

Daniel P. Dowling, Ph.D.

Assistant Professor of Biochemistry
University of Massachusetts Boston
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Career History

- 2014-present **Assistant Professor**
Department of Chemistry
University of Massachusetts – Boston, MA
- 2010-2014 **Postdoctoral Research Assistant**
Department of Chemistry
HHMI/Massachusetts Institute of Technology – Boston, MA
Postdoctoral research conducted with Professor Catherine L. Drennan.
- 2004-2009 **Graduate Research Assistant**
Department of Chemistry
University of Pennsylvania – Philadelphia, PA
Doctoral research conducted with Professor David W. Christianson.

Education

University of Pennsylvania (Philadelphia, PA)
Ph.D. in Chemistry, December 2009
Doctoral Thesis in Biological Chemistry with Professor David W. Christianson
Title: Structural Studies of Two Related Metallohydrolases:
Human Histone Deacetylase 8 and Malarial Arginase

College of the Holy Cross (Worcester, MA)
B.A. in Chemistry and Music, *cum laude*, May 2004
Undergraduate Research with Professor Josh R. Farrell
Title: Multidentate aminothiophenol ligands prepared with Mannich condensations

Teaching Experience

University of Massachusetts Boston, Boston, MA
Undergraduate Courses

Course Number	Course Title	Semester Offered	Enrollment
BIOCHM 386	General Biochemistry II Lab*	Spring 2020, 2 sections ^{\$}	16/15
		Spring 2019, 2 sections	16/10
		Spring 2018, 3 sections ^{\$}	14/14/10

BIOCHM 384	General Biochemistry II Lecture*	Spring 2017	36
		Spring 2016	33
		Spring 2015	51
BIOCHM 383	General Biochemistry I Lecture*, &	Fall 2016	94
		Fall 2015	99
		Fall 2014	77
BIOCHM 188S	Science Gateway Seminar II*	Spring 2017	6
BIOCHM 187S	Science Gateway Seminar I*	Fall 2016	9
CHEM 130-L	General Chemistry Nursing Lab	Fall 2014	27
CHEM 116-D	Chemical Principles II Discussion	Fall 2018, 4 sections	33/27/27/27
CHEM 115-D	Chemical Principles I Discussion	Fall 2020	13 currently
		Spring 2016, 2 sections	34/34
		Spring 2015, 2 sections	33/33

* Courses I developed

[§] One section was led by a graduate student under my guidance

& Team-taught course with one other professor

University of Massachusetts Boston, Boston, MA

Graduate Courses

Course Number	Course Title	Semester Offered	Enrollment
CHM 680L and	Physical Biochemistry*	Fall 2020	11
BIOL 680L		Fall 2017	10

* Courses I developed

Current Mentees

Doctoral Students

2021-present Jayata Shailesh Mawani, *expected start in spring of 2021*, Integrated Biosciences Program

* delayed start due to COVID-19 shutdown of embassy in India

2019-present Jonathan Webb, graduate student, Chemistry Department

2018-present Reyaz Gonzalez, graduate student, Chemistry Department

2018-present Jeremy Liew, graduate student, Chemistry Department

2015-present Andrew Gnann, Ph.D. candidate, Chemistry Department

* expected thesis defense in January of 2021

Undergraduate Research Students

2019-present Israa El Saudi, IMSD student, Biology Major

2018-present Courtney Truong, SPARC student, Biology Major

2020-present Alice Wong, Biochemistry Major

2020-present Simon Johnson, Biochemistry Major

2020-present Catherine Gaitanakis, Biochemistry Major

Former Mentees

2017-2019	Jessica Soule, master's student, Chemistry Department, successfully defended master's thesis, July 2019, entered Ph.D. program at UCLA in the fall of 2019
2014-2016	Yuan Xia, master's student, Chemistry Department, successfully defended master's thesis, December 2016, Technical Account Manager at GenScript Europe
2014-2015	Cindy Hunt, graduate student, Chemistry Department transferred to the biotechnology program at UMass Boston Fall 2015

Undergraduate Research Students

2018-2020	Christopher Kim* ^{&} , dental student at the University of Pennsylvania Dental School
2019-2020	Clara Barthelemy, completing her studies at UMass Boston
2019-2019	Filip Stefanovic, transferred to a cellular biology lab at UMass Boston
2017-2018	MacKenzie Patterson* ^{&} , graduate student at Brandeis University
2017-2018	Mark MacRae* ^{&} , graduate student at Sackler Institute, NYU
2017-2018	Viet Dieu, medical student at Des Moines University
2014-2017	Bryan Henriquez, medical student at St. George's University
2014-2017	Sarah Nzikoba* ^{&} , Research Associate at Dana-Farber Cancer Institute, Boston, MA
2014-2017	Andy Pham, accepted into Physician Assistant Program
2014-2017	Susana Ruiz, Research Associate II at Repertoire Immune Medicines, Cambridge, MA
2014-2016	Dhruval Amin* ^{&} , entered master's program 2016, accepted to Chicago Medical School 2017
2014-2016	Andrew Heim, works for a biotech, Quintara Biosciences, Boston, MA
2014-2016	Samander Randhawa* ^{&} , Resident Doctor at SUNY Upstate Medical University Hospital
2014-2016	John Zhang*, Resident Doctor at UMass Memorial Medical Center

* graduated with honors in chemistry, biology, or biochemistry

[&] member of the Honors College

Visiting High School Students

Summer 2015 Nicholas Santiago, undergraduate at the University of Pennsylvania

Graduate Program Student Committees**Doctoral Thesis Committees**

2020*	Margarita Tararina (Boston University, Karen Allen Lab)
2017-present	Sabrina Akhter
2017-2019	Alex Muthengi
2017-2018	Meg McKinnon
2017-2018	William Horton
2015-2017	Courtney Ngai <i>*served as an external committee member</i>

Master's Thesis Committees

2020	Anne Qiu
2015	Kenny Pham

Journal Publications

Journal Impact Factors (IF) are listed from 2018 with times cited as of September 5th 2020.

Calculated h-index: 14 | Sum of Times Cited: 762 (743 without self citations)

Publication Citations**IF****Times
Cited**During my appointment at UMass Boston: Submitted

- 18 J. Liew, I. El Saudi, S.V. Nguyen, D.K. Wicht, and D.P. Dowling. “Structures of alkanesulfonate monooxygenase MsuD provide insight into C–S bond cleavage, substrate scope, and an unexpected role for the tetramer” *J. Biol. Chem.*, submitted Dec. 14th 2020, *revisions requested*
We have solved the first crystal structure of MsuD from Pseudomonas fluorescens. MsuD is a two-component flavin-dependent methanesulfonate monooxygenase that requires the NADH/FMN oxidoreductase MsuE to supply the reduced FMN substrate. Here we report snapshots of MsuD in different states related to the catalytic cycle: with oxidized FMN, with oxidized FMN and methanesulfonate, and without ligands. Structures of the FMN–methanesulfonate–MsuD complex identify a novel use of the protein C-terminus in substrate binding and oligomerization for this two-component monooxygenase family. 4.238

During my appointment at UMass Boston: Published

- 17 J. Soule, A.D. Gnann, R. Gonzalez, M.J. Parker, K.C. McKenna, S.V. Nguyen, N.T. Phan, D.K. Wicht, D.P. Dowling. “Structure and function of the two-component flavin-dependent methanesulfinate monooxygenase within bacterial sulfur assimilation” *Biochem. Biophys. Res. Commun.*, 2020, 522, 107-112.
We solved the first crystal structure of MsuC and reported the biochemical characterization of MsuC as a flavin-dependent methanesulfinate monooxygenase. 2.705 0
- 16 T.A.J. Grell, B.N. Bell, C. Nguyen, D.P. Dowling, N.A. Bruender, V. Bandarian, C.L. Drennan. “Crystal structure of AdoMet radical enzyme 7-carboxy-7-deazaguanine synthase from *Escherichia coli* suggests how modification near [4Fe-4S] cluster engender flavodoxin specificity” *Prot. Sc.*, 2019, 28, 202-215.
I mentored the undergraduate student Ben Bell to crystallize and solve the crystal structure of QueE from E. coli. 2.42 1
- 15 N.A. Bruender, T.A.J. Grell, D.P. Dowling, R.M. McCarty, C.L. Drennan, V. Bandarian. “7-Carboxy-7-deazaguanine synthase: A radical S-adenosyl-L-methionine enzyme with polar tendencies” *J. Am. Chem. Soc.*, 2017, 139, 1912-1920.
I crystallized and solved the structures of QueE that identified an unexpected adduct between the substrate and 5'-deoxyadenosine. These structures led us to explore the biochemistry that was occurring. 14.695 14

- 14 D.P. Dowling*, Y. Kung, A.K. Croft, K. Taghizadeh, W.L. Kelly, C.T. Walsh, C.L. Drennan*. "Structural elements of an NRPS cyclization domain and its intermodule docking domain" *PNAS.*, 2016, 113, 12432-12437. 9.58 25
* co-corresponding authors
I solved the first structure of an NRPS cyclization domain with a docking domain attached. Through analysis of this structure, I developed an enzyme assay to probe mutations within the identified active site. These studies identified an unpredicted catalytic residue, aspartate 449.
- 13 D.P. Dowling, Z.D. Miles, C. Köhrer, S. J. Maiocco, S. Elliott, V. Bandarian, C.L. Drennan. "Molecular basis of cobalamin-dependent RNA modification" *Nucleic Acids Res.*, 2016, 44, 9965-9976. 11.147 12
I crystallized and solved the first structures of epoxyqueuosine reductase (QueG), revealing this enzyme is structurally related to the B₁₂-dependent reductive dehalogenases. Additionally, I cocrystallized QueG with a substrate tRNA stem loop, revealing how substrate RNA binds to this enzyme. As very few cocrystal structures of tRNA modifying enzymes are solved with cognate tRNA, these structures illuminated important features of enzyme-tRNA interactions.
- Prior to beginning my appointment at UMass Boston: Published
- 12 D.P. Dowling, R.M. McCarty, A.P. Young, N.A. Bruender, V. Bandarian, C.L. Drennan. "Radical SAM enzyme QueE defines a new minimal core fold and metal-dependent mechanism" *Nat. Chem. Biol.*, 2014, 10, 106-112. 12.154 38
*Selected as Cover Art Feature
*I solved the first structures of the radical SAM enzyme QueE, revealing how the SAM molecule binds in relation to the 4Fe-4S cluster and the substrate. These structures identified a secondary, divalent metal site that appears to be critical for binding and activating the substrate. Additionally, the structure of QueE from *B. multivorans* revealed drastic modifications of the overall protein fold, highlight how Nature is able to expand upon the radical SAM protein fold.*
- 11 D.P. Dowling, J.L. Vey, A.K. Croft, C.L. Drennan. "Structural diversity in the AdoMet radical enzyme superfamily" *BBA-Prot. Proteom.*, 2012, 1824, 1178-1195. 2.54 49
In this review, we analyze features of the AdoMet radical enzyme superfamily protein fold that are important for substrate binding, activation, and product formation. Additionally, structural trends and motifs are discussed to aid in the characterization and identification of AdoMet radical enzymes.
- 10 D.P. Dowling, A.K. Croft, C.L. Drennan. "Radical use of Rossmann and TIM barrel architectures for controlling coenzyme B₁₂ chemistry" *Annu. Rev. Biophys.*, 2012, 41, 403-427. 12.175 29
In this review, we analyze the structures of important B₁₂-dependent enzymes, specifically reviewing how Nature uses the Rossmann and TIM barrel protein folds for this enzyme superfamily. Similarities and differences are analyzed, revealing our current understanding of how these protein folds can be modified to facilitate free radical reactions using coenzyme adenosyl(III)cobalamin.

- 9 K.E. Cole, D.P. Dowling, M.A. Boone, A.J. Phillips, D.W. Christianson. 14.695 107
 "Structural basis of the antiproliferative activity of largazole, a depsipeptide inhibitor of the histone deacetylases" *J. Am. Chem. Soc.*, 2012, 133, 12474-12477.
I performed the initial crystallization trials and obtained the first cocrystals of HDAC8 complexed with largazole.
- 8 M.L. Ilies, D.P. Dowling, P.M. Lombardi, D.W. Christianson. 2.448 19
 "Synthesis of a new trifluoromethylketone analogue of L-arginine and contrasting inhibitory activity against human arginase I and histone deacetylase 8" *Bioorg. Med. Chem. Lett.*, 2011, 21, 5854-5858.
I conducted the enzyme inhibition assays with histone deacetylase 8.
- 7 M.L. Ilies, L.Di Costanzo, D.P. Dowling, K.J. Thorn, D.W. Christianson. 6.054 41
 "Binding of α,α -disubstituted amino acids to arginase suggests new avenues for inhibitor design" *J. Med. Chem.*, 2011, 54, 5432-5443.
I crystallized and solved structures of new α,α -disubstituted amino acid derivatives complexed with Plasmodium falciparum arginase.
- 6 P.M. Lombardi, K.E. Cole, D.P. Dowling, D.W. Christianson. 7.052 122
 "Structure, mechanism, and inhibition of histone deacetylases and related metalloenzymes" *Curr. Opin. Struct. Biol.*, 2011, 21, 735-743.
Here we analyze the similarities between metallohydrolases that adopt the same protein fold: arginases, histone deacetylases, and polyamine amidohydrolases.
- 5 D.P. Dowling, M.L. Ilies, K.L. Olszewski, S.P. Portugal, M.M. Mota, M. Llinás, D.W. Christianson. 2.952 28
 "Crystal structure of arginase from *Plasmodium falciparum* and implications for L-arginine depletion in malarial infection" *Biochemistry*, 2010, 49, 5600-5608.
I crystallized, solved, and reported the first structures of a parasitic arginase enzyme, here from Plasmodium falciparum. These structures identified interesting differences between the human and parasitic enzymes that possibly could be targeted for drug discovery.
- 4 D.P. Dowling, S.G. Gattis, C.A. Fierke, D.W. Christianson. 2.952 54
 "Structures of metal-substituted human histone deacetylase 8 provide mechanistic inferences on biological function" *Biochemistry*, 2010, 49, 5048-5056.
Although the metalloenzyme family of histone deacetylases have been predicted to be zinc-dependent hydrolases, biochemical data suggest HDAC8 is most active with Fe(2+). Here, I developed a protocol to exchange the cofactor metal ion of HDAC8 for crystallographic study. I solved and reported structures of HDAC8 with Co(2+), Fe(2+), and Mn(2+).
- 3 D.P. Dowling, S.L. Gantt, S.G. Gattis, C.A. Fierke, D.W. Christianson. 2.952 141
 "Structural studies of histone deacetylase 8 and its site-specific variants complexed with substrate and inhibitors" *Biochemistry*, 2008, 47, 13554-13563.

Here I studied the structure and function of HDAC8, a member of the important histone deacetylase family. In addition to reporting structures of HDAC8 in a new crystal form with the inhibitors trichostatin A and 3-(1-methyl- 4-phenylacetyl-1H-2-pyrrolyl)-N-hydroxy-2-propenamide (APHA), I crystallized and solved the structure of an inactive mutant with an acetylated tetrapeptide substrate. This structure importantly revealed substrate interactions to an active site tyrosine residue that stabilized negative charge during the reaction cycle.

- 2 D.P. Dowling, L.Di Costanzo, H.A. Gennadios, and D.W. Christianson. 7.014 38
"Evolution of the arginase fold and functional diversity" Cell. Mol. Life Sci.,
2008, 65, 2039-2055.

We discuss and analyze relations of the arginase fold to histone deacetylase enzymes, two protein families that adopt similar protein folds and metal cofactor site locations despite sharing minimal protein identity.

- 1 C.S. Higham, D.P. Dowling, J.L. Shaw, A. Cetin, C.J. Zielgler, J.R. Farrell. 2.33 44
"Multidentate aminophenol ligands prepared with Mannich condensations" Tet.
Lett., 2006, 47, 4419-4423.

Here I conducted the initial synthetic reactions to develop a protocol for generating the aminophenol ligands, and I crystallized one of the synthesized compounds for structural studies by X-ray diffraction.

Textbook Contributions

J.A. Himmelberger, K.E. Cole, D.P. Dowling, *Biocatalysis: Nature's Chemical Toolbox*. In Bela Torok, Timothy Dransfield (Ed.), *Green Chemistry: An Inclusive Approach*. Elsevier (2017)

Professional Training Experience

2020 STEM Educational Excellence workshop. Virtual
2020 Speak Out Summer Institute on diversity, inclusion and equity. Virtual
2015 Grant Writing Workshop for new faculty. UMass Boston, Boston, MA
2014 MIT Teaching Certificate Program. MIT, Cambridge, MA
2014 NSF-focused Grant Writing Workshop. ASBMB, Washington, DC
2011 Research Ethics Training. MIT, Cambridge, MA
2011 Mentoring Undergraduate Researchers Series. MIT, Cambridge, MA

PI Seminar Presentations

2021 Spring *Structural Explorations of the Enzymes of 5-Hydroxymethyldeoxyuridine Modification from Pseudomonas Phage M6*. Invited Seminar Speaker, Bridgewater State University, Bridgewater, MA
2021 Spring *Structural Explorations of the Enzymes of 5-Hydroxymethyldeoxyuridine Modification from Pseudomonas Phage M6*. Invited Seminar Speaker, New England Biolabs, Ipswich, MA
2020 Spring *Oxygenation Reactions in Biochemistry: A Study of Bacterial Sulfur Assimilation from Organosulfur species*. Invited Seminar Speaker, Chemistry Department, College of the Holy Cross, Worcester, MA
***cancelled due to COVID-19**
2019 Spring *Oxygenation and Cyclization Reactions in Biochemistry*. Invited Seminar Speaker, Biophysics and Biophysical Chemistry Program, John Hopkins School of Medicine, Baltimore, MD

- 2019 Spring *Modular Enzyme Assembly Lines as Avenues for Biocatalysts of Azoline Moieties in Diverse Molecular Contexts*. Keynote Speaker at Undergraduate Research Symposium, Suffolk University, Boston, MA
- 2018 Fall *Dowling Lab Research Overview*. Chemistry Graduate Seminar, UMass Boston, Boston, MA
- 2017 Fall *Dowling Lab Research Overview*. Integrated Biosciences Program, UMass Boston, Boston, MA
- 2016 Fall *Biocatalysis as a Green Alternative to Drug Discovery*. Green Chemistry Workshop, UMass Boston, Boston, MA
- 2016 Fall *Using Molecular Detail to Understand Enzyme Mechanisms: A Study of Natural Product Biosynthesis*, Bridgewater State University, Bridgewater, MA
- 2015 Fall *Towards a Molecular Understanding of Azole Formation in Nonribosomal Peptide Biosynthesis*. New England Biolabs, Ipswich, MA
- 2015 Fall *Towards a Molecular Understanding of Azole Formation in Nonribosomal Peptide Biosynthesis*. Department of Chemistry, UMass Boston, Boston, MA
- 2015 Spring *Modifications Abound: Structure-Functional Studies of Complex Biological Reactions*. Department of Biology, UMass Boston, Boston, MA
- 2014 Fall *Modifications Abound: Structure-Functional Studies of Complex Biological Reactions*. Greater Boston Crystal Group, Boston University, MA
- 2014 Fall Research Overview Talk. Department of Chemistry, UMass Boston, Boston, MA

PI Poster Presentations

- 2018 Spring D.P. Dowling, Y. Kung, A.K. Croft, K. Taghizadeh, C.T. Walsh, and C.L. Drennan. *Exploring the molecular determinants of heterocycle formation in nonribosomal peptides/polyketides*. Experimental Biology Conference, San Diego, CA
- 2015 Summer C.A. Hunt, C. Guan, P. Weigele, D.P. Dowling. *Crystallization of a kinase involved in 5-hydroxymethyldeoxyuridine modification in phage*. American Chemical Society Conference, Boston, MA
- 2015 Spring D.P. Dowling, Z.D. Miles, C. Köhrer, V. Bandarian, and C.L. Drennan. *B₁₂ in a New Light: Queuosine tRNA Modification*. ASBMB Spring Conference, Boston, MA

Student Research Presentations

- 2020 Spring **J. Liew**, I. El-Saudi, S. V. Nguyen, D. K. Wicht, and D. P. Dowling. *Structural characterization of MsuD: Flavin-dependent monooxygenase involved in the sulfur assimilation pathway from DMSO₂ to Pseudomonas fluorescens under the sulfur starvation response*. Accepted talk canceled due to COVID-19. ACS online Scimeeting: <https://doi.org/10.1021/scimeetings.0c02518>
- 2020 Spring **K. McKenna**, J. Liew, D. P. Dowling, and D. K. Wicht. *Substrate specificity of methanesulfinate monooxygenase MsuC*. ACS online Scimeeting: <https://doi.org/10.1021/scimeetings.0c01647>
- 2020 Spring **S. V. Nguyen**, J. Liew, D. P. Dowling, and D. K. Wicht. *Production, purification, and quantification of the reduced flavin-dependent monooxygenase MsuD from Pseudomonas fluorescens Pf0-1*. ACS online Scimeeting: <https://doi.org/10.1021/scimeetings.0c01040>
- 2020 Spring **N. T. N. Phan**, J. Liew, D. P. Dowling, and D. K. Wicht. *Substrate specificity of the sulfur assimilation enzyme SfnG*. ACS online Scimeeting: <https://doi.org/10.1021/scimeetings.0c01342>
- 2020 Winter **J. Liew**. *Structural characterization of a flavin-dependent monooxygenase in bacterial sulfur assimilation from dimethylsulfone*. Greater Boston Crystal Group, NEU, MA (seminar)
- 2019 Winter **A. Gnann**, Y. Xia, J. Soule, and D.P. Dowling. *Carrier Protein and Substrate Recognition of the Second Cyclization Domain of Yersiniabactin Synthetase*. Enzyme Mechanisms Conference, New Orleans (poster)
- 2019 Winter **A. Gnann**. *Structures of the first two enzymes of 5-(2-aminoethyl)deoxyuridine installation in phage DNA*. Greater Boston Super Crystal Group, UMass Boston, MA (seminar)

- 2019 Winter **J. Soule**, D.P. Dowling, D.K. Wicht. *Kinetic characterization of an FMNH₂-dependent monooxygenase from Pseudomonas fluorescens involved in methanesulfinate utilization*. Enzyme Mechanisms Conference, New Orleans (poster)
- 2018 Spring **M. Patterson**, M. MacRae, V. Dieu, B. Henriquez, J. Soule, and D.P. Dowling. *Optimizing Protein Crystal Formation of a Heterocyclization Domain from Yersiniabactin Synthetase*. Experimental Biology Conference, San Diego (poster)
- 2018 Spring **M. Patterson**, A. Gnann, Y.-J. Lee, P. Weigele, and D.P. Dowling. *Working Toward Structural Characterization of a Double-Stranded DNA Kinase Involved in Base Hypermodification*. Oracle Poster Session, UMass Boston (poster)
- 2018 Spring **M. MacRae**, J. Soule, B. Henriquez, M. Patterson, M. Dieu, Y. Xia, and D.P. Dowling. *Fluorescence Assay Development to Monitor Enzymatic Heterocyclization*. Oracle Poster Session, UMass Boston (poster)
- 2018 Spring **M. MacRae**, J. Soule, B. Henriquez, M. Patterson, M. Dieu, Y. Xia, and D.P. Dowling. *Fluorescence Assay Development to Monitor Enzymatic Heterocyclization*. Northeastern Regional ASBMB Regional Meeting, Northeastern University (poster)
- 2018 Spring **V. Dieu**, M. Patterson, M. MacRae, B. Henriquez, and D.P. Dowling. *Exploring the Substrate Binding Tunnels within the EpoB Cyclization Domain*. CSM Poster Session, UMass Boston (poster)
- 2018 Spring **C. Kim** and D.P. Dowling. *An Overview of Protein Crystallography*. Sanofi Genzyme Poster Session, UMass Boston (poster)
- 2017 Spring **A. Gnann**, P. Weigele, and D.P. Dowling. *Initial Crystallography of a Phage DNA Kinase*. American Society for Biochemistry and Molecular Biology Annual Meeting, Chicago Convention Center, Chicago, IL (poster)
- 2017 Spring **B. Henriquez**, S. Nzikoba, S. Ruiz, Y. Xia, B. Castellano and D.P. Dowling. *Expression and Crystallization of the First Heterocyclization Domain of Yersiniabactin Synthetase from Yersinia pestis*, CSM Showcase, UMass Boston (poster)
- 2017 Spring **S. Ruiz**, Y. Xia, and D.P. Dowling, *Elucidating the Noncovalent Interactions of the Docking Domain of EpoB*, Oracle Poster Session, UMass Boston (poster)
- 2017 Spring **S. Nzikoba**, A. Pham, A. Gnann, and D.P. Dowling. *Towards the Structural Characterization of NeoN: A Radical S-adenosyl-L-methionine Epimerase Involved in the Last Biosynthetic Step of Neomycin Biosynthesis*, Massachusetts Statewide Undergraduate Research Conference, UMass Amherst (poster)
- 2016 Spring **M. Patterson**, B. Henriquez, and D.P. Dowling, *Optimizing Protein Crystal Formation of a Heterocyclization Domain from Yersiniabactin Synthetase*, Oracle Poster Session, UMass Boston (poster)
- 2016 Spring **Andrew Gnann**, *Initial Crystallography of a Phage DNA Kinase*, Greater Boston Super Crystal Group, MIT, MA (seminar)
- 2016 Fall **Yuan Xia**, *Structural Characterization of the Second Cyclization Domain in Yersiniabactin Biosynthesis*, Greater Boston Super Crystal Group, MIT, MA (seminar)
- 2015 Summer **Yuan Xia**, Bryan Henriquez, Sarah Nzikoba, Susana Ruiz, Brian Castellano, Subrata Mishra, Dominique Frueh, Daniel P. Dowling. *Crystallization of a Heterocyclization Domain in Yersiniabactin Biosynthesis*, ACS Conference, Boston MA (poster)
- 2015 Spring **Yuan Xia**, *Structural Elucidation of the Yersiniabactin Cyclization Domains*, Greater Boston Crystal Group, Boston University, MA (seminar)
- 2015 Spring **Bryan Henriquez**, Sarah Nzikoba, Susana Ruiz, Yuan Xia, Brian Castellano, and Daniel P. Dowling, *Cyclization Domains of Yersiniabactin Synthetase*, Sanofi-Genzyme (poster)
- 2015 Spring **Samender Randhawa**, John Zhang, Cindy Hunt, and Daniel P. Dowling, *Characterization of Radical S-Adenosyl-L-Methionine Epimerase NeoN*, Oracle (poster)

2015 Spring **Dhruval Amin**, Andrew Heim, Cindy Hunt, and Daniel P. Dowling. Towards the Structure of Histone Deacetylase 6 (poster)

Funding Description

START-UP FUNDS

University of Massachusetts Boston 9/1/2014 – 8/31/2018 \$300,000

GRANTS RECEIVED

1807480 8/01/2018 – 12/31/2020 \$96,278 direct costs
NSF/CLP, subcontract with Suffolk No cost extension to 12/2021 \$47,268 indirect costs
Title: RUI: Biophysical Characterization of Reduced Flavin-Dependent Two Component Monooxygenase Sulfur Assimilation Enzymes: SfnG, MsuC, and MsuD

Joseph P. Healey Research Grant Award 02/02/2018 – 03/31/2019 \$7,500
University of Massachusetts Boston
Healey Research Grant Program, UMass Boston
Title: Determining the Mechanisms of Complex Chemical Modifications of DNA on the Polynucleotide Level in *Pseudomonas* Bacteriophage M6.

1R15GM123425-01 4/01/2017 – 3/31/2020 \$299,956 direct costs
NIH/NIGMS No cost extension to 3/2021 \$145,411 indirect costs
Title: Molecular Determinants of Natural Product Heterocyclization

Seed Funding 12/15/2016 – 1/31/2018 \$5,000
University of Massachusetts Boston
Office of Global Programs
Title: Structural and Functional Studies of a Unique DNA-binding Motif from the Capicua Gene Regulator Protein.

STEM Outreach Seed Funding 9/1/2015 – 6/30/2017 \$2,741.93
American Society for Biochemistry
and Molecular Biology
Title: From Atoms to Biomolecules: Increasing Appreciation of Central Dogma and Biomolecule Evolution with 8th Grade Students

NVIDIA Corporation – Hardware donation – K5200 graphics card
“X-ray Crystallography Using 3D Environments”

Student Awards

Andrew Gnann Mastricola Award, Spring 2020
Christopher Kim Daniel Koshland Award for Academics and Service in Biochemistry, Spring 2020
Christopher Kim Undergraduate Research Fund for Spring of 2019 and Spring of 2020
Israa ElSaudi Undergraduate Research Fund for 2019-2020
Courtney Truong Undergraduate Research Fund for 2019-2020
Andrew Gnann Sanofi-Genzyme Graduate Research Fellowship for 2018-2019
Christopher Kim Sanofi-Genzyme Undergraduate Research Fellowship Fall 2018
Andrew Gnann Chemistry Department’s Graduate Teaching Award for 2017-2018

Christopher Kim	Sanofi-Genzyme Undergraduate Research Fellowship Spring 2018
MacKenzie Patterson	Oracle Undergraduate Research Fellowship Fall 2017
MacKenzie Patterson	Oracle Undergraduate Research Fellowship Spring 2017
MacKenzie Patterson	ASBMB Research Award, received Spring 2017
Susana Ruiz	Oracle Undergraduate Research Fellowship Fall 2016 and Spring 2017
Sarah Nzikoba	Oracle Undergraduate Research Fellowship Fall 2016 and Spring 2017
Andy Pham	Beacon Scholarship summer 2016
Susana Ruiz	Beacon Scholarship summer 2016
Dhruval Amin	Beacon's Undergraduate Fellowship Summer 2015
John Zhang	Beacon's Undergraduate Fellowship Summer 2015
Bryan Henriquez	Sanofi Genzyme Undergraduate Research Fellowship 2014 – 2015
Dhruval Amin	Oracle Undergraduate Research Fellowship 2014-2015
Samender Randhawa	Oracle Undergraduate Research Fellowship 2014-2015
Sarah Nzikoba	Berkeley Cue Scholarship 2014 – 2015

Professional Memberships

2014-present	Member, American Society for Biochemistry and Molecular Biology
2012-present	Member, American Crystallographic Association
2005-present	Member, American Chemical Society
2004-present	Member, Phi Beta Kappa, Pi of Massachusetts

Service Activities

Departmental:

2014-present	Member of the Graduate Committee, Department of Chemistry
2014-present	Served as faculty advisor for biochemistry majors
2014-present	Member of the Committee on Undergraduate Curriculum and Majors, Department of Chemistry
2016-2017	Member of the Chemistry Executive Committee
2015-2017	Represented the Chemistry Department on the CSM Scholarship Committee, each May
2015-2017	Represented the Chemistry and Biochemistry Programs at Welcome Day April 8 th , 2017; February 25 th , 2017; February 28 th , 2015.
2015	Represented the Chemistry and Biochemistry Programs at the Majors Exploration Fair April 30 th , 2015
2014-2015	Member of Green Chemistry Faculty Search Committee, Department of Chemistry
2014	Represented the Chemistry and Biochemistry Programs at the UMass Boston Open house October 15 th , 2016; October 18 th , 2014

College and University:

- 2018-present Senate member for the College of Science and Mathematics
Served as secretary of the senate for 2018-2020
Was on adoption leave during the fall of 2019
- 2016-present Member of the Integrated Biosciences Program Committee, UMass Boston
- 2015-present Member of the Institutional Biosafety Committee (IBC), UMass Boston
- 2015-present Faculty mentor for the UMass Boston ASBMB Undergraduate Chapter, UMass Boston
- 2014-present Member of the Biochemistry Committee, UMass Boston

Professional:

- 2014-present Organized four meetings per academic year for the *Greater Boston Super Structural Group*, attended by the Allen Lab (Boston University), Drennan Lab (MIT), Dowling Lab (UMass Boston), Mattos Lab (Northeastern University), Gaudet Lab (Harvard University), Hekstra Lab (Harvard University), and Bradshaw Lab (Brandeis University)
 -hosted the April 17th, 2015 meeting at UMass Boston
 -hosted the December 6th, 2019 meeting at UMass Boston
- 2015-present American Society for Biochemistry and Molecular Biology Regional Meeting Poster Session. Boston, MA, Role: Poster Judge
 -November 18th, 2018; November 5th, 2017; October, 16th, 2016; November 8th, 2015.
 -missed 2019 as I was on adoption leave
- 2015, 2017 American Society for Biochemistry and Molecular Biology Annual Meeting. Boston, MA. Role: Poster Judge, April 21st, 2018; March 28th, 2015

Invited reviewer for professional journals:

ACS Biochemistry

BBA: Proteins and Proteomes

JSB: Journal of Structural Biology

Journal of Cheminformatics

PLOS: PLOS One

Scientific and Technological Research Council of Turkey: Turkish Journal of Chemistry

Invited reviewer for grant proposals:

Royal College of Surgeons in Ireland

Community:

- 2015-present Developed an outreach Partnership between the UMass ASBMB Undergraduate Chapter and the McCormack-Dever Middle School, our local public middle school, with the help of science teachers Kris Grymonpré and Lani Trumble at McCormack

Overview: Designed, organized and implemented four outreach events to be held throughout each academic year: two in the fall and two in the winter semesters. Topics bridge chemistry and biochemistry principles to the science curriculum of 7th and 8th graders. Three wet labs were designed to give middle school science students an opportunity to perform lab experiments in a college setting, hosted at UMass Boston within the Sandbox lab in the Integrated Sciences

Complex. UMass Boston ASBMB Undergraduate Chapter members and graduate students volunteered to serve as group mentors to middle school students. *We are currently in plans to develop a virtual outreach event for the 2020-2021 academic year.*