

Lindsey Richelle Fernandez Backman

Curriculum Vitae

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Education:

- 2015-current Ph.D. candidate in Chemistry Department (Biological Chemistry division),
Massachusetts Institute of Technology, Cambridge, MA
- 2011-2015 B.S. in Chemistry (*summa cum laude*), Minor in Classical Studies,
University of Florida, Gainesville, FL

Research experience:

- Fall 2015-current Graduate student in Professor Catherine Drennan's lab at MIT
structurally characterizing multiple members of the glycy radical
enzyme family and related proteins via X-ray crystallography
- Summers 2014, 2015 Completed the HHMI EXROP and Capstone programs at MIT
working in Professor Catherine Drennan's lab studying pyruvate
formate lyase and hydroxyproline dehydratase, two members of
the glycy radical enzyme family
- Fall 2011-Spring 2015 Undergraduate researcher in Professor Kevin Brown's lab at the
University of Florida studying the effects of oxidative stress on the
kinase ATM and the ATM-dependent transcription factor NF- κ B in
breast cancer cells using molecular biology techniques

Publications:

Lindsey R.F. Backman*, Yolanda Y. Huang*, Michael A. Funk, Emily P. Balskus, Catherine L. Drennan (2020). Molecular basis for catabolism of the abundant metabolite *trans*-4-hydroxy-L-proline by a microbial glycy radical enzyme. *eLife*. 9: e51420.

Sarah E.J. Bowman, **Lindsey R.F. Backman**, Rebekah E. Bjork, Mary C. Andorfer, Santiago Yori, Alessio Caruso, Collin M. Stultz, and Catherine L. Drennan (2019). Solution structure and biochemical characterization of a spare part protein that restores activity to an oxygen-damaged glycy radical enzyme. *J Biol Inorg Chem*. 24(6):817-829.

Lindsey R.F. Backman, Michael A. Funk, Christopher D. Dawson, Catherine L. Drennan (2017). New tricks for the glycy radical enzyme family. *Crit Rev in Biochem and Mol Biol*, 52:6, 674-695.

Lisa M. Dyer, Jessica D. Kepple, Lingbao Ai, Wan-Ju Kim, Virginia L. Stanton, Mary K. Reinhard, **Lindsey R.F. Backman**, W. Scott Streifeld, Nivetha R. Babu, Nicolai Treiber, Karin Scharffetter-Kochanek, Peter J. McKinnon, Kevin D. Brown (2017). ATM is required for SOD2

expression and homeostasis within the mammary gland. *Breast Cancer Res Treat.* 166(3):725-741.

Muzaffer Dükel, W. Scott Streitfeld, Tsz Ching C. Tang, **Lindsey R.F. Backman**, Lingbao Ai, W. Stratford May, Kevin D. Brown (2016). The breast cancer tumor suppressor TRIM29 is expressed via ATM-dependent signaling in response to hypoxia. *J Biol Chem*, 291 (41):21541-21552.

Merve Alpay*, **Lindsey R.F. Backman***, Xiaodong Cheng, Muzaffer Dükel, Wan-Ju Kim, Lingbao Ai, Kevin D. Brown (2015). Oxidative stress shapes breast cancer phenotype through chronic activation of ATM-dependent activity. *Breast Cancer Res Treat*, 151 (1):75-87.

*Authors contributed equally

Presentations:

Lindsey R. F. Backman, Yolanda Y. Huang, Mary C. Andorfer, Brian Gold, Ronald T. Raines, Emily P. Balskus, and Catherine L. Drennan. *Structural Characterization of a Hydroxyproline Dehydratase from Clostridiodes difficile*. Poster presentation.

Bioinorganic Chemistry Gordon Research Seminar. Ventura, CA. January 2020.

Metals in Biology Gordon Research Conference. Ventura, CA. January 2020.

MIT Women in Chemistry (WIC)/Chemistry Alliance for Diversity and Inclusion (CADI) Poster Symposium. October 2019. *Top 3 Poster Award*.

Howard Hughes Medical Institute (HHMI) Gilliam Fellows Meeting, Bethesda, MD. September 2019.

MIT Biology Department Building 68 Retreat, Falmouth, MA. June 2019.

Drennan Lab 20th Year Reunion. Cambridge, MA. July 2020.

2019 Enzyme Mechanisms Conference, New Orleans, LA. January 2019.

MIT Biophysics Retreat, Falmouth, MA. October 2018. *Awarded first place poster prize*.

Howard Hughes Medical Institute (HHMI) Gilliam Fellows Meeting, Bethesda, MD. September 2018.

Howard Hughes Medical Institute (HHMI) Gilliam Fellows Meeting, Bethesda, MD. September 2017.

MIT Biology Department Building 68 Retreat, Falmouth, MA. June 2017.

Center for Environmental Health Sciences (CEHS) Poster Session, MIT, Cambridge, MA. January 2017.

MIT Biology Department Building 68 Retreat, Falmouth, MA. June 2016.

Symposium in honor of Prof. Joanne Stubbe. MIT. Cambridge, MA. June 2016.

Lindsey R. F. Backman. *Structural investigation of a novel 4-hydroxyproline dehydratase prominent in the human gut microbiome.* Oral presentation.

Broad Institute-MIT-Harvard Chemical Biology Supergroup. Cambridge, MA. May 2020.

MIT Department of Biology Data & Drinks. Cambridge, MA. February 2019.

Protein Structure Function Supergroup Meeting. Cambridge, MA. October 2018.

Lindsey R. F. Backman. *Investigation of skatole production in mammalian gut bacteria.* Oral presentation.

MIT Department of Biology Science Slam. Cambridge, MA. April 2019.

Teaching and Mentoring Experience:

Summer 2020-current	Research mentor for MIT Summer Research Program (MSRP) students Christa Imrich and Mira May
Fall 2018-current	Graduate Resident Advisor for La Casa, a LatinX undergraduate living community, in the MIT dormitory New House
June 2018, 2019, 2020	Developed and co-led “Identifying and Managing Imposter Syndrome” workshop for MSRP students
April 2020	Developed and taught a 4-session virtual workshop on processing crystallographic data with XDS
Summer 2018	MSRP-Biology graduate student pod leader
Fall 2019	Research mentor for MIT undergraduate researcher, Abigail Scott
Summer 2018	MSRP graduate student pod leader
Fall 2017	Research mentor for rotating graduate student, Linda Zhong
Spring 2017-Fall 2017	Research mentor for MIT undergraduate researcher, Songela Chen
Summers 2016, 2017	Research mentor for MSRP and HHMI EXROP student Santiago Yori
Spring 2016	Teaching assistant for the MIT biochemistry lab course, 5.36
Fall 2015	Teaching assistant for the MIT general chemistry course, 5.111

Fall 2013-Spring 2015 Assistant to Prof. Phillip Brucat in developing an online general chemistry lab course for the UF Chemistry Department

Spring 2012-Spring 2013 Teaching assistant for CHM2054 lab, Accelerated General Chemistry Laboratory Course, with Prof. Phillip Brucat at UF

Awards and Honors:

Spring 2020 Gordon Research Conference Carl Storm Underrepresented Minority Fellowship

Fall 2017 Howard Hughes Medical Institute Gilliam Fellowship

Fall 2016 MIT Dept. of Chemistry's Award for Excellence in Teaching

Spring 2016 National Science Foundation (NSF) Graduate Research Fellowship Program (GRFP)

Fall 2015 DOW Chemical Graduate Fellowship for Underrepresented Minorities in Chemistry

Summer 2015 HHMI Capstone Award
Supports HHMI EXROP alumni to return to the lab where they completed their EXROP summer for another summer of research

Spring 2015 Graduated *summa cum laude* in Chemistry from the University of Florida (Honors Thesis: *Antioxidants Block NF- κ B Activity and Mesenchymal Phenotype in MDA-MB-231 Breast Cancer Cells*)

Summer 2014 HHMI EXROP (Exceptional Research Opportunities Program) Award

Spring 2014 University of Florida Presidential Service Award
Presented to UF students who have performed 200+ hours of community service and demonstrated outstanding service to the Gainesville community

Summer 2013 UF's University Scholars Award
Presented to select undergraduate researchers within each department at UF to support them in working full-time in an on-campus lab over the summer

Summer 2012 HHMI-UF Science for Life Intramural Award
Presented to freshman at UF to support them in working full-time in an on-campus lab over the summer

Fall 2011 University of Florida Presidential Platinum Award
Highest level, four-year academic scholarship awarded to a select group of rising freshmen admitted into the University of Florida

Leadership and outreach experience

Fall 2019-Current	MIT Latinx Graduate Student Association (LGSA) Co-founder and co-president of MIT LGSA, the first cross-departmental networking organization for Latinx graduate students at MIT
Fall 2020-Current	MIT Department of Chemistry Diversity, Equity, and Inclusion Committee (DEIC) At-large student representative for Dept. of Chemistry DEIC which works to create, implement and optimize programs that support the success of all underrepresented groups in the Department
Spring 2016-Current	MSRP, Converge, Post-Baccalaureate, and Non-traditional Graduate Student Group (MCPN) Co-founder and member of this organization for current MIT graduate students who are alumni of MIT undergraduate diversity initiatives and/or students from underrepresented backgrounds
Fall 2015-Current	MIT Chemistry Access Program Helped recruit and mentor students who have participated in the MIT Chemistry Access Program. The MIT Access Program brings underrepresented minority undergraduate students to MIT and gives them the opportunity to network with members of the Dept. of Chemistry and learn about chemistry graduate programs and the application process.
Spring 2020	MIT Department of Chemistry Statement of Values Working Group Worked on committee to develop Department of Chemistry's statement of values
November 2019	Annual Biomedical Research Conference for Minority Students (ABRCMS) Recruited for MIT Department of Chemistry at ABRCMS
Fall 2017-2019	MIT Chemistry Outreach program Volunteer at high schools in the greater Boston area where we present chemistry demos, discuss the relevance of chemistry in everyday life, and encourage students to pursue STEM fields.
Spring 2014-Spring 2015	UF-HHMI Science for Life Ambassador UF's HHMI-funded Science for Life Program focuses on getting students involved with research early on within their undergraduate careers. As a selected ambassador, I mentored students on how to obtain research positions and be successful within their labs.
Spring 2012-Spring 2015	Active member of Alpha Phi Omega Alpha Phi Omega is a co-ed national community service fraternity. As an active member, I completed over 350 hours of community service.

- Fall 2014 Organized the first N.E.R.D. 5K (Novel Education Reward Day 5K) at UF which raised money to promote higher education, particularly in STEM fields, in migrant communities of Florida
- Fall 2013 Service Vice President for Alpha Phi Omega
Planned between 15 and 20 service events per week for approximately 125 active members, working with various non-profit organizations within the Gainesville community and surrounding areas of Florida.