

MATTHEW JAY SADERHOLM

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EDUCATION

Ph.D., Biological Chemistry, August, 1998. University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.

Fulbright Fellowship, 1992-1993. ETH, Zürich, Switzerland.

B.A., *magna cum laude*, Chemistry, May 1992. Berea College, Berea, Kentucky.

EXPERIENCE

Assistant Professor. Fall 1999-Present. Department of Chemistry, Berea College.

Postdoctoral Fellow. August 1998-July 1999. Department of Biochemistry, Duke University.
Research Advisor: Dr. Carol A. Fierke.

Guest Lecturer. Fall 1997 and Spring 1998. Department of Chemistry, University of North Carolina at Chapel Hill.

Research Assistant. May 1994-July 1998. Department of Chemistry, University of North Carolina at Chapel Hill.

Teaching Assistant. Fall 1993, Spring 1994, Summer 1995. Department of Chemistry, University of North Carolina at Chapel Hill; Fall 1989-Spring 1992. Department of Chemistry and Department of General Studies, Berea College.

Undergraduate Research Assistant. Summer 1989, Summer 1990, Summer 1992. Department of Chemistry, Berea College; Summer 1991, Summer 1992. Department of Biochemistry, University of Kentucky. Lexington, Kentucky.

Undergraduate Research Fellow. Fall 1988-Spring 1989. Consortium for Materials Development in Space, University of Alabama in Huntsville. Huntsville, Alabama.

HONORS

American Peptide Symposium Young Investigator's Minisymposium Speaker, 1997 & 1999.

NIH Postdoctoral Fellowship 1999-2001 (Accepted Berea College professorship instead).

Fifteenth American Peptide Symposium Poster Competition, 1997. Third place.

Program for Protein Engineering and Molecular Genetics trainee, 1995-1996. University of North Carolina at Chapel Hill.

Charles N. Reilley Fellowship, 1993-1994. University of North Carolina at Chapel Hill.

Thomas J. Watson Fellowship, 1992-1993 (Accepted Fulbright Fellowship instead).

Phi Kappa Phi National Honor Society, 1992. Berea College.

Undergraduate Research Fellowship, 1988-1989. University of Alabama in Huntsville.

PROFESSIONAL AFFILIATIONS

American Chemical Society
American Peptide Society

Kentucky Academy of Science

RECENT PRESENTATIONS

- 1) Matthew Saderholm. "Computers and Chemistry: An Integration in the Laboratory," The Berea College Technology Fair, Berea College, Berea, KY, April 2002.
- 2) Matthew Saderholm. "Effective Use of the EDGE Program through Computer-Assisted Data Acquisition," Teaching and Learning Luncheon Presentation, Berea College, Berea, KY, November 2002.
- 3) Matthew Saderholm. "Proline-Based Antimicrobial Peptides," Berea College Faculty Symposium, November, 2004.
- 4) Matthew Saderholm. "INBRE Research Efforts at Berea College," Presentation to the INBRE Steering Committee, University of Louisville, September, 2005.

RECENT PRESENTATIONS BY MY STUDENTS

- 1) Anne Kee, Jessica Reynolds, and Matthew Saderholm. "The Synthesis of Berea College," The Second Annual Kentuckiana Research Symposium, University of Louisville, Louisville, KY, March 2002.
- 2) Jessica Reynolds, Anne Kee, and Matthew Saderholm. "The Synthesis of Berea College Using Solid-Phase Synthesis," The University of Kentucky Undergraduate Research Poster Competition, The University of Kentucky, Lexington, KY, April 2002 (received an honorable mention).
- 3) Fred Boggs and Matthew Saderholm. "Homology Modeling of Protein Geranylgeranyltransferase Using the Protein Farnesyltransferase Coordinates," Kentucky Academy of Science Symposium, Highland Heights, KY, November, 2002 (received second place in competition).
- 4) Josh Owen and Matthew Saderholm. "Design of a New Class of Cationic Antimicrobial Peptides," Kentucky Academy of Science Symposium, Highland Heights, KY, November, 2002.
- 5) Melissa Bradley and Matthew Saderholm. "Synthesis of the Cationic peptide G(KPP)₄," Kentucky Academy of Science Symposium, Bowling Green, KY, November, 2003.
- 6) Erica Summey, Mark Cunningham, and Matthew Saderholm. "Short, Practical and Efficient Syntheses of Protected Proline Derivatives," Kentucky Academy of Science Symposium, Bowling Green, KY, November, 2003.
- 7) Melissa Bradley and Matthew Saderholm. "Synthesis of 4-Aminoproline," Kentucky Academy of Science Symposium, Morehead, KY, November, 2004.
- 8) Wendy Brotherton and Matthew Saderholm. "Synthesis of two Oligoproline Peptides," Kentucky Academy of Science Symposium, Morehead, KY, November, 2004.
- 9) Rachel Schneider and Matthew Saderholm. "Characterization of Ginsenosides Found in Appalachian Ginseng Samples," Kentucky Academy of Science Symposium, Morehead, KY, November, 2004.

SELECTED PUBLICATIONS

- 1) Saderholm, M., Lemon, S., and Erickson, B., Characterization of Deltoid and Reduced Deltoid: Two Chimeric Proteins Containing the Oligomerization Site of Hepatitis Delta Antigen. Submitted.
- 2) Saderholm, M., and Erickson, B., Engineering of Cysteine-containing Variants of Quadrin and Deltoid, Two Proteins Containing the Multimerization Site of the Hepatitis Delta Antigen, submitted.
- 3) Saderholm, M., Hightower, K., and Fierke, C., Protein Farnesyltransferase Exhibits pH-dependent Activity Towards H-Ras Peptide Substrates. *Biochemistry*, 2000. 39(40), 12398-12405.
- 4) Saderholm, M., Saconn, P., Shah, N., and Erickson, B. Engineering of Cysteine-containing Variants of Quadrin and Deltoid, Two Proteins Containing the Oligomerization Site of the

- Hepatitis Delta Antigen. Peptides for the New Millennium (Proceedings of the 16th American Peptide Symposium), 2000. 463-464.
- 5) Guy, P., Lim, A., Saderholm, M., Yan, Y., Erickson, B., and Anderegg, R.J., Metal-Ion Binding and Limited Proteolysis of Betabellin 15D, a Designed Beta-sandwich Protein. *J. Am. Soc. Mass Spec.*, 1999. 10 (10), 969-974.
 - 6) Lim, A., Makhov, A., Saderholm, M., Griffith, J., and Erickson, B., Engineering of Betabellin 16D: A Beta-sandwich Protein that Forms Narrow Fibrils that Associate into Broad Ribbons. *Biochem. Biophys. Res. Comm.*, 1999. 264, 498-504.
 - 7) Saderholm, M. and Erickson, B., Engineering of Deltoid and Reduced Deltoid: Two Chimeric Proteins Containing the Oligomerization Site of the Hepatitis Delta Antigen. *Lett. Pep. Sci.*, 1999. 6 (1) 23-30.
 - 8) Nakhle, B., Vestal, T., Saderholm, M., and Erickson, B., Synthesis of an Iron(II)-braced Proline-II Tripod Protein. *Lett. Pep. Sci.*, 1999. 6 (1), 31-43.
 - 9) Lim, A., Guy, P., Makhov, A., Saderholm, M., Kroll, M., Yan, Y., Anderegg, R., and Erickson, B., Engineering of Betabellin 15D: Copper(II)-induced Folding of a Fibrillar Beta-sandwich Protein. *Lett. Pep. Sci.*, 1999. 6 (1), 3-14.
 - 10) Lim, A., Saderholm, M., Kroll, M., Yan, Y., Makhov, A., Griffith, J., and Erickson, B., Engineering of Betabellin 15D: a 64-Residue Beta-sheet Protein that Forms Long Narrow Multimeric Fibrils. *Protein Sci.* 1998 7 (7), 1545-1554.
 - 11) McCafferty, D., Friesen, D., Danielson, E., Wall, C., Saderholm, M., Erickson, B., and Meyer, T., Photochemical Energy Conversion in a Helical Oligoproline Assembly. *Proc. Natl. Acad. Sci. USA.* 1996 92 (16), 8200-8204.
 - 12) Kroll, M., Yan, Y., Lim, A., Kearney, J., Dukes, K., Saderholm, M., and Erickson, B., Engineering of Betabellins 15D and 12/15: Two Beta Proteins that Bind Divalent Metal Ions. *Peptides: Chemistry, Structure and Biology (Proceedings of the 14th American Peptide Symposium)*, 1995, 563-564.

RESEARCH SUPPORT

RSEC Fellow Sponsor (supported Patricia Draves from Monmouth College during summer 2005)	6/1/05-8/1/05	\$1,000
NSF MRI (Major Research Instrumentation)	8/01/04-7/31/07	\$261,000
NIH INBRE (Information Network of Biomedical Research Excellence)	7/30/04-8/01/09	\$80,000
RSEC Fellow Sponsor (supported Mark Cunningham from Atlanta Metropolitan College during his sabbatical)	6/1/03-8/1/03	\$1,000
NIH KBRIN (Kentucky Biomedical Resource Infrastructure Network)	9/30/01-9/29/04	\$165,000
Berea College Teaching, Learning, and Technology Initiative	8/1/01-11/1/02	\$5828
Berea College Teaching, Learning, and Technology Initiative	8/1/01-9/1/01	\$4036
Berea College Undergraduate Research and Creative Projects Program	6/1/01-8/1/01	\$10,000*
Berea College Teaching, Learning, and Technology Initiative	8/1/00-9/1/00	\$1875
Berea College Undergraduate Research and Creative Projects Program	6/1/00-8/1/00	\$10,000*

*includes estimate for two student stipends

A SUMMARY OF MY STUDENT COLLABORATORS AND THEIR PROJECTS

2000 Summer

Jason Born and Shannon Pugh used molecular and homology modeling programs to investigate the docking of drugs onto protein structures.

2001 Short Term

Sam Wade, Jason Born, Kassandra Hewitt, Donald Mulwee, Jessica McCreery, and Yolanda Baltazar synthesized peptide substrates for the cancer target protein farnesyltransferase.

2001 Spring Term

Sanjeewa Goonasekera used the molecular modeling program AMBER to simulate the structure of the protein farnesyltransferase.

2001 Summer

Sam Wade and Miranda Gibson began the synthesis of a protected form of the amino acid selenocysteine while Rachel Schneider and Linda Bolt began the purification of peptides produced in the 2001 short term research class.

2002 Short Term

Anne Kee synthesized, purified, and characterized the peptide BEREAA and Jessica Reynolds synthesized, purified, and characterized the peptide COLLEGE.

2002 Spring Term

Anne Kee researched yeast metabolism and analyzed by NMR the conversion of isotopically-labeled glucose to glycerol and ethanol.

2002 Summer

Fred Boggs used the program UNIX Insight2000 to produce a molecular model of geranylgeranyltransferase by homology modeling and Josh Owen began research on designing and synthesizing proline-containing cationic antimicrobial peptides (PCAPs).

2003 Summer

Melissa Bradley began synthesizing several proline peptides for study as possible antimicrobial compounds and Erica Summey tested several synthetic routes to 4-aminoproline, a nongenetic amino acid that could be used in PCAPs.

2004 Summer

Melissa Bradley synthesized 4-aminoproline and used it to make a nongenetic PCAP and Wendy Brotherton synthesized and characterized several peptides as lead compounds for PCAP design while Rachel Schneider used HPLC to analyze ginseng samples collected by Appalachia-Science in the Public Interest (ASPI).

2005 Fall

Justin Poag used the new LC/MS to analyze ASPI ginseng samples to determine how the composition of active ginsenosides differed from that available from commercial sources.

2006 Spring

Wendy Brotherton and Stella Somiari set up and used the new automated peptide synthesizer from AAPTEC to synthesize several new potential proline-containing cationic antimicrobial peptides.