Dewey Brooke

Birmingham AL 35222

Website: https://www.deweybrooke.org/

My name is Dewey Brooke, and I am a sixth generation Montanan from a small town of 120 called Pony. I enrolled at Montana State University in 2008 and graduated in 2012. From 2009 through 2013, I worked in the lab Dr. Brian Bothner. During that time I gained extensive experience in a wide-range of chemical and biochemical analytical equipment and techniques including LCMS, fluorescence, and electron microscopy. From 2013 to 2015, I further developed those techniques in addition to learning others while working in the lab of Dr. Peter Prevelige at the University of Alabama Birmingham. I have been exposed to a wide variety topics with a majority of my research focusing on the biochemical and biophysical characteristics of viruses. While at Montana State University, I studied the phospholipase a2 domain of adeno-associated virus, the assembly of hepatitis-b virus, and the maturation of nudaurelia capensis omega virus. At UAB, I studied the interaction between TRIM5a and HIV in hopes to better understand the mechanism of TRIM5a-mediated disassembly of HIV. Currently, I am enrolled in the Medical-Scientist Training Program at the University of Alabama School of Medicine.

Education

B.S., Biochemistry with the Highest Honors, Montana State University *May 4, 2012*

Scholarships

- Lewis McRoberts Scholarship | *Fall 2011-Spring 2012*
- E Max & Ione Parkin Memorial Scholarship | *Fall 2010-Spring 2011*
- Asbjornson University Scholarship | *Spring 2009-Spring 2012*
- Governor's Merit Scholarship | *Fall 2008-Spring 2012*

Fellowships

- *McNair Scholar | Spring 2010-Spring 2012*
- INBRE Research Internship| *Summer 2010-Spring 2012*

Analytical Skills and Techniques

Mass Spectrometry

ESI-Mass-Spectrometry
(Bruker MicroTOF, Waters QTOF Premier Agilent 6520, and Agilent 6538)
MALDI-Mass-Spectrometry
(Bruker Autoflex III MALDI TOF)
Hydrogen-Deuterium Exchange
Whole-Protein Hydrogen-Deuterium Exchange
LC-MS Method Development/Enzymatic Assay Development

Single and Multi-dimensional Chromatography

HPLC: Agilent 1100, Agilent 1200, LC Packings Ultimate
UPLC: Agilent 1290
FPLC: GE Akta FPLC

Size-Exclusion Chromatography
Reverse Phase Chromatography
Hydrophyllic Interaction Chromatography
Ion-Exchange Chromatography

Fluorescence Spectroscopy

Use of standard fluorescence instrumentation for analysis of proteins and small molecules (Varian Cary Eclipse Fluorescence Spectrophotometer)
QPCR-based differential thermodynamic profiling of proteins
Pyrene fluorescence of phospholipid bilayer fluidity
Tryptophan Quenching

General

Transmission Electron Microscopy (Leo 906E)
Flow-Cytometry (BD FACSCalibur, AMNIS ImageStream)
Liposome preparation: Extrusion and Sonication
Column Packing and Immobilization
Western Blot
SDS-PAGE: Silver Staining, Sypro-Ruby, and Coomassie
QPCR

Programming

Google Cloud (R-Studio Server, BigQuery)
Julia
Python
R
SQL (Legacy and Standard)

Software

Agilent Chemstation & Quantitative Analysis
Bruker Hystar and Data Analysis
HDExaminer
MassLynx 4.1 & ProteinLynx Global Server

Lab Rotations

Akinyemi Ojesina M.D., Ph.D. *Summer 2017*
Markus Bredel (Department of Radiation and Oncology) *Summer 2016*
Dan Gorelick (Department of Pharmacology) *Summer 2015*

Research Experience

Research Assistant (Dr. Peter Prevelige; University of Alabama Birmingham) *June 2013- April 2015*

- HDX Mass-Spectrometry on Viral Proteins
    - Acid induced conformational changes of P22 Tailspike
    - Structural Transitions of the P22 Barrel Domain
    - TRIM5a recognition of the HIV capsid
    - TRIMCyp recognition of the HIV Capsid
    - HIV-2 virulence factor VPX/DCAF1/DDB1 Complex
- Identification of the Alternate Amino Acids Inserted During Suppression of the CFTR-G542X Nonsense Mutation

Research Assistant Grade III (Dr. Brian Bothner; Montana State University) *August 2012- April 2013*

- Biophysical and biochemical characterization of receptor binding in parvoviruses
- The role of dynamics in the assembly of viral capsids using HDX mass-spectrometry
- Electron microscopy of phospholipase a2 induced tubule formation

Research Assistant Grade II (Dr. Brian Bothner; Montana State University) *May-August 2012*

- Biophysical and biochemical characterization of adeno-associated virus
- The role of dynamics in the assembly of viral capsids using HDX mass-spectrometry
- Development of a pyrene-based fluorescent assay for monitoring membrane fluidity

Undergraduate Research Assistant (Dr. Brian Bothner; Montana State University) *December 2009-May 2012*

- Development of a fast liquid-chromatography/mass -spectrometry based lipase assay
- Applications of differential scanning fluorimetry for calculating thermodynamic parameters
- Development of single amino-acid resolution HDX mass-spectrometry
- Calculating the thermodynamics of proteins using chemical denaturation and tryptophan quenching

Publications

Cherwa JE Jr, Tyson J, Bedwell GJ, Brooke D, Edwards AG, Dokland T, Prevelige PE, Fane BA. (2016). **φX174 Procapsid Assembly: Effects of an Inhibitory External Scaffolding Protein and Resistant Coat Proteins In Vitro**. Journal of Virology

Bhardwaj, A., Sankhala, R. S., Olia, A. S., Brooke, D., Casjens, S. R., Taylor, D. J., … Cingolani, G. (2016). **Structural Plasticity of the Protein Plug That Traps Newly Packaged Genomes in Podoviridae Virions.** The Journal of Biological Chemistry

Chang, B. J., Samal, A. B., Vlach, J., Fernandez, T. F., Brooke, D., Prevelige, P. E., & Saad, J. S. (2016). **Identification of the Calmodulin-Binding Domains of Fas Death Receptor.** PloS One, 11(1), e0146493.

Brooke, D., Movahed, N., & Bothner, B. (2015). **Universal buffers for use in biochemistry and biophysical experiments**. AIMS Biophysics, 2(3), 336–342.

Rayaprolu, V., Kruse, S., Kant, R., Movahed, N., Brooke, D. and Bothner, B. (2014). **Fluorometric Estimation of Viral Thermal Stability.** Bio-protocol 4(15): e1199. http://www.bio-protocol.org/e1199

Rayaprolu, V., Kruse, S., Kant, R., Venkatakrishnan, B., Movahed, N., Brooke, D., ... Bothner, B. (2013). **Comparative Analysis of Adeno-Associated Virus Capsid Stability and Dynamics**. Journal of Virology, 13150-13160.

Awards, Honors, and Features

- Phi Kappa Phi Outstanding Senior Award
- Lewis H. McRoberts Award: Outstanding Junior in Biochemistry
- Student Travel Award: 4th Biennial NISBRE Conference
- 1st place McNair Oral Presenter at the 2011 MSU Research Celebration
- Dean's List Fall 2008, Fall 2009-Spring 2012
- The National Society of Collegiate Scholars
- Featured in the Montana State University recruitment letter
- Featured in the 2012 MSU Campus Student Showcase
- Featured in an article by the Bozeman Daily Chronicle to represent the 2600 graduating seniors
- Featured in Mountains and Minds magazine in an article titled: The Heart of Montana
- Representative for the Honors Program at Montana State University

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Presentations

UAB Structural Biology symposium; Poster — October 2014

Hydrogen/Deuterium Exchange Studies of TRIM Family Proteins

Dewey Brooke[1], Brady Summers[2], Yong Xiong[2], Jinwoo Ahn[3], Peter Prevelige[1]

[1]Department of Microbiology, University of Alabama at Birmingham, Birmingham AL.
[2]Department of Molecular Biophysics and Biochemistry, Yale University, New Haven CT.
[3]Department of Structural Biology, University of Pittsburgh School of Medicine, Pittsburgh PA.

North American Cystic Fibrosis Conference; Poster — October 2014

Identification and Functional Consequences of the Alternate Amino Acids Inserted During Suppression of the CFTR-G542X Nonsense Mutation.

Xiaojiao Xue[1, 3], Dewey Brooke[2], Peter Prevelige[2] David M. Bedwell[1, 2, 3]

[1]Department of Genetics, University of Alabama at Birmingham, Birmingham AL.
[2]Department of Microbiology, University of Alabama at Birmingham, Birmingham AL.
[3]Gregory Fleming James Cystic Fibrosis Research Center, University of Alabama at Birmingham, Birmingham, AL

Structural Biology Related to HIV/AIDS 2014; Poster — October 2014

Hydrogen/Deuterium Exchange Studies of TRIM Family Proteins

Dewey Brooke[1], Brady Summers[2] , Yong Xiong[2], Jinwoo Ahn[3], Peter Prevelige[1]

[1]Department of Microbiology, University of Alabama at Birmingham, Birmingham AL.
[2]Department of Molecular Biophysics and Biochemistry, Yale University, New Haven CT.
[3]Department of Structural Biology, University of Pittsburgh School of Medicine, Pittsburgh PA.

4th Biennial NISBRE Conference; Poster — *June 25-27, 2012*

Monitoring the effects of pH and receptor binding on phospholipase activity in adeno-associated virus particles

Dewey Brooke[1], Navid Movahed[1], Antonette Bennett[2], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University
[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

FASEB 2012: Virus Structure and Assembly; Poster — *June 10-15, 2012*

Aging Gracefully; Maturation of a Tetravirus

Navid Movahed[1], Vamseedhar Rayaprolu[1], Jesse Ruzicka[1], Ravi Kant[1], Dewey Brooke[1], An Nguyen[1], Tatiana Domitrovic[2], Erhan Keles[1], John E. Johnson[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University
[2]Scrips Research Institute, La Jolla, California

FASEB 2012: Virus Structure and Assembly; Poster — *June 10-15, 2012*

High Resolution Hydrogen/Deuterium Exchange Mass Spectrometry Gives Insight to the Mechanism of Action of Hepatitis B Virus Capsid Assembly Effectors

Navid Movahed[1], Dewey Brooke[1], Adam Zlotnick[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University
[2]Department of Biology, Indiana University

Montana State University Research Celebration; Poster — *April 19, 2012*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University
[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

American Society of Mass Spectrometry: Mass Spectrometry in Structural Biology; Poster *January 10-15, 2012*

High Resolution Hydrogen/Deuterium Exchange Mass Spectrometry Gives Insight to the Mechanism of Action of Hepatitis B Virus Capsid Assembly Effectors

Navid Movahed[1], Dewey Brooke[1], Vamseedhar Rayaprolu[1], Adam Zlotnick[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Department of Biology, Indiana University

2nd Annual Montana State University McNair Research Symposium; Poster *December 8, 2011*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

UC Berkeley McNair Symposium; Platform *August 4-7, 2011*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

59th Meeting of the American Society of Mass Spectrometry; Platform *April 27, 2011*

Structure to Function: Use of Limited Proteolysis and Hydrogen Exchange Mass Spectrometry to Understand Virus Capsid Assembly and Cell Entry

Brian Bothner[1], Navid Movahed[1], Vamseedhar Rayaprolu[1], Jonathan Hilmer[1], Dewey Brooke[1], Adam Zlotnick[2], Mavis Agbandje-McKenna[3]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Department of Biology, Indiana University

[3]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

Montana State University Research Celebration; Platform and Poster *April 27, 2011*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Brad Poore[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

1st Annual Montana State University McNair Research Symposium; Poster *November 30, 2010*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Brad Poore[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

Montana State University Undergraduate Scholars Program Conference; Poster *August 6, 2010*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Brad Poore[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

24th Annual Symposium of the Protein Society; Poster *August 1-5, 2010*

Analysis of phospholipase activity in adeno-associated virus particles using liquid-chromatography/mass-spectrometry

Dewey Brooke[1], Navid Movahed[1], Brad Poore[1], Mavis Agbandje-McKenna[2], Brian Bothner[1]

[1]Chemistry & Biochemistry Department, Montana State University

[2]Biochemistry & Molecular Biology Department, University of Florida College of Medicine

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References

Brian Bothner Ph.D., Montana State University; *(406) 994-5270*

Associate Professor of Biochemistry/Director of the Mass Spectrometry Facility

Peter Prevelige Ph.D., *University of Alabama Birmingham* *(205) 975-5327*

Professor of Microbiology/Associate Professor of Biochemistry & Molecular Genetics

Trevor Douglas Ph.D. Indiana University; *(406) 994-6566*

Earl Blough Professor of Chemistry
