Benjamin Douglas Caldwell, Ph.D.

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Professional Preparation

- **B.S.**, Chemistry, May 1990, Randolph-Macon College, Ashland, Virginia
- **Ph.D.**, Chemistry, University of Virginia, Charlottesville, Virginia
  Research Advisor: Dr. Charles M. Grisham, Professor of Chemistry and Neurology
  Final Defense Date: July 18, 1995
  Thesis Title: "Nucleotide binding studies to the Na^+,K^+-ATPase: Expression of the cytosolic nucleotide binding domain and metal-nucleotide interactions with the native sodium pump."
- **Postdoctoral Fellow**, Johns Hopkins University School of Medicine, Department of Neuroscience, 1995 – 1998

Appointments

- Chairperson, Department of Chemistry, August 2007
- Associate Professor Department of Chemistry, Missouri Western State University, 2003-present
- Assistant Professor, Department of Chemistry, Missouri Western State University, 1998-2003
- Clinical Associate, Department of Pathology, St. Luke's Hospital, Kansas City, MO, Fall 2003 – present.

Academic Service

- Courses Taught at MWSU
  - CHE 101 Introduction to Chemistry laboratory
  - CHE 104 Fundamentals of Chemistry, lecture and laboratory
  - CHE 111 General Chemistry I, lecture and laboratory
  - CHE 120 General Chemistry II, laboratory
  - CHE 310 Organic Chemistry I
  - CHE 311 Organic Chemistry I Laboratory
  - CHE 340 Physical Chemistry for the Biological Sciences, laboratory
  - CHE 370 Biochemistry, lecture and laboratory
  - CHE 399 Synthesis, Manufacture, and Regulation of Chemical Pharmaceuticals
  - CHE 470 Biochemistry II
  - CHE 490 Research in Chemistry
  - CHE 495 Seminar in Chemistry
  - HON 399 Finding the Science in Science Fiction

- Director, Missouri Western Summer Research Institute, 2002 - 2007
  - Recruited students, faculty and staff; responsible for administrative duties
- Director of Center for Natural and Applied Sciences, MWSU, Western Institute, 2006-2007.
- MWSU Faculty Senate, Fall 2000 - Spring 2005
  - FS Committees: Scholarship, F'99-S'01; Professional Leave, F'05-present, Chair F'06 & F'07
- MWSU Institutional Committee Work:
  - Provost Search Committee, Fall 2005
  - Western Institute for Regional Development – Life Sciences Committee, Fall 2003
  - Administrative Scholarship Review Committee, Fall 2003

  - Strategic Planning Subcommittee on Community Service and Workforce Development, 2002-present
  - Honors Committee, Fall 2000 – present;
    - Chair Golden Griffon review and interview sub-committee, 2005-2007
  - Writing Across the Curriculum (WAC) 5 Year Review Committee, 2001
  - Pre-professional Advisor, Fall 2000 – present
- Academic and Freshman Advising, Fall 1998-present
- St. Joseph Graduate Advisory Council since 2006

Professional Technical and Experimental Skills
Proteins chemistry including protein purification techniques (extraction methods, centrifugation) and chromatography (size exclusion/gel filtration, affinity, ion exchange), protein assays & enzyme kinetics, spectroscopic methods of protein analysis (UV/Vis, fluorescence, circular dichroism, NMR, & EPR), ELISA & immunoassays, immunoprecipitation, cell culture methods (bacterial and mammalian), electrophoresis, Western & Northern blotting, radioactive probes, & bioinformatics,

Instrumental skills includes AA, circular dichroism, EPR, fluorescence, FTIR, HPLC, GC, GC-MS, NMR, & UV/Vis.

Grants:

External Awards

- "Anti-tumor Agents that Bind the DNA Minor Groove" by Todd T. Eckdahl (PI), Jason Baker and Benjamin D. Caldwell to the National Cancer Institute of the National Institutes of Health for an Academic Research Enhancement Award (AREA), September 2001. NIH NCI AREA 1 R15 CA 96723-01. **Awarded July 2003, $100,000 for three years.**

- National Science Foundation Course, Curriculum & Laboratory Improvement (Adaptation and Implementation) grant # DUE-9950492 entitled "Cross Course Group Projects Using NMR to Simulate an Industrial Setting" by Benjamin D. Caldwell, (PI) Shauna L. Hiley & Tony Wallner. **Total award of $99,950.00, Awarded August 2000 for three years**.

Western Institute Summer Research Grant

- $5,000.00 for A Biochemical and Biophysical Examination of PAM-CD:P-CIP2 Binding: Engaging undergraduate students in an active biochemical research project." Co-authored with Dr. Michael W. Ducey (MWSU Chemistry Department), May 2006.

Applied Learning Initiative

- $50,000 to support the 2007 Summer Research Institute, May 2007
- $25,000 to support the 2006 Summer Research Institute, March 2006.

Strategic Planning Implementation Funding, MWSU

- $15,000 for "The Summer Research Institute: Research Collaborations for Undergraduates and High School Students, October 2003.

Funding For Results, MWSU

- Incentive Funding, $825 for "Preparing for Conducting an Interdisciplinary Undergraduate Research Project Funded by the National Cancer Institute. January 2003. Co-authored with Dr. Todd Eckdahl (PI) and Jason Baker.
- Travel funding, $500 for "Educational Symposia and workshops at the annual meeting of the American Society for Biochemistry and Molecular Biology", February 2000.

- Reward funding, $2,000.00 for "Assessment of chemical drawing software use in the preparation of student materials and study aids for Organic Chemistry", February 2000.
- Reward funding, $1,500.00, for "The revision of CHE 111 General Chemistry Laboratory to Include Inquiry and Instrumentation" February 1999. Co-authored with Dr. Shauna Hiley (PI) & Dr. Gerald Zweerink.
- Incentive funding, 3,000, for "Preparation and use of Chemical drawing software for the student materials to enhance learning in organic chemistry" November 1998.

MWSU Foundation Grant

- $4000.00, for the purchase of an Ultrasonic Cell Disruptor, April 2000, for use in the biochemistry laboratory curriculum and for research purposes to rupture bacterial cells for protein purification purposes.

Travel Grants

- American Society for Biochemistry and Molecular Biology Undergraduate Faculty Travel Award, Spring 1999, Spring 2002.

Awards/Honors

- Outstanding Instructor Award. Sponsored by MWSU Disability Services. Spring 2007
- Liberal Arts and Sciences Council of Chairpersons Award, August 2003.
- All-University Outstanding Graduate Teaching Award - Sciences, University of Virginia, 1995.
- American Chemical Society, VA Section Award for Outstanding Achievement, Randolph-Macon College, 1990.
- American Institute of Chemists Foundation Award, Randolph-Macon College, 1990.
- Chi Beta Phi Scientific Honor Fraternity, Randolph-Macon College, 1989.

Professional Affiliations:

- Project Kaleidoscope, Faculty for the 21st Century, member since July 2000.
- American Society for Biochemistry and Molecular Biology, member since 1996.
- American Chemical Society, member since 1990.
  Biological Chemistry (since 1991),
  Chemical Educational Division (since 1995)
- International Center for First-Year Undergraduate Chemistry Education (ICUC) since 2005
- Chemical Educators Association, 1998 – present.
- Council on Undergraduate Research (MWSU institutional representative), June 2007

Workshops Attended

- Critical Thinking: A Professional Development Workshop, MWSU, June 7-8, 2007
- Writing Successful Grants Workshop, MWSU, April 27, 2007.
- NSF STEP/STEM Proposal Workshop, Fluorescent Valley Community College, St. Louis, MO, April 2, 2007.
- Laboratory Safety Management in Academia, presented by Dr. Barbara Foster from University of West Virginia, November 2, 2004 at MWSU.
- Proposal Writing Institute, sponsored by the Council on Undergraduate Research (CUR), East Tennessee State University, July 17-21, 2004.
- Laboratory Safety Institute: Role of Administrators, Missouri Western State University, Feb. 2, 2003.
- National Collegiate Honors Council 31st Annual Conference, Chicago, IL, Oct 31-Nov. 4, 2001.
- Project Kaleidoscope Summer Institute workshop series D – "A coherent program on 21st century science majors," biochemistry workshop, Snowbird, UT, July 22-25, 2001.

- Project Kaleidoscope National Assembly, Tucson, AZ, December 1-2, 2000.
- Project Kaleidoscope Summer Institute workshop series D – "Biochemistry: Biology or Chemistry. What is Biochemistry at the Undergraduate Level?" Keystone, CO, July 26-29, 2000.
- Project Kaleidoscope workshop "Biochemistry: Biology or Chemistry?" Macalester College, St. Paul, MN, July 16-18, 1999.
- "Teaching In Organic Chemistry and Chemistry for the 21st Century – Project Outreach" University of Nebraska-Lincoln, April 24, 1999.

Review of Educational Software

- Tested and reviewed "Lab3D$_{0.5}$ Amino Acid Titration" software from the 3D Virtual Laboratory Project, June 2002. This software was developed by Dr. Charles M. Grisham, University of Virginia, in connection with a grant from the National Science Foundation (DUE-CCLI GA10170).

Publications (* Denotes students)

Benjamin D. Caldwell, (2007) "An Alternative Research Model of Faculty, Undergraduate, and High School Student Collaboration" *CUR Quarterly*, vol. **28** (2):29-34.

Ducey, MW, and BD Caldwell, (2006) "Characterization and Analysis of a Product: A Guided-Inquiry Sequence of Instrumentally Based Experiments for Use in General Chemistry." *ICUC Quarterly*, vol. **2** (1): 2.

Caldwell, B., C. Rohlman, M. Benore-Parsons, (2004) "A Curriculum Skills Matrix for Development and Assessment of Undergraduate Biochemistry and Molecular Biology Laboratory Programs." *Biochemistry and Molecular Biology Education* vol. 32 (1), 11-16.

Caldwell, B.D., D.N. Darlington, P. Penzes, R.C. Johnson, B.A. Eipper, and R.E. Mains, (1999) "The Novel Kinase Peptidylglycine α-Amidating Monooxygenase Interactor Protein 2 Interacts with the Cytosolic Routing Determinants of the Peptide Processing Enzyme Peptidylglycine α-Amidating Monooxygenase," *Journal of Biological Chemistry* **274**: 34646-34656.

Alam, R. M., B.D. Caldwell, R. C. Johnson, D. N. Darlington, B.A. Eipper, R. E. Mains, (1996) "Novel Proteins that Interact with the COOH-terminal Cytosolic Routing Determinants of an Integral Membrane Peptide-processing Enzyme." *Journal of Biological Chemistry* **271**: 28636-28640.

Contributed Essay

Caldwell, B. D. "Recruiting Can Help Jumpstart Faculty Research, Too!" in *Creating Time for Research Vignettes*, Council on Undergraduate Research. *http://www.cur.org/publications/TimeVignettes.asp* Originally submitted to *CUR Quarterly* (June 2004).

Essay reviewed and cited by K. Karukstis, in *Journal of Chemical Education*, **81**(11): 1550-51 (2004).

Presentations:

BD Caldwell. "The Summer Research Institute: An Alternative Research Model Involving Faculty, Undergraduates and High School Students." Presented at the Third Annual conference on Research At Predominantly Undergraduate Institutions, Park University, Parkville, MO, May 1, 2008.

MAF Daggett & BD. Caldwell. "Performance Based Skills Assessment in Introductory Cell Biology and Biochemistry Courses." Presented at the Second Annual Conference on Applied Learning in Higher Education, Missouri Western State University, February 23, 2007.

MW Ducey, BD Caldwell, SL Hiley. “Engaging Students with Research Problems: Applied Learning in the General Chemistry Laboratory.” Presented at the Second Annual Conference on Applied Learning in Higher Education, Missouri Western State University, February 23, 2007.

M Unzicker, J Voelkle, BD Caldwell, MW Ducey. “Remediation of Heavy Metal Ions in Wastewater by Coffee Grounds” Presented at the MWSU Undergraduate Research Summer Institute Symposium, October 2006.

MAF Daggett and BD Caldwell. “Design and Implementation of skill-specific assessments in introductory and advanced cell biology and biochemistry courses.” Presented at the Experimental Biology 2006 in conjunction with the American Society for Biochemistry and Molecular Biology annual meeting, San Francisco, CA April 1-4, 2006.

BD Caldwell. “Recruiting and Research: A Twist on the Typical Summer Research Model.” Presented at Conference on Applied Learning in Higher Education, Missouri Western State University, February 10, 2006.

Eckdahl, T.T., Baker, J.C., Caldwell, B.D., Daggett, M.A.F. “Faculty working together to conduct undergraduate research.” Presented at Conference on Applied Learning in Higher Education, Missouri Western State University, February 10, 2006.

Caldwell, B. "Gatekeeping: Screening Scholarship Applicants." Presented at the 40th Annual Conference of the National Collegiate Honors Council, St. Louis, MO, October 26-30, 2005.

Caldwell, B D, MW Ducey, SL Hiley, G Zweerink. "Guided Inquiry Projects Using Instrumental Analysis in the Freshman General Chemistry Laboratory." Presented at the First Year Undergraduate Chemistry Education International Conference, University of Illinois at Urbana-Champaign, May 22-25, 2005.

Archer, LJ, Caldwell, B D, MW Ducey, SL Hiley, GL Zweerink. "Using Instrumentation in First Year Chemistry Laboratory - Helping Students Visualize the Practice of Chemistry." Presented at the First Year Undergraduate Chemistry Education International Conference, University of Illinois at Urbana-Champaign, May 22-25, 2005.

B. D. Caldwell. Cooperation between chemistry and biology departments can lead to a successful biochemistry and molecular biology undergraduate degree.” Presented at the 229th American Chemical Society Meeting, San Diego, CA, March 13-17, 2005.

B.D. Caldwell and M. Daggett. “A learning community designed to link chemistry and biology laboratory courses.” Presented at the 229th American Chemical Society Meeting, San Diego, CA, March 13-17, 2005.

M.W. Ducey, S.L. Hiley, B.D. Caldwell & G. L. Zweerink. ”Characterization and Analysis of a Product: A Semester Long Guided Inquiry Laboratory Sequence for Use in General Chemistry.” Presented at the Midwest Regional American Chemical Society, Kansas State University, Manhattan, KS, October 21, 2004.

B.D. Caldwell. “Catch ‘Em Early: a novel research opportunity for incoming freshman and high school students.” Presented at the 225th American Chemical Society National Meeting, New Orleans, March 23-27, 2003.

B. Caldwell and J. Zweerink, "Development of an undergraduate level physical chemistry course for biochemistry and molecular biology: an experiment in progress." Presented at Experimental Biology 2002 with the American Society for Biochemistry and Molecular Biology in New Orleans, LA, April 20-24, 2002.

S.L. Hiley, B. Caldwell, and R. Nulph. "Finding the science in science fiction: An honors colloquium." Presented at the 223rd National Meeting of the American Chemical Society, Orlando, FL, April 7-11, 2002.

Parsons, M., B.D. Caldwell, & C.E. Rohlman. "Lab Teaching and the Research Paradigm for Majors and Non Majors." Presented at the Project Kaleidoscope Summer Institute, July 25-28, 2001, Snowbird, UT.

Caldwell, B.D. "A New Faculty Member's Perspective on Starting Research." Presented at the Project Kaleidoscope Summer Institute, July 23-26, 2000, Keystone, CO.

Caldwell, B.D. "Use of Conferencing Software in the Biochemistry Curriculum at Missouri Western State College." Presented at the joint meeting of the American Society for Biochemistry and Molecular Biology, June 4-8, 2000, Boston, MA.

Caldwell, B.D. and T.C. Eckdahl. " Development of an Integrated Biochemistry and Molecular Biology Major at Missouri Western State College." Presented at the 219th National Meeting of the American Chemical Society, March 26-30, 2000, San Francisco, CA.

Hiley, S.L., B.D. Caldwell & G. Zweerink. "Development of instrumental experiments for general chemistry." Presented at the 219th National Meeting of the American Chemical Society, March 26-30, 2000, San Francisco, CA.

Caldwell, B.D., A.M. Harrison, and B.M. Murray. "Student Use of Web-based Tutorials in an On-line Pharmaceutical Chemistry Course." Presented at the 217th National Meeting of the American Chemical Society, March 21-25, 1999, Anaheim, CA.

Harrison, A.M., L.J. Archer, J.M. Beard, B.D. Caldwell, S. Esjornsen, E.R. Guise, B.M. Murray, D. Rosenthal, "A Comparison of Intercollegiate On-Line Chemistry Courses," Presented at the 216th American Chemical Society National Meeting, Boston, MA, August 23-27, 1998.

Caldwell, B.D., R.C. Johnson, D.N. Darlington, B.A. Eipper, R.E. Mains, (1996) "Identification of a Putative Kinase that Interacts with the COOH-terminal Domain of Peptidylglycine α-Amidating Monooxygenase." Presented at the American Society for Biochemistry & Molecular Biology national meeting, New Orleans, LA June 2-6, 1996. Abstract in *FASEB Journal* **10** (6): A1269.

Klevickis, C., B.D. Caldwell, J.E. Mahaney, R.B. Martin, R.A. Farley, and C.M. Grisham, (1993) "New Magnetic Resonance Methods for Study of Na,K-ATPase and Ca-ATPase." Presented at the VIIth International Conference on The Sodium Pump, Todtmost/Black Forest, Germany, September 5-11th, 1993. Abstract in *Biological Chemistry Hoppe-Seyler* **374**: 556.

Farley, R.A, B.S. Gordon, E.E Huston, K. Wang, B.D. Caldwell, and C.M. Grisham, (1993) "Expression of the ATP Binding Domain of Na,K-ATPase in Bacterial Cells." Presented at the 37th Annual meeting of the Biophysical Society, Washington, D.C. Abstract in *Biophysical Journal* **64**: A330.

Presentations with Students (* Denotes students)
Kristen Thomsen*, Jason Barnett*, Darcie Elder, Benjamin D Caldwell, Michael W Ducey. "Investigation of GST fusion proteins for screening protein interactions." Presented at Experimental

Biology 2008 in association with American Society for Biochemistry & Molecular Biology, San Diego, April 5-9, 2008.

D. Silvey* & B.D. Caldwell. "Sequence Specificity Studies of DNA-Anti-tumor Drug Interactions using Molecular Fluorescence." Presented at the Spring Multidisciplinary Research Day, Missouri Western State College, May 4, 2004.

L. Felts*, B.D. Caldwell and M. Ducey. "Development of the laboratory component for a physical chemistry for biological sciences course." Presented at the 225th American Chemical Society National Meeting, New Orleans, March 23-27, 2003.

Amanda Crowley* & Benjamin Caldwell. "Examination of metal binding in small GTP binding proteins by nuclear magnetic resonance spectroscopy" presented at the 2001 Undergraduate Research Summer Institute (URSI) Symposium, Missouri Western State College, St. Joseph, MO, October 16, 2001.

Laura Glasgow*. Benjamin Caldwell, & Jason Baker. " Investigations of the effects of NSAIDs on antibiotic susceptibility in *Staphylococcus aureus*." Presented at American Chemical Society national meeting, San Diego, CA, April 1-5, 2001.

Shana Lombardi-Lynn* & Benjamin Caldwell. "Investigations into the protein-protein interactions between the cytoslic routing determinants of the peptides amidating enzyme PAM and the kinase PCIP2" presented at the American Chemical Society national meeting, San Diego,CA, April 1-5, 2001.

Sylvia Harlow* and Benjamin Caldwell. "Expression and Purification of Secretory Pathway Proteins from *E. coli* for Generation of Polyclonal Antibodies" presented at the 2000 Undergraduate Research Summer Institute (URSI) Symposium, Missouri Western State College, St. Joseph, MO, Oct. 17, 2000.

References available upon request.