

**Tim Gebhart Miracle League South Hills <timgebhartmlsh@gmail.com>CURRICULUM VITAE**

**John P. Perozich**

**Professor.** Department of Biology, Franciscan University of Steubenville

**Chair.** Department of Biology 2011-2013, 2018-Present

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**EDUCATION AND TRAINING**

<u>Dates</u>	<u>Institution</u>	<u>Degree</u>	<u>Year</u>	<u>Major Subject</u>
2000	<b>University of Pittsburgh School of Medicine, Pittsburgh, PA 15260</b>	PhD	2000	Biochemistry and Molecular Genetics
1992	<b>Lebanon Valley College, Annville, PA 17003</b>	BS <i>Magna Cum Laude College and Departmental Honors</i>	1992	Biology major Chemistry minor

**COURSES ROUTINELY TAUGHT**

Bio 106 Survey of Biological Science  
Bio 150 Nutrition & Health for Young Children  
Bio 217 Medical Microbiology  
Bio 250 Introduction to Bioinformatics  
Bio 291 Genetics  
Bio 310 Biochemistry  
Bio 333 Microbiology  
Bio 435 Coordinating Seminar  
Chm 421 Foundations of Biochemistry 1

**AWARDS**

2011 Franciscan University of Steubenville Summer Faculty Development Award  
2010 Franciscan University of Steubenville Summer Faculty Development Award  
2008 FUS Faculty Enrichment Grant  
2008 Franciscan University of Steubenville Summer Faculty Development Award  
11th Edition of *Who's Who Among American Teachers & Educators*<sup>TM</sup> (2007)  
2002 Franciscan University of Steubenville Summer Faculty Development Award  
2001 Franciscan University of Steubenville Summer Faculty Development Award

**RESEARCH**

**Protein Bioinformatics.** Supervised undergraduate research projects. Each student

chooses a different protein to study. Protein sequences from various species or related proteins are accessed from databases and aligned. By analysis of the multiple sequence alignment and the tertiary structure, structural, functional and evolutionary relationships for the protein are elucidated.

### **MEMBERSHIPS IN PROFESSIONAL AND SCIENTIFIC SOCIETIES**

American Association for the Advancement of Science (AAAS)  
American Society for Microbiology (ASM)  
International Society for Computational Biology (ISCB)  
Protein Society

### **UNDERGRADUATE RESEARCH SUPERVISED**

Micholl Dumanig. Spring 2019. Analysis of Beta-Galactosidases.  
Frances Messa. Fall 2018 - Spring 2019. Analysis of Multi-Drug Resistance Transporters.  
Kyle Taggart. Spring 2018 – Spring 2019. Analysis of Presenilin Proteases.  
Brooke Whitehill. Spring 2018. Analysis of the Bcl-2 Family.  
William Schwartzmann. Spring 2016 – Spring 2018. Analysis of RNases.  
Andrew Rankin. Spring 2016. Analysis of the Bcl-2 Family.  
Elizabeth Krilich. Spring 2016 – Spring 2017. Analysis of  $\alpha$ - $\beta$  hydrolases, Analysis of Adenylate-Forming Enzymes  
Monika Nowak. Fall 2015 – Spring 2016. Analysis of Spindlin Proteins.  
Louis Clark. Fall 2015 – Spring 2016. Analysis of Adenylate-Forming Enzymes.  
Joseph Irvin. Spring 2015 – Spring 2016. Analysis of Heme Oxygenases and Related Proteins.  
Anthony Bort. Spring 2015. Comparison of troponin C and Calmodulin.  
Jeffrey Molinaro. Fall 2014 – Spring 2016. Analysis of the Transforming Growth Factor Family.  
Andy Diaz. Fall 2014 – Fall 2015. Analysis of  $\alpha$ - $\beta$  hydrolases.  
Joseph Radzialowski. Fall 2014 – Spring 2015. Analysis of Sialidases  
Richard Ruhl. Fall 2014 – Spring 2015. Analysis of DNA Helicases.  
Nicholas Freas. Fall 2013 – Spring 2014. Extended Analysis of Nucleotide Sugar Dehydrogenases.  
Dorothy McAfee. Fall 2012 – Spring 2014. Comparison of Catechol-O-Methyltransferases with Other Class I Methyltransferases.  
Moriah Holt. Fall 2012 – Spring 2013. Analysis of Clade A & B Serpins.  
Josh Vanderhoof. Fall 2012. Analysis of RNases.  
Michael Niemaszyk. Spring 2012 – Fall 2012. Comparison Sirtuin 2 to Other Histone Deacetylases.  
Nicholas Cundiff. Spring 2012. Analysis of Pentapeptide Repeat Proteins.  
Danielle Leatherby. Fall 2011 – Spring 2012. Comparison of Luciferases and other Adenylate-Forming Enzymes.  
Katie Kirrane. Fall 2011. Analysis of Insulysin.  
Christopher Maguire. Fall 2011. Analysis of Aromatic Amino Acid Hydroxylases.  
Alyssa Morey. Fall 2011. Analysis of Pyruvate Kinases.  
Anne McMahon. Spring 2011 - Fall 2011. Comparison of Influenza Neuraminidases to Other Sialidases.  
Aaron Medina. Spring 2011. Analysis of Protein Phosphatase B.  
Kathryn Steadham. Spring 2011. Analysis of the Chaperone protein GroEL.  
Daniel Cornejo. Fall 2010 – Spring 2011. Analysis of the Globin Family.  
Kim Nguyen. Fall 2010 – Spring 2011. Analysis of Dihydrofolate Reductases.  
Elizabeth Barnes. Spring 2010. Analysis of Estrogen Related Receptors.  
Anthony Machado. Spring 2010. Analysis of the Josephin Domain of Ataxin-3.  
Rebecca Mangan. Spring 2010. Analysis of Fibrinogens.

Patricia Murphy. Spring 2010. Analysis of Benzalacetone Synthetases.  
Katy Vanderhoof. Spring 2010. Analysis of Transthyretin.  
Karrmann McHaffie. Fall 2009. Analysis of Human Growth Hormone.  
Mylauna Swango. Fall 2009. Analysis of the AhpD protein from *Mycobacterium tuberculosis*.  
Lynne Niemaszyk. Spring 2009 – Fall 2009. Comparison of the ATP-Binding Domain of HSP90 and DNA Gyrases.  
Stewart Mahler. Spring 2009. Comparison of TNF- $\alpha$  and TNF- $\beta$ .  
Peter Newton. Spring 2009. Analysis of Nucleotide Sugar Dehydrogenases.  
Patrick Salibi. Spring 2009. Analysis of Acetylcholinesterases.  
Alicia Santos. Spring 2009. Analysis of  $\gamma$ -Crytallin Proteins.  
Jon Bergen. Fall 2007. Analysis of Prion Proteins.  
Allison Carroll. Spring 2006 – Fall 2006. Comparison of Kallikrein Proteins to Other Serine Proteases.  
Amber Gruters. Fall 2003. Site-Directed Mutagenesis of Class 3 Aldehyde Dehydrogenases.

## PRESENTATIONS

***In Silico* Analysis of BCL-2 Protein Family.** Poster. Brooke Whitehill, Andrew Rankin and **John Perozich**. Franciscan University GRACE Symposium. April 2018. Undergraduate research project by Brooke Whitehill, building from Andrew Rankin's earlier research, in which 524 protein sequences of pro-apoptotic and anti-apoptotic BCL-2 family members from various species were aligned to elucidate structural, functional and phylogenetic relationships in the protein family, as well as group specific conservations.

**Extended Analysis of Nucleotide-Sugar Dehydrogenases.** Poster. Nicholas Freas and **John Perozich**. Ninth Great Lakes Bioinformatics (GLBIO) Conference, May 2014, Cincinnati, OH. Undergraduate research project by Nicholas Freas, building from Peter Newton's earlier research, in which 218 protein sequences of different nucleotide-sugar dehydrogenases from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family, as well as group specific conservations.

**Extended Analysis of Class I Methyltransferases.** Poster. Dorothy McAfee and **John Perozich**. Ninth Great Lakes Bioinformatics (GLBIO) Conference, May 2014, Cincinnati, OH. Undergraduate research project by Dorothy McAfee in which 336 protein sequences of different class I methyltransferases from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family, as well as group specific conservations.

**Comparative Analysis of Pentapeptide Repeat Proteins.** Poster. Nicholas Cundiff and **John Perozich**. Eighth Great Lakes Bioinformatics (GLBIO) Conference, May 2013, Pittsburgh, PA. Undergraduate research project by Nicholas Cundiff in which 173 protein sequences of pentapeptide repeat proteins from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparison of Thyroxine-Binding Globulin to Other Clade A and B Serpins.** Poster. Moriah Holt and **John Perozich**. Eighth Great Lakes Bioinformatics (GLBIO) Conference, May 2013, Pittsburgh, PA. Undergraduate research project by Moriah Holt in which 155 protein sequences of clade A & B serpins from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family, and compare them to thyroxine-binding globulin, a specific clade A serpin with the unique function of hormone binding.

**Comparative Analysis of Class I Methyltransferases.** Poster. Dorothy McAfee and **John Perozich**.

Eighth Great Lakes Bioinformatics (GLBIO) Conference, May 2013, Pittsburgh, PA. Undergraduate research project by Dorothy McAfee in which 256 protein sequences of different class I methyltransferases from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparison Sirtuin-2 to Other Histone Deacetylases.** Poster. Michael Niemaszyk and **John Perozich**. Eighth Great Lakes Bioinformatics (GLBIO) Conference, May 2013, Pittsburgh, PA. Undergraduate research project by Michael Niemaszyk in which 130 protein sequences of sirtuin-2, 3 and 5 from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Phylogenetic Analysis of the Aldehyde Dehydrogenase Superfamily.** Poster. **John Perozich**, Hugh Nicholas, Troy Wymore and John Hempel. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Phylogenetic relationships among eighteen families from the aldehyde dehydrogenase superfamily were analyzed based on an alignment of 1310 protein sequences.

**Comparative Analysis of Aromatic Amino Acid Hydroxylases.** Poster. Christopher Maguire and **John Perozich**. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Undergraduate research project by Christopher Maguire in which 108 protein sequences of aromatic amino acid hydroxylases from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparative Analysis of Insulysins.** Poster. Katie Kirrane and **John Perozich**. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Undergraduate research project by Katie Kirrane in which 41 protein sequences of insulysins, also called insulin-degrading enzymes which may play important roles in diabetes and Alzheimer's disease, were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme.

**Comparative Analysis of Pyruvate Kinases.** Poster. Alyssa Morey and **John Perozich**. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Undergraduate research project by Alyssa Morey in which 60 protein sequences of pyruvate kinases from various species were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme.

**Comparative Analysis of the Sialidase Family.** Poster. Anne McMahon and **John Perozich**. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Undergraduate research project by Anne McMahon in which 103 protein sequences of sialidases from living organisms and influenza virus neuraminidase were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparative Analysis of the Adenylate-Forming Superfamily.** Poster. Dani Leatherby and **John Perozich**. Seventh Great Lakes Bioinformatics (GLBIO) Conference, May 2012, Ann Arbor, MI. Undergraduate research project by Dani Leatherby in which 261 protein sequences of adenylate-forming enzymes, aryl- and acyl-CoA synthetases, peptide synthetases and luciferases, were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme superfamily.

**The Aldehyde Dehydrogenase Superfamily: Structural Commonalities and Differences among Family Members.** Poster. John Hempel, **John Perozich**, Jeremy Lipson, Hugh B Nicholas Jr and Troy Wymore. IX European Symposium of the Protein Society. May 2011. Stockholm, Sweden. Initial analysis of an alignment of 1310 aldehyde dehydrogenases (ALDHs). A few selected families such as succinic semialdehyde dehydrogenases were examined.

**DNA Gyrase B and HSP90 N-Terminal Domain and Their Role in the Binding and Hydrolysis of ATP.** Poster. Lynne Niemaszyk and **John Perozich**. Sixth Great Lakes Bioinformatics (GLBIO) Conference, May 2011, Athens, OH. Undergraduate research project by Lynne Niemaszyk which protein sequences from the N-terminal, ATP-binding domain of heat shock protein 90 (HSP 90) and DNA gyrase B from various organisms were aligned to elucidate structural, functional and phylogenetic relationships in the common ATP binding domain in both proteins.

**Comparison of *Mycobacterium tuberculosis* PtpB with Related Protein Phosphatases.** Poster. Aaron Medina and **John Perozich**. Sixth Great Lakes Bioinformatics (GLBIO) Conference, May 2011, Athens, OH. Undergraduate research project by Aaron Medina in which 71 protein sequences of protein tyrosine phosphatases were aligned and compared to the PtpB phosphatase from *Mycobacterium tuberculosis* to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparative Analysis of the Josephin Domain of Ataxin-3.** Poster. Anthony Machado and **John Perozich**. Sixth Great Lakes Bioinformatics (GLBIO) Conference, May 2011, Athens, OH. Undergraduate research project by Anthony Machado in which 51 protein sequences of the Josephin domain from ataxin-3 were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme.

**Comparative Analysis of the Globin Family.** Poster. Daniel Cornejo and **John Perozich**. Sixth Great Lakes Bioinformatics (GLBIO) Conference, May 2011, Athens, OH. Undergraduate research project by Daniel Cornejo in which 234 protein sequences from globin family members, including hemoglobin, myoglobin, neuroglobin and cytoglobin, were aligned to elucidate structural, functional and phylogenetic relationships in the protein family.

**Comparative Analysis of Nucleotide-Sugar Dehydrogenases.** Poster. Peter Newton and **John Perozich**. Ohio Collaborative Conference on Bioinformatics (OCCBIO), June 2009, Cleveland, OH. Undergraduate research project by Peter Newton in which 99 protein sequences from nucleotide-sugar dehydrogenases, including UDP-glucose dehydrogenases and GDP-mannose dehydrogenases, were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme family.

**Comparative Analysis of Acetylcholinesterases.** Poster. Patrick Salibi and **John Perozich**. Ohio Collaborative Conference on Bioinformatics (OCCBIO), June 2009, Cleveland, OH. Undergraduate research project by Patrick Salibi in which 33 protein sequences from acetylcholinesterases from various animals were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme.

**HSP90 N-Terminal Domain and its Role in the Binding and Hydrolysis of ATP.** Poster. Lynne Niemaszyk and **John Perozich**. Ohio Collaborative Conference on Bioinformatics (OCCBIO), June 2009, Cleveland, OH. Undergraduate research project by Lynne Niemaszyk which protein sequences from the Nterminal, ATP-binding domain of heat shock protein 90 (HSP 90) from various organisms were aligned to elucidate structural, functional and phylogenetic relationships in the enzyme.

**Comparison of Horse Prostate Kallikrein and Other Serine Proteases.** Poster. Alison Carroll, Hugh Nicholas and **John Perozich**. Ohio Collaborative Conference on Bioinformatics (OCCBIO), June 2008, Toledo, OH. Undergraduate research project by Alison Carroll which aligned horse prostate kallikrein sequence with other serine proteases (kallikreins, trypsin and chymotrypsin) to elucidate structural and functional relationships in the enzyme family.

**Coenzyme preference in aldehyde dehydrogenase.** Poster. Tenth International Symposium on the Molecular Biology and Enzymology of Carbonyl Metabolism, July 2000, Taos, New Mexico. Examined factors which contribute to coenzyme specificity in different aldehyde dehydrogenases.

**The big book of aldehyde dehydrogenases: Still growing.** Talk. Ninth International Symposium on the Molecular Biology and Enzymology of Carbonyl Metabolism, June 1998, Varallo-Sesia, Italy. Discussed my findings on residue conservation and family relationships from an alignment of 145 aldehyde dehydrogenase protein sequences.

**UDP-glucose dehydrogenase: Structural characteristics.** Poster. Seventh International Symposium on the Molecular Biology and Enzymology of Carbonyl Metabolism, June 1994, Palmerston North, New Zealand. Presented the first non-prokaryotic UDP-glucose dehydrogenase sequence and addressed its relationship to other dehydrogenases.

## PUBLICATIONS

### Refereed Articles

Clark L, Leatherby D, Krilich E, Ropelewski AJ, **Perozich J**. 2018. *In silico* analysis of class I adenylate-forming enzymes reveals family and group-specific conservations. *PLoS One*. 13(9):e0203218. doi:10.1371/journal.pone.0203218

Irvin J, Ropelewski A, **Perozich J**. 2017. *In silico* analysis of heme oxygenase structural homologues identifies group-specific conservations. *FEBS Open Bio* In Press. DOI:10.1002/2211-5463.12275.

Freas N, Newton P, **Perozich J**. 2016. Analysis of Nucleotide Diphosphate Sugar Dehydrogenases Reveals Family and Group-Specific Relationships. *FEBS Open Bio* 6(1):77-89. doi:10.1002/2211-5463.12022

Hempel J, Kuo I, **Perozich J**, Wang B-C, Lindahl R, Nicholas H. 2001. Aldehyde dehydrogenase: Maintaining critical active site geometry at motif 8 in the class 3 enzyme. *Eur J Biochem* 268:722-726.

**Perozich J**, Kuo I, Wang B-C, Boesch J, Lindahl R, Hempel J. 2000. Shifting the NAD/NADP preference in class 3 aldehyde dehydrogenase. *Eur J Biochem* 267:6197-6203.

**Perozich J**, Nicholas H, Wang B-C, Lindahl R, Hempel J. 1999. Relationships within the aldehyde dehydrogenase extended family. *Protein Sci* 8:137-146.

**Perozich J**, Hempel J, Morris SM Jr. 1997. Roles of conserved residues in the arginase family. *Biochim Biophys Acta* 1382:23-37.

Liu Z-J, Sun Y-J, Rose J, Chung Y-J, Hsiao C-D, Chang W-R, Kuo I, **Perozich J**, Lindahl R, Hempel J, Wang B-C. 1997. The first structure of an aldehyde dehydrogenase reveals novel interactions between NAD and the Rossmann fold. *Nature Struct Biol* 4:317-326.

Hempel J, **Perozich J**, Romovacek H, Hinich A, Kuo I, Feingold DS. 1994. UDP-glucose dehydrogenase from bovine liver: Primary structure and relationship to other dehydrogenases. *Protein Sci* 3:1074-1080.

### Proceedings from Symposia

Hempel J, Stanley S, **Perozich J**, Wymore T, Nicholas HB Jr. 2006. Residue Conservations in Aldehyde Dehydrogenase Gene Fusion Products Reemphasize Functional Interpretations. *In: Enzymology and Molecular Biology of Carbonyl Metabolism 12*, H Weiner, B Plapp, R Lindahl & E Maser, eds. West Lafayette IN: Purdue University Press, pp 8-14.

Hempel J, **Perozich J**, Wymore T, Nicholas HB. 2003. An algorithm for identification and ranking of family-specific residues, applied to the ALDH3 family. *Chem Biol Interact 143-144*:23-28.

**Perozich J**, Kuo I, Lindahl R, Hempel J. 2001. Coenzyme specificity in aldehyde dehydrogenase. *Chem Biol Interact 130-132*:115-124.

Hempel J, Lindahl R, **Perozich J**, Wang B-C, Kuo I, Nicholas H. 2001. Beyond the catalytic core of ALDH: A web important residues begins to emerge. *Chem Biol Interact 130-132*:39-46.

**Perozich J**, Nicholas H, Lindahl R, Hempel J. 1999. The big book of aldehyde dehydrogenases: An overview of the extended family. *Adv Exp Med Biol 463*:1-7.

Hempel J, **Perozich J**, Chapman T, Rose J, Liu Z-J, Boesch J, Lindahl R, Wang B-C. 1999. Aldehyde dehydrogenase catalytic mechanism: A proposal. *Adv Exp Med Biol 463*:53-59.

Hempel J, Liu Z-J, **Perozich J**, Rose J, Lindahl R, Wang B-C. 1997. Conserved residues in the aldehyde dehydrogenase family: Locations in the class 3 tertiary structure. *Adv Exp Med Biol 414*:9-13.

**Perozich J**, Leksana A, Hempel J. 1995. UDP-glucose dehydrogenase: Structural characteristics. *Adv Exp Med Biol 372*:79-84.

Sun J, Hempel J, Lindahl R, **Perozich J**, Rose J, Wang B-C. 1995. Progress toward the tertiary structure of (class 3) aldehyde dehydrogenase. *Adv Exp Med Biol 372*:71-77.