HENING LIN

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(a) Education, training, and research experience

07/01/2006-present Assistant professor, Department of Chemistry and Chemical Biology, Cornell University

2003-2006 Postdoctoral fellow, Harvard Medical School. Advisor: Christopher T. Walsh

1998 - 2003 Ph.D., Bioorganic Chemistry, Columbia University. Advisor: Virginia W. Cornish

1994 -1998 B.S., Chemistry, Tsinghua University, Beijing, China.

(b) Publications

1. J. Du, Y. Zhou, Khan S., H. Jiang, J. Kim, J. Woo, J.H. Kim, S. Zhang, R.A. Cerione, Q. Hao, **H. Lin**, "The enzymatic activity of sirtuins uncovers novel protein posttranslational modifications", *manuscript submitted.*
2. X. Zhu, B. Dzikovski, X. Su, A.T. Torelli, Y. Zhang, S.E. Ealick, J.H. Freed, and **H. Lin**. "Mechanistic understanding of Pyrococcus horikoshii Dph2, a [4Fe-4S] enzyme required for diphthamide biosynthesis", *Mol. BioSystems, 7, 74-81, 2011.*
3. X. Zhu, J. Kim, X. Su, and H. Lin, "Reconstitution of diphthine synthase activity in vitro", *Biochemistry, **49**,* 9649-9657, 2010.
4. Y. Zhang, X. Zhu, A. Torelli, M. Lee, B. Dzikovski, R. M. Koralewski, E. Wang, J. Freed, C. Krebs, S. E. Ealick, **H. Lin**, "Diphthamide biosynthesis requires an Fe-S enzyme-generated organic radical", *Nature,* **465**, 891-896 (2010).
5. H. Jiang, J. H. Kim, K. Frizzell, W. L. Kraus, **H. Lin**, "Clickable NAD analogs for labeling substrate proteins of PARPs", *J. Am. Chem. Soc*., **132**, 9363-72 (2010).
6. Q. Liu, R. Graeff, I. A. Kriksunov, H. Jiang, B. Zhang, B. V. L. Potter, N. Oppenheimer, **H. Lin**, H. C. Lee, Q. Hao, "Structural Basis for Enzymatic Evolution from a Dedicated ADP-ribosyl Cyclase to a Multi- functional NAD Hydrolase", *J. Biol. Chem*., **284**, 27637-27645, (2009).
7. H. Jiang, J. Congleton, Q. Liu, P. Merchant, F. Malavasi, H.C. Lee, Q. Hao, A. Yen, **H. Lin**, "Mechanism-based fluorescent labeling of human CD38", *J. Am. Chem. Soc*., **131**, 1658-1659 (2009).
8. J. Du, H. Jiang, **H. Lin**, "Investigating the ADP-ribosyltransferase activity of sirtuins with NAD analogs and ^{32}P-NAD", *Biochemistry* **48**, 2878–2890 (2009)
9. Q. Liu, I.A. Kriksunov, H. Jiang, R. Graeff, **H. Lin**, H.C. Lee, Q. Hao, "Covalent and non-covalent intermediates of an NAD utilizing enzyme - human CD38", *Chem. Biol.* 15,1068-78 (2008)
10. **H. Lin**, J. Du, H. Jiang, "Posttranslational modifications to regulate protein function", Wiely Encyclopedia of Chemical Biology, 2008.
11. **H. Lin**, "Nicotinamide adenine dinucleotide: beyond a redox coenzyme", *Org. Biomol. Chem.*, 5, 2541-2554 (2007).
12. P. Peralta-Yahya, B.T. Carter, **H. Lin,** H. Tao, V.W. Cornish, "High-throughput selection for cellulase catalysts using chemical complementation", *J. Am. Chem. Soc.* **130**:17446-17452 (2008).
13. M.A. Fischbach, **H. Lin**, et al., "The pathogen-associated iroA gene cluster mediates bacterial evasion of lipocalin 2", *Proc. Natl. Acad. Sci. USA*, 103, 1650 (2006).

14. N. A. Larsen, **H. Lin**, R. Wei, M.A. Fischbach, C.T. Walsh, “Structural characterization of enterobactin hydrolase IroE”, *Biochemistry*, 45, 10184 (2006).

15. **H. Lin**, M.A. Fischbach, G.J. Gatto, D.R. Liu, C.T. Walsh, “Bromoenterobactins as potent inhibitors of the pathogen-associated, siderophore-modifying C-glycosyltransferase”, *J. Am. Chem. Soc.*, 128, 9324 (2006).

16. M. A. Fischbach, **H. Lin**, D.R. Liu, C.T. Walsh, “How pathogenic bacteria evade mammalian sabotage in the battle for iron”, *Nat. Chem. Biol.*, 2, 132 (2006).

17. M. Luo, **H. Lin**, M.A. Fischbach, D.R. Liu, C.T. Walsh, J.T. Groves, “Enzymatic tailoring of the bacterial siderophore enterobactin alters membrane partitioning and iron acquisition”, *ACS Chem. Biol.*, 1, 29 (2006).

18. **H. Lin**, M.A. Fischbach, D.R. Liu, C.T. Walsh, “In vitro characterization of salmochelin and enterobactin trilactone hydrolases IroD, IroE, and Fes”, *J. Am. Chem. Soc.*, 127, 11075 (2005).

19. M. A. Fischbach, **H. Lin** (co-first author), D.R. Liu, C.T. Walsh, “In vitro characterization of IroB, a pathogen-associated C-glycosyltransferase”, *Proc. Natl. Acad. Sci. USA*, 102, 571 (2005).

20. **H. Lin** (co-first author), D. Thayer, C.-H. Wong, C.T. Walsh, "Macrolactamization of glycosylated peptide thioesters by the thioesterase domain of tyrocidine synthetase", *Chem. Biol.* 11, 1635 (2004).

21. **H. Lin**, C.T. Walsh, "A Chemoenzymatic Approach to Novel Glycopeptide Antibiotics", *J. Am. Chem. Soc.*, 126, 13998 (2004).

22. E. Yeh, **H. Lin**, S.L. Clugston, R.M. Kohli, C.T. Walsh, "Enhanced macrocyclizing activity of the thioesterase from tyrocidine synthetase in presence of nonionic detergent", *Chem. Biol.* **11**, 1573 (2004).

23. B.T. Carter, **H. Lin**, V.W. Cornish, “Yeast n-Hybrid Systems for Molecular Evolution”, Directed Molecular Evolution of Proteins, S Brakmann, K Johnsson, Eds. Wiley-VCH Verlag, Weinheim, ISBN 3-527-30423-1.

24. W.M. Abida, B.T. Carter, E.A. Althoff. **H. Lin**, V.W. Cornish, “Receptor-Dependence of the Transcription Read-Out in a Small-Molecule Three-Hybrid System”, *Chembiochem.* **3**, 887 (2002).

25. K. Baker, C. Bleczinski, **H. Lin**, G. Salazar-Jimenez, D. Sengupta, S. Krane, and V.W. Cornish, “Chemical complementation: A reaction-independent genetic assay for enzyme catalysis”, *Proc. Natl. Acad. Sci. USA*, **99**, 16537 (2002). Featured in a commentary in *Proc. Natl. Acad. Sci. USA*, **99**, 16513-16515 (2002) and in *Chem. & Eng. News*, **81**, 1, 24 (2003).

26. C. Forster, Z. Tan, M. N. L. Nalam, **H. Lin**, H.Qu, V. W. Cornish, and S. C. Blacklow, “Programming peptidomimetic syntheses by translating genetic codes designed de novo”, *Proc. Natl. Acad. Sci. USA*, **100**, 6353 (2003). Featured in *Chem. Biol.*, **10**, 586-587 (2003) and in *Chem. & Eng. News*, **82**, 3, 64-68 (2004).

27. 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 (2004).

28. **H. Lin**, H. Tao, V.W. Cornish, "Directed Evolution of a Glycosynthase via Chemical Complementation", *J. Am. Chem. Soc.*, 126, 15051 (2004).

29. **H. Lin**, V.W. Cornish, "Screening and Selection Methods for Large-Scale Analysis of Protein Function", *Angew. Chem. Int. Ed*. 41, 4402 (2002).

30. **H. Lin**, V.W. Cornish, "In Vivo Protein-Protein Interaction Assays: Beyond Proteins", *Angew. Chem. Int. Ed*. 40, 871 (2001).

31. **H. Lin**, W.M. Abida, R.T. Sauer, V.W. Cornish, "Dexamethasone-Methotrexate: An Efficient Chemical Inducer of Protein Dimerization In Vivo", *J. Am. Chem. Soc.* 122, 4247 (2000).

(c) Patent applications

1. US Provisional patent application 61/362,078: Modulators for SIRTS and Assay for Screening Same
2. US provisional patent application 61/426,231: High-throughput enzyme activity assay and inhibitors for human Sirt6 and malaria parasiteSir2a.

(d) Honors and Awards

2006	Camille and Henry Dreyfus New Faculty Award
2003	Jane Coffin Childs Fellow, Harvard Medical School
2003	Hammet Award, Columbia University
2001	Arun Guthikonda Memorial Fellow, Columbia University
1998	Graduate with Honor, Tsinghua University
1994-1997	First Prize for Outstanding Academic Achievement, Tsinghua University

(e) Research Support

Current

NF-06-017 The Camille & Henry Dreyfus Foundation
Lin, Hening (PI) 07/01/2006 - 06/30/2011
Combining chemistry, biochemistry, molecular/cell biology to study protein posttranslational modifications
This award proposal is a rough outline of the research program that I intended to pursue as an independent researcher. The goal was to study several protein posttranslational modifications, including diphthamide, ADP-ribosylation, and C-mannosylation.

R01 GM086703-01 NIH/NIGMS
Lin, Hening (PI) 12/01/2008 – 11/30/2013
Chemical approaches for studying the biology of CD38
This proposal aims to study the mode of action of CD38 enzymatic function. Question to be addressed include: (1) Where does the substrate NAD come from? (2) What is the intracellular distribution of CD38? (3) How does the receptor function affect the enzymatic function? (4) Are there unknown natural CD38 ligands in addition to the known ligand CD31?

R01GM088276-01 NIH/NIGMS
Lin, Hening (contact PI) and Ealick, Steve 08/01/2009 – 7/31/2013
Diphthamide biosynthesis
This proposal aims to study how four proteins in eukaryotic cells, Dph1, Dph2, Dph3, and Dph4, catalyze the first step of diphthamide biosynthesis, a posttranslationally modified histidine residue in eukaryotic translation elongation factor 2.

R21 NS073049 NIH/NINDS
Lin, Hening (PI) 09/01/10 – 08/31/12
High-throughput assays for the development of SIRT5-specific inhibitors.

R01 DA030329 NIH/NIDA
Craighead, Harold; Lin, Hening; Lis, John (Contact PI); Zipfel, Warren 10/01/10 – 09/30/2015
In vivo detection and imaging of epigenetic histone modifications and modifying enzymes.

(f) Invited Presentations:

- ACS Northeast Regional Meeting, October, 2006, Binghamton, New York.
- Department of Biomedical Sciences, Cornell University, 2007
- ACS Northeast Regional Meeting, July 2008, Burlington, Vermont.
- Scripps Research Institute, Florida, 12/10/2009
- Florida State University, Department of Chemistry and Biochemistry, 12/15/2009
- NYAS Chemical Biology Discussion Group meeting, 01/25/2010
- University of Nebraska-Lincoln, Department of Biochemistry, 03/23/2010
- University of Washington, Department of Chemistry, 04/21/2010
- SUNY Upstate Medical University, 05/06/2010
- John Hopkins University School of Medicine, Department of Pharmacology and Molecular Sciences, 05/12/2010
- Penn State University, 29th Summer Symposium, "Frontiers in Metallobiochemistry", scheduled 06/02/2010 – 06/05/2010
- Bioorganic Gordon Conference, scheduled for 06/13/2010 -06/18/2010
- ACS 2010 meeting, Boston, "Breakthrough in Biochemistry", 08/22/2010
- Columbia University, Department of Chemistry, 09/30/2010
- Hunter College, Department of Chemistry, 10/01/2010
- University of Minnesota, Department of Medicinal Chemistry, 10/04/2010
- University of Wisconsin, Madison, Department of Chemistry, 10/05/2010
- University of Illinois, Chicago, Department of Chemistry, 10/19/2010
- MIT, Department of Chemistry, 10/25/2010
- Boston University, Department of Chemistry, 10/26/2010
- University of California, Berkeley, Department of Chemistry, 11/02/2010
- University of Texas, Austin, Department of Chemistry and Biochemistry, 11/04/2010
- University of Texas A&M, Department of Chemistry, 11/10/2010
- University of Pennsylvania, Department of Chemistry, 11/18/2010
- Albert Einstein College of Medicine, Department of Biochemistry, 11/30/2010
- 22nd Enzyme Mechanism Conference, St. Pete Beach, 1/2/2011-1/6/2011
- University of California, San Francisco, 01/20/2011
- Yale University, Department of Chemistry, 02/17/2011
- Princeton University, Department of Chemistry, 02/24/2011
- University of Illinois, Department of Chemistry, 02/28/2011
- Sloan-Kettering Memorial Cancer Center, 03/08/2011
- 241st ACS National Meeting & Exposition, Anaheim, CA, 03/29/2011
- 2011 FASEB Summer Research Conference: Histone Deacetylases and Reversible Acetylation in Signaling and Disease, 6/26/2011-7/1/2011, Steamboat Springs, Colorado.
- Enzyme, Co-enzymes, and Metabolic Pathways Gordon Conference, July 10-15, 2011, Waterville Valley, NH

(g) Courses taught:

- Chem 4500: Principles of Chemical Biology, Fall 2009
- Chem 3600: Honor's Organic Chemistry, Spring 2008, 2009, 2010, 2011
- Chem 6670: Topics in Chemical Biology, Fall 2006, 2007, and 2008

(h) Students and postdocs trained

- **Postdoctoral Research Associates (Total 3)**

  Dr. Hong Jiang (September 2006 - present)
  Dr. Jintang Du (January 2007 – Demember 2009)
  Dr. Bin He (November 2009 – present)

- **Graduate Students (Total 8)**

  Current:
  Xuling Zhu (Chemistry, Jan 2007 – Jan 2011)
  Xiaoyang Su (Chemistry, Dec 2007 - present)
  Anita Zhu (Chemistry, Dec 2008 - present)
  Saba Kahn (Chemistry, Jan 2009 - present)
  Jon Shrimp (Chemistry, Jan 2010 – present)

  Past:
  Gil Blum (TPCB rotation student, Jan 2009 – May 2009)
  Kristina Govorovska (BMCB rotation student, May 2008 - Augst 2008)
  Chirag Pungaliya (Chemistry, December 2006 - 2007)
  Ryan King (TPCB rotation student, Jan 2007 - May 2007)
  Colin Gottlieb (Rotation Student, Pharmacology, Oct 2009 - Dec 2009)
  Mariko Yamaguchi (Rotation Student, BMCB, Oct 2009 - Dec 2009)
  Elliot Kahen (Rotation Student, BMCB, Oct 2009 - Dec 2009)

- **Undergraduate students (Total 22)**

  Current:
  Gyung Hoon Kang (Class of 2012, Chemistry, June 2010-present)
  JiSung Jin (Class of 2012, Chemistry, June 2010-present)
  Eva Ge (Class of 2013, Chemistry, May 2010-present)
  Ankur Bajaj (Class of 2013, Chemistry, March 2010-present)
  Diana Cheung (Class of 2013, Chemistry, Nov 2009-present)
  Brian Choi (Class of 2010, Chemistry, Sep 2008-present)
  Ray Kim (Class of 2011, Chemistry, Jan 2009-present)
  Wankyu Lee (Class of 2011, Chemistry, June 2009-present)
  Past:
  Siyi Wang (Class of 2008, Chemistry, Jan 2007- May 2008, graduate student at Princeton University)
  Paolomi Merchant (Class of 2008, Chemistry, Sep 2006- May 2007, graduate student at Columbia University)
  Michael Gavalas (Class of 2009, Human Biology, Health and Society, Sep 2006-May 2008)
  Diane Wu (Class of 2009, Chemistry, Jan 2007-Dec 2007)
  Pierce Stern (Class of 2010, Chemistry, June 2007-Aug 2007)
  Nicole Miller (Class of 2010, Chemistry, Jan 2008-May 2008)

Cooper Citek (Class of 2009, Chemistry, Sep 2006-May 2009, graduate student at Stanford University)
Kedy Edme (May 2009- July 2009, Cornell Leadership Alliance Program student, University of Maryland)
Jungwoo Kim (Class of 2010, Chemistry and Biochemistry, Sep 2007- May 2010, graduate student at U Chicago)
Jun Hyun Kim (Class of 2010, Biology, Jun 2008-Dec 2009, Medical School in Korea)
Jimin Woo (Class of 2010, Chemistry, Jun 2008-Dec 2009, U Penn Medical School)
Eileen Wang (Class of 2010, Chemistry, Sep 2008-May 2010, Intern at Merck)
Sung Won Choi (Class of 2010, Biology, Sep 2008-Dec 2008)
Kyle Horak (Class of 2010, Chemistry, Jan 2009-May 2010, graduate student at Cal Tech)