Colin M. Rathbun

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CONTACT INFORMATION

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PROFESSIONAL EXPERIENCE

Assistant Professor of Chemistry, Dickinson College **2020-present**

also serving as a faculty member of Biochemistry and Molecular Biology

Independent research:

- *Developing new bioluminescent tools for imaging cells in vivo*

NIH Postdoctoral Fellow, BioFrontiers Institute, University of Colorado, Boulder **2018-2020**

Under Professor Amy E. Palmer

- *A general, streamlined synthesis of peptide-based Riboglow probes*
- *Second-generation Riboglow probes for RNA imaging in living cells*
- *Single-molecule imaging of RNA probes in mammalian cells*

EDUCATION

University of California, Irvine, Irvine, CA

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

Under Professor Jennifer A. Prescher **2014-2018**

- *Building better bioluminescent reporters via ab initio calculations*
- *Orthogonal luciferase–luciferin pairs for bioluminescence imaging*
- *Engineering enzyme-substrate pairs for bioluminescence imaging*
- *Multicomponent bioluminescence imaging in vivo*

Under Professor Vy M. Dong **2012-2014**

- *Mechanistic study of a metal-catalyzed carbohydrate acylation reaction*
- *Rhodium-catalyzed retrohydroformylation*

Hope College, Holland, MI, USA

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

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

- *Kinetic investigation of C-C bond activation in quinolinyl ketones*
- *Observing the effects of ligand modification on C-C bond activation*
- *C-C bond activation promoted by an imine directing group*

International REU at the University of Buenos Aires **Summer 2011**

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

SELECTED HONORS & AWARDS

National Institutes 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
- **Edward K.C. Lee Departmental Research Award** (2018)
- **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
- **Hope Chemistry Senior Award for Research** (2012)
- **Alcor Chapter Mortar Board** (2011-2012)
- **Chemistry Department Jaeker Scholarship** (2009)
- **Mathematics Department John H. Kleinheksel Award** (2009)
- **Presidential Scholarship** (2008)

PEER-REVIEWED PUBLICATIONS

11. Rathbun, C. M.*; Ionkina, A. I.*; Yao, Z.; Jones, K. A.; Porterfield, W. B.; Prescher, J. A. "Rapid multicomponent bioluminescence imaging *via* substrate unmixing." *ACS Chem. Biol.*, **2021**, *16*, *4*, 682-690.

10. Braselmann, E.; Rathbun, C. M.; Richards, E. M.; Palmer, A. P. "Illuminating RNA biology: Tools for imaging RNA in live mammalian cells." *Cell Chem. Bio.*, **2020**, *27*, 891-903.

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.

*Co-first author; †Undergraduate collaborator.

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)

PROGRAMMING LANGUAGES

MatLab: Microscope video processing and analysis.

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

HTML/CSS: Developed static lab group website.

LaTeX: Used for all major long-form documents.

Unix Shell: Basic scripting.

Basic knowledge: JavaScript, Java

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, running, rock climbing, and hiking.
- Homebrewing and cooking.
- Keyboardist and vocalist.