

# Elizabeth B. Draganova, Ph.D.

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## EDUCATION AND TRAINING

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**Tufts University School of Medicine**  
*Tufts IRACDA Postdoctoral Fellow*  
*Postdoctoral Scholar*

**Boston, MA**  
2017 – Present  
2016 – 2017

**Georgia State University**  
*Ph.D., Chemistry*

**Atlanta, GA**  
2011 – 2016

**Kennesaw State University**  
*B.S., Biochemistry*

**Kennesaw, GA**  
2008 – 2011

## RESEARCH EXPERIENCE

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**Postdoctoral Scholar**

2016 – 2017

**Tufts IRACDA Postdoctoral Fellow**

2017 – present

Tufts University, Boston, MA  
*Advisor: Dr. Ekaterina (Katya) Heldwein*

- Investigating protein-protein interactions underlying the mechanism and regulation of herpesvirus nuclear egress using structural and biophysical approaches
- Gaining expertise in molecular biology, protein purification, binding studies (SPR and BLI) and structural biology techniques such as cryo-electron microscopy/tomography (cryo-EM/T), x-ray crystallography, and small-angle x-ray scattering (SAXS), cellular biology and virology
- Determined the structural basis for a herpesvirus capsid protein inhibits herpesvirus nuclear budding *in vitro*, providing implications for *in vivo* processes

**Doctoral Research**

2011 – 2016

Georgia State University, Atlanta, GA  
*Advisor: Dr. Dabney Dixon*

- Biophysically characterized heme transport mechanisms of *Corynebacterium diphtheriae* and *Streptococcus pyogenes* heme uptake protein pathways to inform the design of potential antibiotic-alternative therapeutics
- Identified how a novel heme binding protein, HmuT, from *C. diphtheriae* binds and transfers heme
- Gained experience in molecular biology, protein expression, protein unfolding and biophysical techniques such as circular dichroism, fluorescence spectroscopy, and mass spectrometry

**Undergraduate Research**

2010 – 2011

Kennesaw State University, Kennesaw, GA  
*Advisor: Dr. John Haseltine*

- Designed *N*-acyl amino acid esters as substrates for proteolytic kinetic studies of HIV-1 protease
- Investigated proteolytic acyl transfer reactions as a function of substrate length
- Gained experience in organic synthesis, small molecule purification, and NMR

## PUBLICATIONS

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*\*indicates undergraduate co-author*

**Draganova, E. B.**, Thorsen, M. K., and Heldwein, E. E. (2020) Nuclear Egress. In "Alpha herpesviruses: Molecular Biology, Host Interactions and Control", E.E Heldwein and G.A. Smith, Eds. Caister Academic Press.  
doi: <https://doi.org/10.21775/9781913652555.08>

**Draganova, E. B.** and Heldwein, E. E. (2020). Virally derived peptide inhibitors of the herpes simplex type 1 nuclear egress complex. *Scientific Reports* (under revision).

**Draganova, E.B.** and Heldwein, E.E. Virally derived peptide inhibitors of the HSV-1 nuclear egress complex. *BioRxiv* 168898 [Preprint]. June 24, 2020. Available from: <https://doi.org/10.1101/2020.06.24.168898>

**Draganova, E. B.**, Zhang, Jiayan, Zhou, Z. H., and Heldwein, E. E. (2020). Structural basis for capsid recruitment and coat formation during HSV-1 nuclear egress. *eLife*. 9:e56627. DOI: [10.7554/eLife.56627](https://doi.org/10.7554/eLife.56627)

**Draganova, E. B.**, Adrian, S. A., Lukat-Rodgers, G. S., Keutcha, C. S.\*, Schmitt, M. P., Rodgers, K. R., and Dixon, D. W. (2016). *Corynebacterium diphtheriae* HmuT: Dissecting the Roles of Conserved Residues in Heme Pocket Stabilization. *Journal of Biological Inorganic Chemistry*. 21(7):875-86. DOI: [10.1007/s00775-016-1386-3](https://doi.org/10.1007/s00775-016-1386-3)

Akbas, N., **Draganova, E. B.**, Block, D. R., Sook, B. R., Chan, Y. F., Zhuo, J., Eichenbaum, Z., Rodgers, K. R., and Dixon, D. W. (2015). Heme-bound SiaA from *Streptococcus pyogenes*: Effects of Mutations and Oxidation State on Protein Stability. *Journal of Inorganic Biochemistry*. 158:99-109. DOI: [10.1016/j.jinorgbio.2015.10.016](https://doi.org/10.1016/j.jinorgbio.2015.10.016)

**Draganova, E. B.**, Akbas, N., Adrian, S. A., Lukat-Rodgers, G., Collins, D. P., Dawson, J. H., Allen, C. E., Schmitt, M. P., Rodgers, K. R., and Dixon, D. W. (2015). Heme binding by *Corynebacterium diphtheriae* HmuT: Function and heme environment. *Biochemistry*. 54(43):6598-609. DOI: [10.1021/acs.biochem.5b00666](https://doi.org/10.1021/acs.biochem.5b00666)

## FUNDING

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Tufts Institutional Research and Career Development Award (IRACDA) Postdoctoral Fellowship, NIH/NIGMS K12 Award	2019 – present
F32 National Research Service Award Postdoctoral Fellowship, NIH/NIGMS	2017 – 2019
Training in Education and Critical Research Skills (TEACRS) Postdoctoral Affiliate, NIH/NIGMS K12 Award, IRACDA Program	2017 – 2019
Natalie V. Zucker Women's Scholar Research Grant, Tufts University	2017
Collaborative Research Travel Grant, Burroughs Wellcome Fund	2017
Molecular Basis of Disease Fellowship, Georgia State University	2012 – 2016

## HONORS AND AWARDS

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American Society for Virology Postdoctoral Scholar Travel Award (meeting canceled due to COVID-19 pandemic)	2020
2 <sup>nd</sup> Place Poster Award, Postdoc Poster Competition, Tufts University	2019
Selected attendee for the Advanced Cryo-Electron Tomography Workshop, Vienna Biocenter, Vienna, Austria; competitive application	2019
Graduate Teaching Award, Doctoral Level, Georgia State University	2016
Younger Chemist Leadership Development Award, Younger Chemists Committee, American Chemical Society	2016
Best Poster Award, Molecular Basis of Disease Research Day, Georgia State University	2015
Student Leader of the Year Award Nominee, Georgia State University	2015
Graduate Teaching Award, Doctoral Level, Georgia State University	2015
Outstanding Professional Service, Doctoral Level, Georgia State University	2014
Graduate Teaching Award, Doctoral Level, Georgia State University	2012
National Chemical Honors Society, Kennesaw State University	2010 – 2011
HOPE Scholarship, Kennesaw State University	2007 – 2011

## GRADUATE AND UNDERGRADUATE MENTORING

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### Tufts University School of Medicine, Molecular Biology and Microbiology Graduate Program

- Mentoring Nathalie Lavoie during completion of PhD in the Heldwein lab
- Training student in protein purification and confocal microscopy
- Developing a FRET-based assay for monitoring *in vitro* nuclear budding

### **Tufts University School of Medicine Master of Science in Biomedical Sciences Graduate Program**

- Mentored Alexander Vorperian during completion of research-portion (8 months) of thesis program
- Trained student in protein expression, purification, and confocal microscopy
- Guided student in assay optimization, thesis writing, and lab meeting presentations

### **Tufts University, Cell, Molecular and Developmental Biology Graduate Program**

- Mentored Michael Thorsen during an 8-week laboratory rotation and is now a lab member
- Trained student in cloning, protein expression and purification, and confocal microscopy
- Currently working with student on grant proposals and manuscript writing

### **Tufts University, Undergraduate Summer Research Volunteers**

- Mentored high school and undergraduate students for a 3-month summer research experience
- Trained students in cloning, protein purification, confocal microscopy, and x-ray crystallography
  - Alexis Tam Summer 2019 (recent MCPHS graduate/medical school bound)
  - Isabel Bulman Summer 2018 (undergraduate at Boston College)
  - Melanie Wu Summer 2017 (graduate student at University of Queensland)

### **Georgia State University Master of Science in Chemistry**

- Mentored Stephanie Thompson during completion of thesis program and throughout her undergraduate career; currently working in industry
- Trained student in protein expression, purification, protein unfolding studies, and spectroscopic techniques
- Guided student in lab meeting presentations and thesis writing

### **Georgia State University Molecular Basis of Disease Summer Research Program**

- Mentored Cyrienne Keutchka for a 3-month summer research program; currently a graduate student at Harvard
- Trained student in protein expression, purification, protein unfolding studies, and spectroscopic techniques

### **Georgia State University NSF Research Experience for Undergraduates (REU) Program**

- Mentored undergraduate students from outside institutions for a 3-month summer research program
- Trained students in protein expression, purification, and protein unfolding/kinetics
- Guided students in oral and poster presentations
  - Aaliyah Ward Summer 2015 (formulation chemist)
  - Brianna Bailey Summer 2014 (high-school chemistry teacher)

### **Georgia State University Undergraduate Research Students**

- Mentored GSU undergraduate research students over multiple semesters
- Trained students in a variety of biochemical and biophysical techniques
- Guided students in the development of writing skills for publication of data and preparation of oral and poster presentations
  - Jenee Graham 2015 – 2016 (medical scribe)
  - Carly Wieting 2015 – 2016 (data scientist)
  - Brandford Adobaw 2012 – 2014 (emergency medicine medical doctor)
  - Jillian Cochran Summer 2012 (graduate student at Yale University)

## **TEACHING EXPERIENCE**

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### **Adjunct Faculty**

Spring 2020

Department of Biology, Pine Manor College

- Biochemistry II: Principles of Metabolism
  - Designed an undergraduate-level course centered around metabolic pathways and disease
  - Utilized question/answer, small group and peer-led team-teaching (PLTL) strategies to engage student participation and gauge comprehension
  - Incorporated case studies on relevant disease-states to reinforce course material
  - Shifted course to an online format due to COVID-19 pandemic

### **Medical Small Groups Instructor**

School of Medicine, Tufts University

Fall 2018

- Biochemistry for Medical Students
  - Led interactive small group sessions based on medical case studies related to important aspects of biochemistry

- Utilized PLTL strategies to accomplish student learning goals

### Laboratory Instructor

Department of Chemistry, Georgia State University

2013 – 2016

- Organic Chemistry I Lab, CHEM 3100
  - Supervised 45 students during a semester long project-based chemistry lab
  - Instructed students how to develop proper organic laboratory techniques including extractions, distillations, and sublimations
  - Enhanced the comprehension spectroscopic applications (gas chromatography, mass spectrometry, and infrared spectroscopy) to aid in the identification of unknown compounds
- General Chemistry Lab, CHEM 1212K
  - Supervised 50 students during a semester long project-based chemistry lab
  - Instructed students how to develop proper laboratory techniques
  - Aided and enhanced the comprehension of general chemistry concepts from lecture

### Teaching Assistant

Department of Chemistry, Georgia State University

2011 – 2014

- Biochemistry I & II Lecture
  - Assisted in writing of exams
  - Led tutoring sessions to enhance the students' comprehension of the course material
- Organic Chemistry II Lecture
  - Instructed auxiliary courses for students taking advanced organic chemistry
  - Created worksheets and held class discussions which aided in the development of students' problem solving and critical thinking skills
- General Chemistry I & II Laboratory
  - Supervised students in the development of their laboratory techniques
  - Emphasized problem solving and laboratory safety methods
  - Proctored and graded exams, notebooks, and lab reports

### Teaching Assistant

Department of Chemistry, Kennesaw State University

2009 – 2011

- General and Organic Chemistry Labs
  - Supervised students in the development of their laboratory techniques
  - Aided students in problem solving in the laboratory
  - Proctored and graded exams, notebooks, and lab reports

## INVITED TALKS AND ORAL PRESENTATIONS

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*\*indicates undergraduate co-author*

**Draganova, E.B.** Structural Basis for Capsid Recruitment and Coat Formation During HSV-1 Nuclear Egress. American Society for Virology, Virtual Meeting, June 19, 2020.

**Draganova, E.B.** When the Stars Align: Structural Basis for HSV-1 Capsid Egress. Research Report, Department of Molecular Biology and Microbiology, Tufts University School of Medicine, Boston, MA, March 17, 2020.

**Draganova, E.B.** Going Star Crazy: Structural Basis for HSV-1 Capsid Egress. Virology Supergroup, Tufts University School of Medicine, Boston, MA, December 13, 2019.

**Draganova, E.B.** To Bud or Not to Bud: Inhibition of the HSV-1 Nuclear Egress Complex. Boston Area Herpesvirus Symposium, Harvard Medical School, Boston, MA, May 7, 2019.

**Draganova, E.B.** Never Count Your Buds Before They Hatch: Inhibition of the HSV-1 Nuclear Egress Complex. Research Report, Department of Biology, Stonehill College, North Easton, MA, February 1, 2019.

**Draganova, E.B.** Never Count Your Buds Before They Hatch: Inhibition of the HSV-1 Nuclear Egress Complex. Research Report, Department of Molecular Biology and Microbiology, Tufts University School of Medicine, Boston, MA, December 18, 2018.

**Draganova, E.B.** HSV-1 Nuclear Egress Complex and UL25: The Best of Buds. Research Report, Department of Molecular Biology and Microbiology, Tufts University School of Medicine, Boston, MA, December 19, 2017.

**Draganova, E. B.** To Postdoc, or Not to Postdoc – That is the Question. 68<sup>th</sup> Southeastern Regional Meeting of the American Chemical Society; Columbia, SC, October 23 – 26, 2016.

Keutcha, C. S.\*, **Draganova, E. B.**, and Dixon, D. W. The Role of HmuT in the Heme Uptake Pathway of *C. diphtheriae*. Georgia-Alabama Louis Strokes Alliance for Minority Annual Symposium; Atlanta, GA, April 14, 2016.

**Draganova, E. B.** Biophysical Perspectives of Heme Uptake Pathways in Pathogenic Bacteria. Molecular Basis of Disease Fellows Lecture Series, Georgia State University, Atlanta, GA, January 21, 2016.

**Bennett, E. H.** and Dixon, D.W. HmuT Heme Binding in *Corynebacterium diphtheriae*: A Closer Look at Conserved Residues. Oglethorpe University, Atlanta, GA, April 15, 2015.

**Bennett, E. H.**, Akbas, N., Burgos, J., Schmitt, M., Collins, D., Dawson, J., Lukat-Rodgers, G., Rodgers, K., and Dixon, D.W. HmuT Heme Binding in *Corynebacterium diphtheriae*: A Closer Look at Conserved Residues. 66<sup>th</sup> Southeastern Regional Meeting of the American Chemical Society; Nashville, TN, October 16 – 19, 2014.

**Bennett, E. H.**, Burroughs, S., and Laughlin, S. "I'm a Barbie Girl in the Science World." Panel. Graduate Teaching Assistant (GTA) Pedagogy Conference; Georgia State University, Atlanta, Georgia, April 19, 2013.

## SELECTED POSTER PRESENTATIONS

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*\*indicates undergraduate co-author*

**Draganova, E.B.** Structural Basis for Capsid Recruitment and Coat Formation During HSV-1 Nuclear Egress. American Society for Virology Abstract Accepted as Flash Talk + Poster Presentation (meeting canceled due to COVID-19 pandemic).

**Draganova, E. B.** and Ekaterina E. Heldwein. To Bud or Not to Bud: Inhibition of the HSV-1 Nuclear Egress Complex, IRACDA 2018; Atlanta, GA, July 16, 2018.

**Draganova, E. B.** and Ekaterina E. Heldwein. To Bud or Not to Bud: Inhibition of the HSV-1 Nuclear Egress Complex, 32<sup>nd</sup> Protein Society Meeting; Boston, MA, July 11, 2018.

**Draganova, E. B.** and Ekaterina E. Heldwein. To Bud or Not to Bud: Inhibition of the HSV-1 Nuclear Egress Complex, Clinical and Translational Science Symposium, Tufts Medical Center; Boston, MA, May 18, 2018.

Thompson, S.S.\*, **Draganova, E. B.**, Ouattara, M. Collins, D. Dawson, J. Block, D. Lukat-Rodgers, G. Rodgers K. Eichenbaum, Z., and Dixon, D.W. "Auto-reduction Studies of Shr-NEAT2 Domain in *Streptococcus pyogenes*." Seventh Annual Southeast Enzyme Conference; Atlanta, Georgia; April 16, 2016.

Keutcha, C. S.\*, **Draganova, E. B.**, and Dixon, D. W. The Role of HmuT in the Heme Uptake Pathway of *C. diphtheriae*. Emerging Researchers National Conference in STEM; Washington D.C., February 26, 2016.

Thompson, S.S.\*, Thompson, T., **Bennett, E. H.**, and Dixon, D.W. Preliminary Studies of the HmuT Protein in the Heme Uptake Pathway of *Corynebacterium diphtheriae*. Georgia State University Undergraduate Research Conference; Atlanta, Georgia; April 14, 2015.

**Bennett, E. H.**, Akbas, N., Adrian, S., Lukat-Rodgers, G., Collins, D., Allen, C., Dawson, J., Schmitt, M., Rodgers, K., and Dixon, D.W. Heme Binding in *Corynebacterium diphtheriae* HmuT: An Investigation of Conserved Residues. 6<sup>th</sup> Southeast Enzyme Conference; Atlanta, GA, April 11, 2015.

Bailey, B.\*, **Bennett, E. H.**, and Dixon, D.W. Heme Binding in *Corynebacterium diphtheriae*: A Tale of Two Mutants. Southeastern Regional Meeting of the American Chemical Society; Nashville, TN, October 16 – 19, 2014.

**Bennett, E. H.**, Akbas, N., Burgos, J., Schmitt, M., and Dixon, D.W. Axial Ligation of the HmuT Heme Binding Protein in *Corynebacterium diphtheriae*. 248<sup>th</sup> Meeting of the American Chemical Society; San Francisco, CA, August 10 – 14, 2014.

**Bennett, E. H.**, Akbas, N., Burgos, J., Schmitt, M., Collins, D., Dawson, J., Lukat-Rodgers, G., Rodgers, K., and Dixon, D.W. Updates on the Axial Ligation of the HmuT Heme Binding Protein in *Corynebacterium diphtheriae*. 5<sup>th</sup> Southeast Enzyme Conference; Atlanta, GA, April 5, 2014.

Adobaw, B.\*, Bartlett K.\*, **Bennett, E.H.**, Dixon, D. Schmitt, M., Collins, D., Michael, J.; Axial Ligands of the Heme Uptake Protein HmuT from *Corynebacterium diphtheriae*; Georgia State Undergraduate Research Conference; Atlanta, GA; March 11<sup>th</sup>, 2013.

Adobaw, B.\*, Rinomhota G.\*, **Bennett, E.H.**, Dixon D.; HmuT as a Binding Protein in the Heme Uptake Pathway of *Corynebacterium diphtheriae*; Herty Medalist Undergraduate Research Symposium; Atlanta, GA; September 14, 2012.

## **PROFESSIONAL DEVELOPMENT AND TRAINING**

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Research Reproducibility for Everyone, Tufts University	Fall 2020
Diversity, Equity, and Inclusion in Mentoring: Challenges and Opportunities, Leukocyte Biology	Fall 2020
Manuscript Writing Workshop Series, Tufts University	Spring 2020
Page One Specific Aims Grant Writing Workshop, Tufts University	Spring 2019
How a Mentor Can Help Students and Faculty Succeed Workshop, Tufts University	Spring 2019
Culturally Sensitive Mentoring Workshop, Tufts University	Spring 2019
Postdoc to Faculty Workshop, Participant, American Chemical Society	Summer 2018
Active Learning in the Classroom Workshop, Tufts University	Spring 2018
Course Design Workshop, Tufts University	Fall 2017

## **LEADERSHIP AND SERVICE TO PROFESSION**

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Board Member, National Graduate Education Advisory Board, American Chemical Society	2019 – 2021
Chair, Northeastern Section of the Younger Chemists Committee, American Chemical Society	2018 – 2020
Mentoring Circles, Mentee, Tufts University	2017 – 2018
Mentoring Circles, Mentee, Tufts University	2017 – 2018
Mentoring Circles, Mentee, Association of Women in Science, Massachusetts Chapter	2016 – 2017
Women's Chemist Committee, Atlanta, American Chemical Society	2016
Graduate Student Alliance, Treasurer, GSU	2015 – 2016
Parking and Transportation Committee, Graduate Student Representative, GSU	2014 – 2016
Chemistry Graduate Student Association, President, GSU	2014 – 2016
Graduate Student Alliance, Chemistry Representative, GSU	2014
Atlanta Science Advocacy, Co-Director, Outreach and Development	2014
Graduate Career Alliance, Chemistry Division, GSU	2014
Professional Science Club, Graduate Student Panelist, GSU	2014
Association of Women in Science, GSU Chapter, Co-founder	2013 – 2016
Chemistry Graduate Student Association, Vice-president, GSU	2013 – 2014
Judge, Undergraduate Poster Session, SERMACS	2013

## **PROFESSIONAL MEMBERSHIPS**

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American Society of Virology	2019 – present
American Association for the Advancement of Science	2018 – present
Protein Society	2017 – present
American Chemical Society	2014 – present