

**Lori D. Banks, Ph.D.**  
**lbanks@bates.edu**

**Employment**

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2019-Present	Bates College Assistant Professor Department of Biology Research: <i>Structural and Biochemical Basis for Rotavirus NSP4 Viroporin Activity</i> Courses: Research and Seminar (Microbiology and Biochemistry), Microbiology, Cellular Biochemistry, STEM Scholars, Lab-Based Biological Inquiry: Living in a Microbial World (Cheese Extravaganza), Cellular Basis of Life
2018-2019	Baylor College of Medicine (BCM) Staff Scientist Department of Molecular and Cell Biology Mentor: Nicholas Mitsiades, MD and Salma Kaochar, PhD
2015-2019	Baylor College of Medicine Human Genome Sequencing Center (HGSC) Pre-Graduate Education Training (PGET) Program Consultant and Instructor Curriculum Design and Postbaccalaureate Instructor
2018	University of Houston (Main Campus) Adjunct Professor Department of Biology and Biochemistry Intro to Biological Science I Lecture
2018	Baylor College of Medicine Postdoctoral Associate Department of Pathology Center for Drug Discovery Mentor: Martin Matzuk, M.D., Ph.D.
2016-2018	University of St. Thomas-Houston Adjunct Professor Department of Biology Intro to Population Biology Lecture, Biochemistry Lab
2015-2017	Baylor College of Medicine Research Education and Career Horizon- Institutional Research and Academic Career Development Award (REACH-IRACDA) Postdoctoral Research, Teaching, and Curriculum Design Fellowship

Department of Molecular Virology and Microbiology (MVM)  
*Restitution of the Infant Gut Microbiome Following Rotavirus Infection;  
Structural Basis for NSP4 Viroporin Activity*  
Mentor: Joseph M. Hyser, Ph.D.

2014-2015      alliantgroup, LP  
Senior Associate  
R&D Tax Credit Study Project Manager & Technical SOP Manual Consultant

2011-2014      University of Texas Health Science Center at Houston (UTHealth)  
Postdoctoral Fellow  
Department of Microbiology and Molecular Genetics  
*Role of the Phosphotransferase System in Bacillus anthracis Virulence Gene  
Regulation*  
Mentor: Theresa M. Koehler, Ph.D.

### **Education**

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#### Graduate

2005-2011      Baylor College of Medicine, Houston, TX  
Doctorate of Philosophy- Molecular Virology and Microbiology  
*Biochemical Characterization of Metallo- $\beta$ -Lactamase Activity*  
Mentor: Timothy G. Palzkill, Ph.D.

#### Undergraduate

2004-2005      Human Genome Sequencing Center (HGSC) Pre-Graduate Education  
Training (PGET) Program Postbaccalaureate Fellow  
Department of Pediatrics, Section of Infectious Diseases  
BCM, Houston, TX  
*Role of Toll-like Receptors in Bacterial and Viral-Induced Cardiac Injury*  
Mentors: Jesus G. Vallejo, MD & Debra Murray, Ph.D.

2000-2004      Prairie View A&M University (PVAMU), Prairie View, TX  
Bachelor of Science-Biology  
Minor in Chemistry

### **Honors and Awards**

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2021      Arthur Vining Davis Foundations Periclean Faculty Leader in STEM and  
Social Sciences  
2020      Cell Mentor 1,000 Inspiring Black Scientists in America  
2015-2018      BCM REACH-IRACDA Fellowship  
2017      MVM Retreat Book Cover Contest Winner  
2016      1<sup>st</sup> Place Postdoc MVM Departmental Retreat Poster Presentation  
2016      BCM Postdoc Seminar Series Finalist  
2010      3<sup>rd</sup> Place Poster Award BCM Graduate Student Research Symposium  
2009-2010      Gulf Coast Consortia/Keck Center Pharmacoinformatics Training Program  
Fellowship  
2009      American Society for Microbiology Corporate Activities Program Student  
Travel Grant

2007	Acres of Diamonds Award from the Minority Trainee Research Forum
2005-2006	National Institute of General Medical Sciences Initiative for Minority Student Development Predoctoral Fellowship
2005	Harris Busch Achievement Award
2003	Cell Biology Society of UTMB Award

### **Institutional Service and Community Engagement**

2020-Present	Bates College Institutional Review Board Member
2020-Present	Center for Black Community Development Committee Member (Within the Permanent Commission on the Status of Racial, Indigenous and Maine Tribal Populations)
2019-Present	Charter member of Zeta Phi Beta Sorority, Incorporated (Community Service Organization), Gamma Alpha Nu Zeta Chapter (Nashua, NH); Inaugural Secretary and Scholarship Chair
2018-Present	Science Alumni Chapter of the PVAMU National Alumni Association (Formerly the Annual PVAMU Biology Department Symposium Committee); (2020-Present) President (2018-2020) Board member
2020	Bates Biology Lab Classroom Social Distancing Working Group Member
2020	Bates COVID Testing Center Volunteer
2015-2017	Alkek Center for Metagenomics and Microbiome Research Postdoc President
2016	7th Annual REACH-IRACDA Symposium Planning Committee
2013	University of Texas Postdoc Association Abstract Competition Review Committee
2012-2014	University of Texas Postdoc Association Executive Committee
2008-2009	BCM Graduate Student Council Representative

### **Teaching and Mentoring Activities**

I have been fortunate to share my love of all things science with others at various stages of their education. In those moments, I always aim to incorporate problem-solving and critical thinking activities to maximize learner benefit, whether in the classroom or the lab. I think it's important to share one's failures in addition to the successes so that students have a balanced understanding of the practice of science.

2020-Present	Society for the Advancement of Chicanos and Native Americans (SACNAS) Inaugural Chapter Advisor at Bates College
2020	Bates College Biology Student Journal Club Guest
2020	Bates College Ask Me Anything Panelist
2015-2019	UTHealth Individual Development Plan Bootcamp Mentor
2013-2019	UTHealth Association of Minority Biomedical Researchers Graduate Student Mentor
2006-2018	PVAMU Biology Department Symposium Poster Judge
2016	BCM Postdoc Association Research Mentor Training Certificate (National Research Mentoring Network)
2008- 2011	BCM Initiative for Minority Student Development, Houston, TX Tutor for Molecular Methods, Molecular Interactions, Structure of Macromolecules, Molecular Biology of the Cell-Protein Lecture

2009-2010 BCM First-year Initiative Mentorship Program  
First-year student mentor

### **Science Literacy and Community Outreach Activities**

In addition to volunteering at numerous science and career fairs, my efforts outside of the lab have focused on expanding science literacy in underserved populations, and communicating scientific literature to the lay public. In my other community associations a Girl Scout leader, and as a member of Zeta Phi Beta Sorority Inc., I speak to girls, children of color, and low-income youth about pursuing STEM careers. In the wake of the SARS-CoV2 pandemic, I have also contributed to several community information sessions about infectious diseases and vaccines and public health.

2020-2021 COVID-19 Science Cafe- Co-organizer and Speaker  
Weekly Webinar Series about SARS-CoV2, COVID-19, and related public health issues for members of the Bates Community

2020-2021 Straight Talk with Sistahs in Science, Co-organizer and Panelist  
Weekly Facebook townhall about SARS-CoV2, COVID-19, and related public health issues for the general public

2020 Bates Townhall- CORONAVIRUS - The Economic and Public Health Impact of the Outbreak Panelist

2020 Community Engaged Learning Plan Development with Promise Early Education Center (Lewiston, ME)

2019 United Nations International Day of Women and Girls in Science Speaker at Baylor College of Medicine Biotech Academy at Rusk Middle School (Houston ISD)

2018-2019 MacGregor Elementary School Career Day (Houston ISD)

2016-2019 Present "Strawberry DNA Extraction" modules to Houston-area preschool/elementary groups in conjunction with BCM HGSC; Includes cell biology lesson and coloring books from Cell Press/BioRad.

2018 Baylor College of Medicine Academy at Ryan Middle School DNA Day Presenter (Houston ISD)

2018 Prairie View A&M University Land Grant Research Symposium Panelist

2018 Drew Academy Career Fair (Aldine ISD)

2018 Cross Roads Community Church College Fair

2018 Science and Engineering Fair of Houston

2018 Edgar Allen Poe Elementary School Science Day (Houston ISD)

2017 March for Science Houston Science Demonstration Leader

2017 Lambda Zeta Chapter Scholarship Luncheon Speaker; "Pinky and the Brain: Lessons for Success".

2017 Lambda Zeta Chapter Archonette Club Teen Summit Career Speaker; "Enjoying Life as a Scientist".

2009-2011 Reviving Baseball In Inner Cities (RBI) High School SAT Prep Houston, TX  
Tutored reading comprehension and mathematics for local inner-city youth baseball team.

### **Research Summary**

My primary research interests lie in understanding the molecular mechanisms that govern host-pathogen interactions. Defining the structure and function of molecules at this interface will further our understanding of how pathogens sense their host environments and lead to the development of new therapeutic tools. My laboratory is currently focused on proteins key to the replication of rotavirus, and identifying small molecules that inhibit their function.

#### **Publications** (\* denotes co-authorship)

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1. **L Banks**, A McDonough, D Whittington, D Murray. An Active Approach to Teaching Central Dogma. The FASEB Journal. 14 May 2021. DOI: 10.1096/fasebj.2021.35.s1.01708. Proceedings of the American Society for Biochemistry and Molecular Biology 2021.
2. K Engevik, **L Banks**, J Petrosino, M Engevik, J Hyser. Exploring the interaction between rotavirus and Lactobacillus. The FASEB Journal. 14 May 2021. DOI: 10.1096/fasebj.2021.35.s1.04505. Proceedings of Experimental Biology 2021.
3. **L Banks**. Why Clean Energy Should Be King: Contributing Piece by Dr. Lori Banks. March 10, 2021. <https://www.revisionenergy.com/blogs/why-isnt-clean-energy-king-it-should-be/>.
4. **L Banks**. Vaccinating the Virus. Rainier Olympic Nurses Association Newsletter. Spring 2021. [https://rainierolympicnurses.org/wp-content/uploads/2021/04/RONA\\_Nwsltr\\_202103\\_WEB.pdf](https://rainierolympicnurses.org/wp-content/uploads/2021/04/RONA_Nwsltr_202103_WEB.pdf).
5. D Murray, J Drummond, D Ritter, K Martin, **L Banks**, D Whittington. Bioinformatics Bootcamp: A model for training clinical researchers. Medical Research Archives. Vol 8 No 5 (2020): Vol.8 issue 5 May 2020. DOI: <https://doi.org/10.18103/mra.v8i5.2108>.
6. MA Engevik, **LD Banks**, KA Engevik, AL Chang-Graham, JL Perry, DS Hutchinson, NJ Ajami, JF Petrosino, JM Hyser Microbial Degradation of Ileal Mucus Promotes Rotavirus Infection. Gastroenterology. Volume 158, Issue 6, Supplement 1, S-226-S-227, MAY 01, 2020. [https://doi.org/10.1016/S0016-5085\(20\)31254-3](https://doi.org/10.1016/S0016-5085(20)31254-3). Proceedings of the 2020 Digestive Diseases Week.
7. \*MA Engevik, \***LD Banks**, KA Engevik, AL Chang-Graham, JL Perry, DS Hutchinson, NJ Ajami, JF Petrosino, JM Hyser. Rotavirus infection induces glycan availability to promote ileum-specific changes in the microbiome aiding rotavirus virulence. Gut Microbes. 2020 Sep 2;11(5):1324-1347. doi: 10.1080/19490976.2020.1754714. Epub 2020 May 13. PMID: 32404017.
8. TG Hammerstrom, **LB Horton**, MC Swick, A Joachimiak, J Osipiuk, TM Koehler. Crystal structure of *Bacillus anthracis* virulence regulator AtxA and effects of phosphorylated histidines on multimerization and activity. Molecular Microbiology. 2015 Feb;95(3):426-41. doi: 10.1111/mmi.12867. PMID: 25402841.
9. CJ Adamski, AM Cardenas, NG Brown, **LB Horton**, B Sankaran, BV Prasad, HF Gilbert, T Palzkill. Molecular basis for the catalytic specificity of the CTX-M extended-spectrum  $\beta$ -lactamases. Biochemistry. 2015 Jan 20;54(2):447-57. doi: 10.1021/bi501195g. PMID: 25489790.
10. NP Sastri, M Viskovska, JM Hyser, MR Tanner, **LB Horton**, B Sankaran, BV Prasad, MK Estes. Structural plasticity of the coiled-coil domain of rotavirus NSP4. Journal of Virology. 2014 Dec;88(23):13602-12. doi: 10.1128/JVI.02227-14. PMID: 25231315.
11. **LB Horton**, S Shanker, R Mikulski, NG Brown, K Phillips, E Lykissa, BVV Prasad, TG Palzkill. Mutagenesis of zinc ligand residue Cys221 reveals plasticity in the IMP-1 metallo- $\beta$ -lactamase active site. Antimicrobial Agents and Chemotherapy. 2012 Nov;56(11):5667-77. PMID: 22908171.

12. P Chen, **LB Horton**, R Mikulski, L Deng, S Sundryal, TG Palzkill, Y Song. 2-Substituted 4,5-Dihydrothiazole-4-carboxylic Acids are novel inhibitors of Metallo- $\beta$ -lactamases. *Bioorganic & Medicinal Chemistry Letters*. 2012 Oct 1;22(19):6229-32. PMID: 22921080.
13. \*NG Brown, \***LB Horton**, \*W Huang, S Vongpunsawad, T Palzkill. Analysis of the functional contributions of Asn233 in the IMP-1 metallo- $\beta$ -lactamase. *Antimicrobial Agents and Chemotherapy*, 2011 Dec;55(12):5696-702. PMID:21896903
14. C Gorbea, KA Makar, M Pauschinger, G Pratt, JL Bersola, J Varela, RM David, **L Banks**, CH Huang, H Li, HP Schultheiss, JA Towbin, JG Vallejo, NE Bowles. A role for Toll-like receptor 3 variants in host susceptibility to enteroviral myocarditis and dilated cardiomyopathy. *Journal of Biological Chemistry*. 2010 Jul 23;285(30):23208-23. PMID: 20472559.
15. LB Boyd, MJ Maynard, SK Morgan-Linnell, **LB Horton**, R Sugang, RJ Hamill, JR Jimenez, J Versalovic, D Steffen, and EL Zechiedrich. Relationships among ciprofloxacin, gatifloxacin, levofloxacin, and norfloxacin MICs in fluoroquinolone-resistant *Escherichia coli* clinical isolates. *Antimicrob Agents and Chemotherapy*. 2009 Jan;53(1):229-34. PMID: 18838594.

### **Invited Talks**

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1. San Francisco State University Department of Biology Seminar- “Knowing Your Enemy and Knowing Yourself: Combating Viral Infections from Many Angles”. October 2020, San Francisco, CA. Virtual.
2. Bates College Indigenous Peoples’ Day Celebration, Co-organizer, and Discussion Panelist. October 2020. Lewiston, ME.
3. Premdecial Concepts Institute Biology VSE Panel Discussion - “The PCI Chronicles: Confessions of the Biology Elite?” Panelist. July 2020, Prairie View, TX. Virtual.
4. Bates Forté Foundation Speaker Series: Resilience. Guest speaker. June 2020. Lewiston, ME. Virtual.
5. PVAMU Spring 2020 BIOL1031 Seminar Course. Guest speaker. April 2020. Prairie View, TX. Virtual.
6. Boston Bates Business Network: Research, Biotech, and Pharma. Panelist. October 2019.
7. Bates College Center for Purposeful Work Grad School 101 Session. Panelist. October 2019.
8. Inaugural Bates College Indigenous Peoples’ Day Celebration, Co-organizer, and Book Discussion Panelist. October 2019. Lewiston, ME.
9. *Segmental Changes of the Intestinal Microbiome in Rotavirus Diarrhea*. Panelist and Speaker at the New Scholars Symposium on Fostering Diversity in Microbiology: Research, Pedagogy, and Climate in STEM. January 2018, Bates College, Lewiston, Maine.
10. *March of Dimes Project  $\geq 39$* . Keynote speaker at the Zeta Phi Beta Sorority, Inc., Lambda Zeta Chapter, Stork’s Nest Education Program Graduation. April 2017, Houston, TX.
11. *Structure Function Studies of Metallo- $\beta$ -lactamase*. Keynote speaker at the Annual Biology Research Symposium at Prairie View A&M University, October 2009, Prairie View, TX.

### **Podcast Interviews**

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1. **L Banks**. The Gift of Science. Language of God, Episode 68. February 25, 2021. [Biologos.org](https://biologos.org/podcast-episodes/lori-banks-the-gift-of-science). <https://biologos.org/podcast-episodes/lori-banks-the-gift-of-science>.
2. L Batts, **L Banks**. Technically 200 Talks: Moms on STEM. June 3, 2021. [Code2College.org](https://www.instagram.com/p/CPrGmHkD7Qm/). <https://www.instagram.com/p/CPrGmHkD7Qm/>.

## Conferences and Meetings

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### *Talks*

1. **L Banks**. Mutation Tolerance of the Rotavirus NSP4 Viroporin Domain. 47th Maine Biological and Medical Sciences Symposium. April 2020, Mount Desert Island, ME. Virtual.
2. **L Banks**, J Auchtung, DS Hutchinson, JL Perry, JF Petrosino, JM Hyser. Neonatal rotavirus infection alters the microbial geography of the small intestine. BCM 2016 Postdoc Seminar Series. March 2016. Houston, TX.
3. **LB Horton**, TG Hammerstrom, TM Koehler. A Phosphomimetic Mutant of the Bacillus anthracis Virulence Gene Regulator AtxA Exhibits Decreased Multimerization and Activity. Talk presented at the International Conference on Bacillus anthracis, Bacillus cereus, and Bacillus thuringiensis, September 2013. Victoria, British Columbia, Canada.
4. **L Banks**, W Huang, and T Palzkill. Substrate Specificity Determinants of TEM-1  $\beta$ -Lactamase. Presented at the Minority Trainee Research Forum, September 2007. Fort Lauderdale, FL.

### *Posters*

1. **L Banks**, A McDonough, D Whittington, D Murray. An Active Approach to Teaching Central Dogma. American Society for Biochemistry and Molecular Biology. April 2021.
2. K Engevik, **L Banks**, J Petrosino, M Engevik, J Hyser. Exploring the interaction between rotavirus and Lactobacillus. April 2021. Experimental Biology. April 2021.
3. **L Banks**, M Engevick, DS Hutchinson, PB Ganesh, J Auchtung, A Chang-Graham, NJ Ajami, J Versalovic, JF Petrosino, JM Hyser. The Gut Microbiome and Host Contribute to Mucus Loss During Rotavirus Diarrhea. BCM Molecular Virology and Microbiology Retreat, October 2017. Houston, TX.
4. **L Banks**, DS Hutchinson, BP Ganesh, J Auchtung, NJ Ajami, J Versalovic, JF Petrosino, JM Hyser. Early Childhood Rotavirus Infection Alters Microbial Geography of The Small Intestine. Poster presented at the Molecular Basis of Infectious Disease (MBID) Retreat, March 2017. Houston, TX.
5. **L Banks**, DS Hutchinson, BP Ganesh, J Auchtung, NJ Ajami, J Versalovic, JF Petrosino, JM Hyser. Early Childhood Rotavirus Infection Alters Microbial Geography of The Small Intestine. Poster presented at the Frontiers in Digestive Diseases Symposium, February 2017. Houston, TX.
6. **L Banks**, DS Hutchinson, J Auchtung, JF Petrosino, JM Hyser. Spatial and Temporal Alterations of Infant Gut Microbial Geography during Acute Rotavirus Diarrhea. Poster presented at the International Human Microbiome Consortium, November 2016. Houston, TX.
7. **L Banks**, DS Hutchinson, J Auchtung, R Britton, JM Hyser. Spatial and Temporal Alterations of Infant Gut Microbial Geography during Acute Rotavirus Diarrhea. BCM Molecular Virology and Microbiology Retreat, October 2016. Houston, TX.
8. **L Banks**, DS Hutchinson, J Auchtung, R Britton, JM Hyser. Spatial and Temporal Alterations of Infant Gut Microbial Geography during Acute Rotavirus Diarrhea. Poster presented at the National IRACDA Conference, June 2016. Tucson, AZ.
9. **L Banks**, SE Blutt, JM Hyser, M Conner. Neonatal Rotavirus Infection Alters the Adult Gut Microbiome in Mice. Poster presented at the 7th Annual Frontiers in Digestive Diseases Symposium, February 2016. Houston, TX.

10. **LB Horton**, TG Hammerstrom, TM Koehler. Phosphoregulation of the Bacillus anthracis Virulence Regulator AtxA. Presented at the Molecular Basis of Infectious Disease (MBID) Retreat, March 2013. Houston, TX.
11. **L Horton**, T Palzkill. The Role of Cysteine 221 in IMP-1 Metallo- $\beta$ -lactamase Function. Poster presented at the American Society of Microbiology General Meeting, May 2009, Philadelphia, PA.
12. **L Banks**, W Huang, and T Palzkill. Role of Residues 101-114 in Specificity of TEM-1  $\beta$ -Lactamase. Presented at the Molecular Basis of Infectious Disease (MBID) Retreat, March 2008. Houston, TX.
13. **L Banks**, CH Huang, J Bersola, JS Baker, HS Hardarson, M Pauschinger, K Fitzgerald, JG Vallejo, NE Bowles. A novel mutation in the Toll/IL-1R domain-containing adapter inducing IFN $\beta$  (TRIF) gene and its potential association with virus-induced dilated cardiomyopathy. Presented at Annual Meeting of the Society for Pediatric Research, May 2005. Washington, D.C.
14. **L Banks**, LA Denner, RG Tilton. Analysis of NF- $\kappa$ B Pathway Components in Human Renal Cortex from Diabetic and Normal Patients. Presented at Intercultural Cancer Council Biennial Meeting, May 2004. Washington, D.C.

#### **Current Research Support**

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1. NIH P20 GM103423      Banks Role: Subaward PI  
07/01/19 – 04/30/22      NIH/NIGMS

#### **Completed Research Support**

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1. NIH R25-HG006674-02      Gibbs (PI), Banks Role: Instructor  
03/20/12 – 04/30/18      NIH/NHGRI
2. NIH K12 GM084897      Slaughter (PI), Banks Role: REACH-IRACDA Postdoctoral Fellow  
07/01/15-02/28/18      NIH/NIGMS
3. NIH 5R01AI033537      Supplement Koehler (PI), Horton Role: Postdoctoral Fellow  
07/01/12-06/30/14      NIH/NIAID
4. NIH T90DK070109      Stancel (PI), Horton Role: Predoctoral Fellow  
06/01/09-05/31/10      NIH/NIDDK
5. NIH 3R01GM062474      Supplement Vallejo (PI), Banks Role: Postbaccalaureate Fellow  
07/01/04-06/30/05      NIH/NIGMS

#### **Current Teaching Support**

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1. Arthur Vining Davis Foundations Periclean Faculty Leaders in STEM and Social Sciences-Redesign of BIO321 Cellular Biochemistry Course to focus on the influence of public policy on the health of individuals through food availability.

#### **Completed Teaching Support**

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1. Harvard Center for Community Partnerships Community-Engaged Learning Project Grant Winter 2020 for BIO315 Microbiology Course to focus on lay communication of science.

#### **Patents**

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U.S. Patent Application 20120329842, “Small Molecule Compounds as Broad-Spectrum Inhibitors of Metallo-beta-lactamases”, invented by Yongcheng Song, Timothy Palzkill, Prasad B.V. Venkatar, **Lori B. Horton**, and Pinhong Chen. Published December 27, 2012.

### **Professional Memberships**

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2020- Present	Biophysical Society
2019-Present	American Society for Biochemistry and Molecular Biology
2016- Present	Black Women in Science and Engineering
2006- Present	American Society for Microbiology
2005- Present	Society for the Advancement of Chicanos and Native Americans in Science