

# DONALD S. BERKHOLZ

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## EDUCATION

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- 2004– **Oregon State University**—Corvallis, Oregon  
Ph.D. candidate in Biochemistry & Biophysics  
Dissertation: Protein structure at atomic resolution:  
Conformation dependence of ideal geometry in proteins  
Research advisor: **P. Andrew Karplus**
- 2002–2004 **University of Richmond**—Richmond, Virginia  
B.S. Biochemistry & Molecular Biology  
B.A. Chemistry  
Research advisor: **J. Ellis Bell**
- 2000–2002 **Gustavus Adolphus College**—St. Peter, Minnesota  
Research advisor: **J. Ellis Bell**

## POSITIONS & HONORS

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### Positions & employment

- 2005– **Doctoral student**—P. Andrew Karplus; Biochemistry & Biophysics, OSU. Analysis of ultrahigh-resolution structures of glutathione reductase. Protein Geometry Database development. Implementation of conformation-dependent geometry restraints in PHENIX.
- 2002–2004 **Undergraduate researcher**—J. Ellis Bell; Biochemistry, UR. Continuation of project begun in 2000 on 3-phosphoglycerate dehydrogenase (PGDH).
- 2001–2002 **Undergraduate researcher**—Jonathan Smith; Physical Chemistry, GAC. Studies of serotonin conformation by resonance Raman spectroscopy; UV-vis spectroscopy; & HyperChem, Gaussian, MOPAC, GAMESS, & AMBER calculations.
- 2001–2002 **Undergraduate researcher**—Brian O'Brien; Organic Chemistry, GAC. Synthesized 4-*t*-butylphthaloylphosphamide from constituents.
- 2001 **Summer NSF-REU researcher**—Len Banaszak; Biochemistry, Molecular Biology & Biophysics, University of Minnesota. Developed an improved procedure for mitochondrial isolation as part of a project to visualize mitochondrial surfaces using AFM. Made & characterized a PGDH mutant.
- 2000–2002 **Undergraduate researcher**—J. Ellis Bell; Biochemistry, GAC. Enzyme kinetics & FRET on native & four mutants of 3-phosphoglycerate dehydrogenase under NSF grant #0220532.

### Teaching experience

- 2007 **Teaching assistant**—biochemistry (490/590 level, biochemistry majors & graduate students)
- 2004–2007 **Teaching assistant**—biochemistry (450/550 level, other science majors)
- 2004 **Teaching assistant**—cellular & molecular biology
- 2004 **Teaching assistant**—biochemistry laboratory
- 2001–2002 **Writing tutor**—Writing Center
- 2001 **Chemistry tutor**—Department of Chemistry

### Other experience & professional memberships

- 2007– **Guest author**—LWN.net. Write articles as commissioned expert on Linux-related topics.
- 2003– **Open-source developer**—Gentoo Linux distribution. Relevant experience: leadership of groups as large as ~250 people, collaboration with difficult people, project management, conflict resolution, computer programming, logical thought, discussion facilitation, scientific programs.
- 2001–2002 **Cluster architect & administrator**—Department of Chemistry, GAC. Prototype Linux cluster supported NSF CCLI grant #0311607 for \$108,551.

## Honors & awards

- 2008 **Finn Wold Travel Award**—Protein Society  
2008 College of Science Student Travel Award—OSU  
2002 **1<sup>st</sup> prize, undergraduate poster**—ASBMB  
2002 **2<sup>nd</sup> place in John C. Johnson Award for Excellence in Student Research, molecular biology poster**  
—Tri-Beta biological honor society  
2001 NSF-REU (Research Experience for Undergraduates) program—UMN  
2000 Partners in Scholarship (*the top merit-based scholarship*)—GAC  
2000 Presidential Scholarship—GAC  
2000 **National Merit Scholar**  
1999 **Eagle Scout**

## Advanced coursework

X-ray crystallography

Oxidative & nitrate stress

Medicinal chemistry

Quantum chemistry

Genomics & cellular evolution

Protein evolution

Enzyme kinetics

Single-molecule biochemistry

Mathematical basis of statistics

Linear algebra

Computer programming in C

## **PEER-REVIEWED PUBLICATIONS**

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Berkholz DS, Bell JK, Grant GA, Banaszak LJ, Bell JE. **Probing the active site of 3-phosphoglycerate dehydrogenase: the role of acid-base catalysis and the local charge environment of the transition state in V-type regulation by serine.** (in preparation).

Berkholz DS, Faber HR, Savvides SN, Karplus PA. **Catalytic cycle of human glutathione reductase near 1 Å resolution.** *J. Mol. Biol.* **382**: 371 (2008).

Karplus PA, Shapovalov MV, Dunbrack Jr RL, Berkholz DS. **A forward-looking suggestion for resolving the stereochemical restraints debate: ideal geometry functions.** *Acta Cryst.* **D64**: 335 (2008).

Benison G, Berkholz DS, Barbar E. **Protein assignments without peak lists using higher-order spectra.** *J. Magn. Reson.* **190**: 8 (2007).

## **PRESENTATIONS**

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Berkholz D, Shapovalov M, Dunbrack R, Karplus PA. **Beyond Linus Pauling: Conformation dependence of ideal geometry in proteins.** Protein Society annual symposium, July 2008.

Berkholz D, Faber HR, Karplus PA. **Glutathione reductase catalysis at atomic resolution.** West Coast Protein Crystallography Workshop, March 2007.

Berkholz D, Smith JM. **Conformations of 5-hydroxytryptamine (serotonin) in solution.** 1<sup>st</sup> Annual MERCURY Conference in Computational Chemistry. Hamilton College, N.Y., July 2002.

Berkholz D, O'Brien B. **Synthesis of cesium 4-tert-butylphthaloylphosphanide.** Sigma Xi Research Symposium, GAC, May 2002.

Berkholz D, Bell E. **Probing the active site of 3-phosphoglycerate dehydrogenase: the role of acid-base catalysis and the local charge environment of the transition state in V-type regulation by serine.** American Society of Biochemistry & Molecular Biology national meeting, April 2002, & Beta Beta Beta biennial meeting, June 2002.

Berkholz D, Johnson P, Bell E. **Domains, conformations and choices in D-3-phosphoglycerate dehydrogenase.** Sigma Xi Research Symposium, GAC, May 2001.

## INVITED TALKS

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**Probing the active site of 3-phosphoglycerate dehydrogenase: the value of undergraduate research.** Sole speaker at Partners in Scholarship annual meeting, GAC, May 2002.

## PAST FUNDING

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Research Project Grant (R01), National Institutes of Health (2008). **Empirical conformation-dependent covalent geometry variation in proteins.** I collected and analyzed the preliminary data instrumental in the funding of this grant. Principal investigator: P. Andrew Karplus. \$650,000.

Presidential Student-Faculty Collaboration Grant, GAC (2002). **Investigation of stilbene derivatives exhibiting intramolecular charge-transfer: computational and resonance Raman spectroscopic approaches.** Faculty collaborator: Jonathan M. Smith. \$7,500.