

THOMAS C. FREEMAN, JR., PH.D.

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Education

Tulane University New Orleans, LA	Ph.D. Field: Biochemistry	August 2003 – May 2010
Xavier University of Louisiana New Orleans, LA	B.S. Major: Biochemistry	August 1999 – May 2003

Dissertation

Tulane University, New Orleans, LA August 2003 – August 2009

Advisor: Dr. William Wimley

My thesis work, entitled “The genomic prediction and characterization of transmembrane β -barrels (TMBBs) in Gram-negative bacteria” (246 pages), involved developing a powerful bioinformatics tool to mine proteomic data for TMBB-encoding genes and validating a predicted model TMBB with an in-depth biochemical and biophysical characterization.

Research Experience

Seeding Postdoctoral Innovators in Research and Education (SPIRE)

Postdoctoral Scholar June 2011 – Present

University of North Carolina at Chapel Hill, Chapel Hill, NC

Mentor/PI: Dr. Leslie Parise/Dr. Linda Dykstra

Current role is to investigate the interactions between cellular adhesion molecules and their regulators in order to better understand how the dysregulation of these systems contributes to disease. Specific duties include performing various biophysical, biochemical, and computational experiments in order to elucidate the molecular mechanisms by which calcium-and-integrin binding protein 1 (CIB1) influences integrin-based cellular adhesion and signaling.

Postdoctoral Research Fellow September 2009 – June 2011

Tulane University, New Orleans, LA

Supervisor: Dr. William Wimley

Duties included performing independent investigations on novel membrane-spanning β -barrel proteins. This work encompassed a wide breadth of techniques ranging from bioinformatics to molecular biology in order to elucidate the complexities of the sequence-structure relationship of trans-membrane β -barrels. This work resulted in several poster presentations, and three first-author publications.

Undergraduate Research Intern August 2001 – May 2003

Xavier University of Louisiana, New Orleans, LA

Supervisor: Dr. Tarun Mandal

I performed a wide variety of experiments which were important for the development and characterization of novel, biodegradable drug delivery systems. This work resulted in my co-authorship of five publications and was presented at the ABRCMS Conference in 2001 and 2002.

Undergraduate Research Assistant May 2001 – August 2001
Dental Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC
Supervisor: Dr. Roland Arnold
Project focused on the trypsin-like proteolytic activity of *Pseudomonas aeruginosa*, an opportunistic pathogen. This work showed that many strains of *Pseudomonas aeruginosa* express extracellular proteolytic activity, which may be a component of their pathological virulence.

High School Research Intern Summer 1998 and Summer 1999
Project SEED (Summer Educational Experience for the Disadvantaged)
Dental Research Center, University of North Carolina at Chapel Hill, Chapel Hill, NC
Supervisor: Dr. Roland Arnold
Project focused on the synergistic colonization habits of a highly virulent periodontal pathogen *Porphyromonas gingivalis* and *Fusobacterium nucleatum*. This work was presented at the ACS National Meeting in 1998 and the AAAS meeting in 1999.

Teaching Experience

Adjunct Assistant Professor of Chemistry January 2013 – Present
Johnson C. Smith University, Charlotte, NC
Teaching mentor: Dr. Tim Champion (Chair)
Spring 2013: Biochemistry (BIO 333/CHE 333). This course was designed to teach students about the chemical behaviors and properties of molecules found in living organisms, and the complex network of chemical interactions that drive metabolism. The course format includes lectures, a variety of active learning exercises, and discussions in our class meetings. (13 students)
Fall 2013: Biochemistry (CHE 333). This course used an evidence-based teaching strategy known as POGIL (Process-Oriented Guided Inquiry Learning) where students learn biochemistry using teamwork to solve problems, and engage in critical thinking exercises to develop concepts, which they can apply to novel scenarios. (11 students)

Mentoring Experience

Undergraduate Student Mentored: Armando L. Corona May 2013 – July 2013
UNC-SPIRE Summer Research Experience, Chapel Hill, NC
Mentored an undergraduate student in a variety of scientific techniques, data analysis, and provided counseling on future career aspirations. The student's project involved studying the protein-protein interactions between a regulator of cell adhesion and the membrane-bound effector of cell adhesion using a synthetic lipid membrane system. This student presented this work in a poster at the 2013 ABRCMS meeting.

Graduate Student Mentored: C. Brian Garrett January 2012 – December 2012
Academic Coaching UNC-IMSD, Chapel Hill, NC
UNC Office of Graduate Education/Academic Excellence Program
I provided academic coaching and mentoring to a doctoral student in Biochemistry, and helped the student to improve skills in critically assessing research literature, present research data, and prepare for the scholarship needed to succeed in passing qualifying exams, which he successfully passed.

Undergraduate Student Mentored: Jennifer I. Okpala May 2012 – July 2012
UNC SURE (Summer Undergraduate Research Experience), Chapel Hill, NC

Mentored an undergraduate student in learning the scientific method, critical thinking, technical skills, giving oral and poster presentations, as well as provided counseling on future career aspirations. The student's project involved trying to design and develop a peptide based inhibitor to a novel potential cancer target.

Junior Coordinator

May 2001 – August 2001

Project SEED/REAP, Durham, NC

Supervisor: Mr. Kenneth Cutler

Duties included mentoring high school students and instructing them in the methods and philosophies of scientific research and communication. The students were participants in the American Chemical Society- and US Army-sponsored Project SEED/REAP (Summer Educational Experience for the Disadvantaged / Research and Engineering Apprenticeship Program).

Pedagogical Training

2013 Lesson Planning

UNC, Chapel Hill, NC

One-hour workshop on how to devise and execute a lesson plan within the time constraints of a normal class facilitated by Jennifer Coble, PhD (UNC Biology Department)

2013 Developmental Neurobiology Course

Okinawa Institute of Science and Technology, Okinawa, Japan

Fifteen-day course on the development of nervous systems in animals from simple invertebrates to humans with lectures and practical laboratory experiences using model systems including *Caenorhabditis elegans*, *Drosophila melanogaster*, and *Danio rerio*

2013 POGIL (Process-Oriented Guided Inquiry Learning) workshop

UNC, Chapel Hill, NC

Three-hour workshop on the value and implementation of POGIL, an evidence-based teaching strategy that emphasizes the use of inquiry and teamwork to guide the students to learn various process skills. Facilitated by Michael Bruno, PhD and Gail Webster, PhD (Guilford University)

2012 Research ethics training.

UNC, Chapel Hill, NC

Eight-hour course sponsored by Office of Postdoctoral affairs that fulfills the NIH requirements for research ethics training

2012 Seminar on College Teaching

UNC, Chapel Hill, NC

Ten-week course that provided practical and comprehensive lessons on constructing and teaching a college course facilitated by Ed Neal, PhD.

2012 Effective College Teaching Workshop

UNC Chapel Hill, NC

Eight-hour workshop primarily focused on using active learning strategies in class, and prioritization of time as a professor facilitated by Richard Felder, PhD and Rebecca Brent, PhD.

Honors & Awards

2013 Service Award, Office of Postdoctoral Affairs, UNC, Chapel Hill, NC

2012 Best Postdoc/Research Faculty/Staff Poster 2012 Biochemistry and Biophysics Research Retreat, Wrightsville Beach, NC

- 2009 The Michael A. Gerber Prize for Molecular and Cellular Biology, Tulane University, New Orleans, LA
- 2008 Minority Travel Award, Biophysical Society
- 2003 Louisiana Board of Regents Fellowship, Tulane University, New Orleans, LA
- 2002 Alfred E. Harcourt Scholar, Xavier University of Louisiana
- 2001 Minority Access to Research Careers (MARC) Scholar, Xavier University of Louisiana
- 2000 Excellence in Organic Chemistry Award, Xavier University of Louisiana
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Guest lectures

- 2013 Guest Lecture: Enzyme Kinetics, North Carolina A&T State University, Greensboro, NC
- 2013 Guest Lecture: The characterization of protein-protein interactions, North Carolina A&T State University, Greensboro, NC
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Presentations

- 2012 Poster "Identification of novel integrin binding partners of CIB1: Structural and thermodynamic basis of CIB1 promiscuity" presented at Department of Biochemistry and Biophysics Retreat, University of North Carolina at Chapel Hill
- 2012 Poster "Identification of novel integrin binding partners of CIB1: Structural and thermodynamic basis of CIB1 promiscuity" presented at 2nd Annual Oliver Smithies Symposium, Chapel Hill, NC
- 2012 Seminar "CIB1 binding to new integrin partners: the expanding role of CIB1 in integrin biology" presented at UNCP, Pembroke, NC
- 2012 Seminar "CIB1 binding to new integrin partners: the expanding role of CIB1 in integrin biology" presented at JCSU, Charlotte, NC
- 2012 Seminar "CIB1 binding to new integrin partners: the expanding role of CIB1 in integrin biology" presented at NCATSU, Greensboro, NC
- 2012 Seminar "CIB1 binding to new integrin partners: the expanding role of CIB1 in integrin biology" presented at NCCU, Durham, NC
- 2011 Poster presented at the Biophysical Society Annual Meeting, Baltimore, MD
- 2010 Two posters presented at Biophysical Society Annual Meeting, San Francisco, CA
- 2009 Poster presented at Biophysical Society Annual Meeting, Boston, MA
- 2008 Poster presented at Biophysical Society Annual Meeting, Long Beach, CA
- 2008 Poster "Expression, refolding and characterization of predicted beta-barrel proteins from *Salmonella typhimurium* LT2" presented at American Chemical Society National Meeting, New Orleans, LA
- 2007 Poster "Cloning, expression, and characterization of predicted beta-barrel proteins in *Salmonella typhimurium* LT2: A search for potential vaccine candidates" presented at Biophysical Society Annual Meeting, Baltimore, MD
- 2002 Poster presented at ABRCMS, New Orleans LA
- 2001 Poster presented at ABRCMS, Orlando, FL
- 1999 Poster presented at AAAS National Meeting Anaheim, CA
- 1998 Poster presented at ACS National Conference Boston, MA
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Peer-Reviewed Publications (Refereed)

1. **Freeman TC Jr**, Black JL, Bray HG, Dagliyan O, Wu YI, Tripathy A, Dokholyan NV, Leisner TM, Parise LV. Identification of Novel Integrin Binding Partners for Calcium and Integrin Binding Protein 1 (CIB1): Structural and Thermodynamic Basis of CIB1 Promiscuity. *Biochemistry*. 2013 Sep 25. [Epub ahead of print] PubMed PMID: 24011356.
2. **Freeman TC Jr**, Wimley WC. TMBB-DB: a transmembrane β -barrel proteome database. *Bioinformatics*. 2012 Oct 1;28(19):2425-30. Epub 2012 Jul 27. PubMed PMID: 22843985; PubMed Central PMCID: PMC3463127
3. **Freeman TC Jr**, Landry SJ, Wimley WC. The prediction and characterization of YshA, an unknown outer-membrane protein from *Salmonella typhimurium*. *Biochim Biophys Acta*. 2011 Jan;1808(1):287-97. Epub 2010 Sep 20. PubMed PMID: 20863811; PubMed Central PMCID: PMC2997857.
4. **Freeman TC Jr**, Wimley WC. A highly accurate statistical approach for the prediction of transmembrane beta-barrels. *Bioinformatics*. 2010 Aug 15;26(16):1965-74. Epub 2010 Jun 10. PubMed PMID: 20538726; PubMed Central PMCID: PMC2916714.
5. Graves RA, **Freeman T**, Mandal TK. In vitro dissolution method for evaluation of buprenorphine in situ gel formulation: a technical note. *AAPS PharmSciTech*. 2007 Aug 3;8(3):E62. PubMed PMID: 17915812.
6. Graves RA, **Freeman T**, Pamujula S, Praetorius N, Moiseyev R, Mandal TK. Effect of cosolvents on the characteristics of enkephalin microcapsules. *J Biomater Sci Polym Ed*. 2006;17(6):709-20. PubMed PMID: 16892730.
7. Graves RA, Moiseyev R, **Freeman T**, Mandal TK. Effect of surfactant on the characteristics of biodegradable microcapsules. *J Biomater Sci Polym Ed*. 2005;16(5):585-96. PubMed PMID: 16001718.
8. Pamujula S, Graves RA, **Freeman T**, Srinivasan V, Bostanian LA, Kishore V, Mandal TK. Oral delivery of spray dried PLGA/amifostine nanoparticles. *J Pharm Pharmacol*. 2004 Sep;56(9):1119-25. PubMed PMID: 15324480.
9. Graves RA, Pamujula S, Moiseyev R, **Freeman T**, Bostanian LA, Mandal TK. Effect of different ratios of high and low molecular weight PLGA blend on the characteristics of pentamidine microcapsules. *Int J Pharm*. 2004 Feb 11;270(1-2):251-62. PubMed PMID: 14726140.

Professional Society Memberships

1. American Chemical Society
2. American Society for Biochemistry and Molecular Biology
3. Biophysical Society