olin M. Rathbun

September 11, 2019

CONTACT INFORMATION

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EDUCATION

University of California, Irvine, Irvine, CA

Ph.D., Chemistry, September 2012 – May 11, 2018

- **Thesis Advisor**: Associate Professor Jennifer Prescher
- 3.98 cumulative GPA

Hope College, Holland, MI, USA

B.S., Chemistry (A.C.S. Certified), Minor in Mathematics, May, 2012

- **Thesis Advisor**: Professor Jeffrey B. Johnson
- 3.99 cumulative GPA

RESEARCH EXPERIENCE

University of Colorado, Boulder, Boulder, CO

Under Professor Amy E. Palmer **August 2018 – present**

- *A general, streamlined synthesis of peptide-based Riboglow probes* (ongoing)
- *Second-generation Riboglow probes for RNA imaging in living cells* (ongoing)

University of California, Irvine, Irvine, CA

Under Professor Jennifer A. Prescher **May 2014 – May 2018**

- *Building better bioluminescent reporters via ab initio calculations* (2014)
- *Orthogonal luciferase–luciferin pairs for bioluminescence imaging* (February 2015 – November 2016)
- *Engineering mutually orthogonal enzyme-substrate pairs for bioluminescence imaging* (November 2016 – November 2017)
- *Multicomponent bioluminescence imaging in vivo* (November 2017 – May 2018)

Under Professor Vy M. Dong **December 2012 – May 2014**

- *Mechanistic study of a metal-catalyzed, regioselective carbohydrate acylation reaction* (2013)
- *Rhodium-catalyzed retrohydroformylation* (January 2014 – May 2014)

Hope College, Holland, MI

Under Professor Jeffrey B. Johnson **2010 – 2012**

- *Kinetic investigation of C-C bond activation in quinolinyl ketones* (2010)
- *Observing the effects of ligand modification on C-C bond activation* (2011)
- *C-C bond activation promoted by an imine directing group* (Summer 2012)

University of Buenos Aires, Buenos Aires, Agentina

Under Professor Fabio Doctorovich **Summer 2011**

- *Synthesis of an electron-poor, water-soluble porphyrin for the isolation of HNO*

Selected Honors & Awards

National Institute of Health
- **Ruth L. Kirschstein National Research Service Award Individual Postdoctoral Fellowship** (2019)

National Science Foundation
- **Graduate Research Fellowship** (2012)
- **International Research Experience for Undergraduates** (2011)

Barry M. Goldwater Scholarship Foundation
- **Barry M. Goldwater Scholarship** (2011)

University of California, Irvine
- **Allergan Graduate Fellowship** (2017 – 2018)
- **Grad Slam Campus-Wide Finalist** (2017)
- **UCI NSF GRFP Symposium 3rd-Place Presentation** (2017)
- **AGS Symposium Judges' Winner** (2016)

Hope College
- **Presidential Scholarship** (2008)
- **Chemistry Department Jaeker Scholarship** (2009)
- **Chemistry Department John H. Kleinheksel Award** (2009)
- **Alcor Chapter Mortar Board** (2011 – 2012)

Peer-Reviewed Publications

10. Rathbun, C. M.; Ionkina, A.; Prescher, J. A. "Multicomponent bioluminescence imaging in vivo." *Manuscript in preparation*.

9. Liu, M. D.; Warner, E. A.; Morrissey, C. E.; Fick, C. W.; Wu, T. S.; Ornelas, M. Y.; Ochoa, G. V.; Zhang, B. S.; Rathbun, C. M.; Porterfield, W. B.; Prescher, J. A.; Leconte, A. M. "Statistical Coupling Analysis-Guided Library Design for the Discovery of Mutant Luciferases." *Biochemistry*, **2018**, *57*, 663.

8. Rathbun, C. M.*; Porterfield, W. B.*; Jones, K. A.*; Sagoe, M. J.; Reyes, M. R.; Hua, C. T.; Prescher, J. A. "Parallel screening for rapid identification of orthogonal bioluminescent tools." *ACS Cent. Sci.*, **2017**, *3*, 1254.

7. Rathbun, C. M.; Prescher, J. A. "Bioluminescent Probes for Imaging Biology Beyond the Culture Dish." *Biochemistry*, **2017**, *56*, 5178. *Invited review*.

6. Rathbun, C. M.*; Jones, K. A.*; Porterfield, W. B.*; McCutcheon, D. C.; Paley, M. A.; Prescher, J. A. "Orthogonal Luciferase-Luciferin Pairs for Bioluminescence Imaging." *J. Am. Chem. Soc.*, **2017**, *139*, 2351.

5. Steinhardt, R. C.; Rathbun, C. M.; Krull, B. T.; Yu, J. M.; Yang Y.; Nguyen, B. D.; Kwon, J.; McCutcheon, D. C.; Jones, K. A.; Furche, F.; Prescher, J. A. "Brominated Luciferins are Versatile Bioluminescent Probes." *ChemBioChem*, **2016**, *18*, 96.

4. Steinhardt, R. C.; O'Neill, J. M.; Rathbun, C. M.; McCutcheon, D. C.; Paley, M. A.; Prescher, J. A. "Design and Synthesis of an Alkynyl Luciferin Analogue for Bioluminescence Imaging." *Chem. Eur. J.*, **2016**, *22*, 3671.

3. Chen, I. H.; Kou, K. G. M.; Le, D. N.; Rathbun, C. M.; Dong, V. M. "Recognition and Site-Selective Transformation of Monosaccharides by Using Copper(II) Catalysis." *Chem. Eur. J.*, **2014**, *20*, 5013.

2. Lutz, J. P.; Rathbun, C. M.; Stevenson, S. M.; Powell, B. M.; Boman, T. S.; Baxter, C. E.; Zona, J. M.; Johnson, J. B. "Rate-Limiting Step of the Rh-Catalyzed Carboacylation of Alkenes: C-C Bond Activation or Migratory Insertion?" *J. Am. Chem. Soc.*, **2012**, *134*, 715.

1. Rathbun, C. M.; Johnson, J. B. "Rhodium-Catalyzed Acylation of Quinolinyl Ketones: Carbon-Carbon Single Bond Activation as the Turnover Limiting Step of Catalysis." *J. Am. Chem. Soc.*, **2011**, *133*, 2031.

PRESENTATIONS

Rathbun, C. M. *Chemical probes for single molecule RNA imaging in living cells*. Chemtools II Janelia Research Conference, Janelia, Ashburn, VA, April 28 – May 1, 2019. (poster and oral)

Rathbun, C. M. *Engineered luciferase-luciferin pairs for multicomponent bioluminescence imaging*. Janelia Protein Engineering Workshop, Janelia, Ashburn, VA, March 4–8, 2018. (poster and oral)

Rathbun, C. M. *Engineered luciferase-luciferin pairs for multicomponent bioluminescence imaging*. Gordon Research Conference: Bioorganic Chemistry, Andover, NH, June 11–16, 2017. (poster)

Rathbun, C. M. *Using the firefly to illuminate cancer*. Grad Slam Finals Competition (T.E.D.–style talk), U.C. Irvine, April 11, 2017. (oral)

Rathbun, C. M. *Constructing new bioluminescent tools with minimally perturbed luciferins*. Vertex Day, U.C. Irvine, March 11, 2016. (oral)

Rathbun, C. M. *Constructing new bioluminescent tools with minimally perturbed luciferins*. ACS National Meeting, San Diego, CA, March 14–17, 2016. (oral)

Rathbun, C. M. *Mechanistic study of a metal-catalyzed, regioselective carbohydrate acylation reaction*. ACS National Meeting, Indianapolis, IN, September 9–12, 2013. (poster)

TEACHING EXPERIENCE

University of Colorado, Boulder, Boulder, CO

Mentor to Undergraduate Researchers **July 2019 – present**

- Mentored undergraduate Rita Kamenetskiy in the synthesis of a new, truncated probe for RNA imaging.

Claremont McKenna, Pitzer, and Scripps Colleges, Claremont, CA

Guest Lecturer **October 2, 2017**

- Presented current research to a chemistry class with content tailored to topics currently being covered. Incorporated breakout discussions to keep students engaged with the material.

University of California, Irvine, Irvine, CA

Mentor to Undergraduate Researchers **January 2015 – August 2017**

- Oversaw undergraduate Yuhang Yang in synthesis and cross-coupling of brominated luciferins.
- Mentored Yusef Ibreighith in screening a luciferase library for deep mutational scanning analysis.

Graduate Chemical Biology Teaching Assistant **January – March 2017**

- Lead weekly workshops and helped draft problem sets and exams for a graduate-level chemical biology course lead by Jennifer Prescher.
- Participated in **GetFIT** program for prospective faculty, which included giving a lecture and soliciting feedback from a faculty mentor.

Organic Chemistry Teaching Assistant **September 2012 – May 2013**

- Oversaw undergraduates in general and organic chemistry labs. Lead workshops for organic chemistry lecture classes.

Hope College, Holland, MI

Teaching Assistant **2009 – 2012**

- Oversaw undergraduates in general and organic chemistry labs. Lead workshops for organic and physical chemistry lecture classes.

Programming Languages

Python: Data mining and analysis with Numpy. Algorithms for parallel processing with supercomputing clusters. Unsupervised image analysis.

HTML/CSS: Developed static lab group website from the ground-up. Implemented liquid templating engine for easy future updates.

LaTeX: Used for all major long-form documents.

Unix Shell: Basic scripting.

Java: Working knowledge.

Basic knowledge: JavaScript, Unix Shell, Ruby.

Languages

English (native speaker)

Spanish: Conversational. Intermediate classes in college as well as 2011 summer research experience in Buenos Aires, Argentina.

Recreational Interests

- Enjoy cycling, rock climbing, and hiking.
- Homebrewing and cooking.
- Keyboardist and vocalist.