

LINDA COLUMBUS

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EDUCATION, RESEARCH EXPERIENCE & EMPLOYMENT

University of Virginia, Charlottesville, VA

Assistant Professor of Chemistry, August 2007

The Scripps Research Institute, La Jolla, CA

Postdoctoral Fellow with Scott Lesley, June 2006-July 2007

Postdoctoral Fellow with Kurt Wüthrich, Aug. 2002-June 2006

University of California, Los Angeles, Los Angeles, CA

Postdoctoral Fellow with Wayne Hubbell, June 2001-Aug. 2002

University of California, Los Angeles, Los Angeles, CA

Graduate research with Wayne Hubbell, Sept. 1996-June 2001

Ph.D. in Biochemistry and Molecular Biology, May 2001

Thesis: "Investigating backbone and side chain dynamics of α -helices in the nanosecond regime with site-directed spin labeling"

Smith College, Northampton, MA

Undergraduate study with David Bickar, June 1993-May 1996

B.A. in Chemistry (*High Honors*), May 1996

Honors Thesis: "Investigation of MPP⁺ binding to neuroreceptors"

PUBLICATIONS

1. Gross A, **Columbus L**, Hideg K, Altenbach C, Hubbell WL. Structure of the KcsA potassium channel from *Streptomyces lividans*: A site-directed spin labeling study of the second transmembrane segment. *Biochemistry* 38: 10324-10335 (1999).
2. Gaponenko V, Howarth JW, **Columbus L**, Gasmi-Seabrook G, Yuan J, Hubbell WL, Rosevear PR. Protein global fold determination using site-directed spin and isotope labeling. *Protein Science* 9: 302-309 (2000).
3. **Columbus L**, Kalai T, Jeko J, Hideg K, Hubbell WL. Molecular motion of spin labeled side chains in α -helices: Analysis by variation of side chain structure. *Biochemistry* 40: 3828-3846 (2001).
4. **Columbus L**, Hubbell WL. A new spin on protein dynamics. *Trends in Biochemical Sciences*, 27: 288-295 (2002).
5. **Columbus L**, Hubbell WL. Mapping backbone dynamics in solution with site-directed spin labeling: GCN4-58 bZip free and bound to DNA. *Biochemistry* 43: 7273-7287 (2004).
6. Liang ZC, Lou Y, Freed JH, **Columbus L**, Hubbell WL. A multifrequency electron spin resonance study of T4 lysozyme dynamics using the slowly relaxing local structure model. *Journal of Physical Chemistry B* 108: 17649-17659 (2004).
7. **Columbus L**, Peti W, Herrmann T, Etezady T, Wüthrich K. NMR structure determination of the conserved hypothetical protein TM1816 from *Thermotoga maritima*. *Proteins: Structure, Function and Bioinformatics* 60: 552-557 (2005).
8. **Columbus L**, Lipfert J, Klock H, Millet I, Doniach S, Lesley SA. Expression, purification, and characterization of *Thermotoga maritima* membrane proteins for structure determination. *Protein Science* 15: 961-975 (2006).
9. Lipfert J, **Columbus L**, Chu V, Doniach S. Analysis of small-angle X-ray scattering data of protein-detergent complexes with singular value decomposition. *Journal of Applied Crystallography* 40: (2007).
10. Lipfert J, **Columbus L**, Chu V, Lesley SA, Doniach S. Size and shape of detergent micelles determined by small-angle X-ray scattering. *Journal of Physical Chemistry B* 111: 12427-12438 (2007).

11. McCleverty C*, **Columbus L***, Kreusch A, Lesley SA. Structure and ligand binding of the soluble domain of a *Thermotoga maritima* membrane protein of unknown function TM1634. *Protein Science* 17: 869-877 (2008).
12. **Columbus L**, Nakamoto, R.K., Cafiso, D.S. Properties of Membrane Proteins in Wiley Encyclopedia of Chemical Biology (2008).
13. **Columbus L**, Lipfert J, Jambunathan K, Fox DA, Sim AYL, Doniach S, Lesley SA. Mixing and matching detergents for membrane protein NMR structure determination. *JACS* 131: 7320 – 7326 (2009).
14. Beuck C, Szymczyna BR, Kerkow DE, Carmel AB, **Columbus L**, Stanfield RL, and Williamson JR. Structure of the GLD-1 homodimerization domain: Insight into STAR protein-mediated translational regulation. *Structure* 18: 377 – 389 (2010).
15. Kroncke BM, Horanyi P, **Columbus L**. Structural origins of nitroxide side chain dynamics on membrane protein α -helices. *Biochemistry* 49: 10045–10060 (2010).
16. Dewald AH, Hodges, JC, **Columbus L**. Physical determinants of β -barrel membrane protein folding in lipid vesicles. *Biophysical Journal* In press. (2011).

*These authors contributed equally

RECENT HONORS, AWARDS, & FELLOWSHIPS

2010	Cottrell Scholar Award
2009	NSF CAREER Award
2008	UVA Mead Honored Faculty
2003-2006	NIH Ruth L. Kirschstein National Research Service Award Postdoctoral Fellowship

RECENT INVITED TALKS

- 2011 Department of Chemistry & Biochemistry, Florida State University
- 2011 Division of Biophysics, Warsaw University, Poland
- 2010 Department of Integrative Biology & Pharmacology, University of Texas Medical School at Houston
- 2010 National Institute of Environmental Health Sciences Laboratory of Structural Biology
- 2010 FASEB Conference: Molecular Biophysics of Cellular Membranes
- 2010 54th Annual Biophysical Society
- 2009 Department of Chemistry, Northeastern University
- 2009 Southeast Magnetic Resonance Conference
- 2009 Physical Chemistry Division of the Southeast Regional Meeting of the American Chemical Association
- 2009 Department of Structural Biology, University of Pittsburgh
- 2009 Department of Chemistry, University of Florida
- 2009 Institute for Structural Biology and Drug Discovery, Virginia Commonwealth University
- 2009 53rd Annual Biophysical Society Meeting
- 2009 Department of Chemistry, Mount Holyoke
- 2009 Department of Chemistry, Smith College

CURRENT FUNDING

RO1GM087828-02	Columbus (PI)	07/01/2009-06/30/2014
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NIH/NIGMS
Award amount: \$207,000/yr (direct)
Structure and dynamics of bacterial membrane protein - receptor interactions
Role: Principal Investigator

Columbus, Linda CV

MCB 0845668 Columbus (PI) 07/1/2009 – 06/30/2014

NSF

Award Amount: \$136,000/yr (total)

CAREER: An innovative study of membrane protein – detergent interactions

Role: Principal Investigator

UVA nanoSTAR Seed Fund Program Columbus (Co-PI) 2010

Award Amount: \$30,000

Role: Co-principal Investigator with Alison Criss (Dept. of Microbiology, UVA School of Medicine)

Cottrell Scholar Award Columbus (PI) 2010 – 2012

Research Corporation for Science Advancement

Award Amount: \$75,000 (total)

Hijacking the hijackers: taking advantage of the chemistry of bacterial pathogens

DUE 1044858 Columbus (PI) 2011 – 2013

NSF

Award Amount: \$199,927 (total)

Known structure, unknown function: An undergraduate research curriculum

COMPLETED FUNDING

J-885 Jeffress Memorial Trust Columbus (PI) 07/1/2009-06/30/2010

Award Amount: \$10,000.00 (direct)

Determining the structure and molecular determinants of membrane protein interactions involved in bacterial pathogenesis using NMR and EPR spectroscopy

Role: Principal Investigator

J-885 Jeffress Memorial Trust Columbus (PI) 01/2008-12/2008

Award Amount: \$20,000.00

Determining the structure and molecular determinants of membrane protein interactions involved in bacterial pathogenesis using NMR and EPR spectroscopy

Role: Principal Investigator

5 F32 GM068286-03 NIH/NIGMS Columbus (PI) 06/16/03 – 06/15/06

This study targets helical membrane proteins with two, three, and four predicted transmembrane segments for NMR structure determination in order to significantly diversify the different types of membrane protein structures known.

Role: Principal Investigator