviewer, Beckman Young Investigator Award, 2006, 2007

Permanent Member, NIH SBCB Study Section, 2006-2011

DOE GTL Bioenergy Centers Reviewer, 2007, 2011

American Chemical Society, Program Committee, 2012-2014, organizing Biology Program 2014 ACS Meeting San Francisco

Reviewer, NIH SBIR, 2014

Reviewer, NIH CSR Ranking Pilot, 2015

Reviewer, European Research Council, Starting Grant Review Panel, March 12-13 and June 11-14, 2019, Brussels, Belgium

Member, NSF Subcommittee, MPS and the Living World, 2020-2021

Reviewer, NIH Special Emphasis Panel, 2021

Reviewer, Allen Distinguished Investigator Awards, 2021

Founder, Co-Chair, and now member Steering Committee, NYC Chemical Biology Discussion Group, New York Academy of Sciences, 2003-present

Founding Member and Scientific Executive Committee, GP-Write, 2016-present

Member, Board of Reviewing Editors, Science, 2021-2025

Reviewer, HHMI Gilliam Fellowships Program, 2022

Associate Editor, BioDesign Research, 2022-present