Jesse D. Bloom

620 South Madison Ave, Pasadena, CA 91106; 626-354-2565; jesse.bloom@gmail.com

Education and Training

Beckman Fellow **CALIFORNIA INSTITUTE OF TECHNOLOGY** 2007-present
Research with Dr. David Baltimore on virus evolution

Ph.D. Chemistry **CALIFORNIA INSTITUTE OF TECHNOLOGY** 2002-2007
Research with Dr. Frances Arnold on protein evolution and engineering applications

M. Phil. Theoretical Chemistry **CAMBRIDGE UNIVERSITY** 2001-2002
Computational analysis of protein energy landscapes with Dr. David Wales

B.S. Biochemistry **UNIVERSITY OF CHICAGO** GPA of 3.9/4.0 1997-2001
Research with Dr. Susan Lindquist on yeast prion protein biochemistry

Research Experience

POSTDOCTORAL RESEARCH

- Evolution of oseltamivir resistance with Dr. Baltimore 2007-present
- Co-evolution of influenza and the innate immune system with Dr. Baltimore 2007-present

GRADUATE RESEARCH

- Protein evolution and molecular chaperones with Drs. Arnold and Lindquist 2006-2007
- Theory of protein evolution with Dr. Claus Wilke and Dr. Alpan Raval 2002-2006
- Experimental evolution of ß-lactamase and cytochrome P450 with Dr. Arnold 2004-2007
- Bioinformatics analysis of protein evolutionary rates with Dr. Christoph Adami 2002-2003

MASTERS RESEARCH 2001-2002

- CHARMM / Monte Carlo analysis of peptide energy landscapes with Dr. Wales

UNDERGRADUATE RESEARCH 1999-2001

- Biochemistry and genetics of yeast prion Sup35p with Dr. Lindquist

Research Mentoring Experience

I have been the primary mentor to six different undergraduates, five of whom performed research of sufficient quality to to lead to their co-authorship on a publication.

Awards and Honors

Beckman Fellowship for research at Caltech	2008
Irvington Institute postdoctoral fellowship from the Cancer Research Institute	2007
ASCIT Teaching Award for undergraduate research mentoring at Caltech	2007
Demetriades-Tsafka Prize for best Caltech Ph.D. thesis in bioengineering	2007
Gordon Moore Graduate Fellowship to Caltech	2002-2007
HHMI Predoctoral Fellowship	2002-2007
Churchill Scholarship for study at Cambridge University	2001-2002
University of Chicago prize for top undergraduate in Biochemistry	2001
Phi Beta Kappa	2000
HHMI Undergraduate Summer Research Fellowship	2000
full-ride Dolin Honors Scholarship to University of Chicago	1997-2001
Corvallis High School (Montana) valedictorian	1997
National Merit Scholar	1997

Publications (18 total)

1) **Jesse D. Bloom** and Matthew J. Glassman. “Inferring stabilizing mutations from protein phylogenies: application to influenza hemagglutinin.” *PLoS Comput. Biol.* 5:e1000349 (2009)

2) **Jesse D. Bloom** and Frances H. Arnold. “In the light of directed evolution: pathways of adaptive protein evolution.” *Proc. Natl. Acad. Sci. USA.* 106:995-10000 (2009)

3) Jijun Dong, **Jesse D. Bloom**, Vladimir Goncharov, Madhuri Chattopadhyay, Glenn L. Millhauser, David G. Lynn, Thomas Scheibel, and Susan Lindquist. “Probing the role of PrP repeats in the conformational conversion and amyloid assembly of chimeric yeast proteins.” *J. Biol. Chem*. 282:34204-34212 (2007)

4) Yougen Li, Andrew M. Sawayama, Chris D. Snow, **Jesse D. Bloom**, and Frances H. Arnold. “A diverse family of thermostable cytochrome P450s created by recombination of stabilizing fragments.” *Nature Biotechnology*. 25:1051-1056 (2007)
   ***Faculty of 1000* rated Must Read with one evaluation**

5) **Jesse D. Bloom**, Zhongyi Lu, David Chen, Alpan Raval, Ophelia S. Venturelli, and Frances H. Arnold. “Evolution favors protein mutational robustness in sufficiently large populations.” *BMC Biology*. 5:29 (2007)
   ***Faculty of 1000* rated Recommended with one evaluation**
   Named to shortlist for 2007 BioMed Central Biology prize

6) **Jesse D. Bloom**, Philip A. Romero, Zhongyi Lu, and Frances H. Arnold. “Neutral genetic drift can alter promiscuous protein functions, potentially aiding functional evolution.” *Biology Direct*. 2:17 (2007)
   ***Faculty of 1000* rated Recommended with one evaluation**

7) **Jesse D. Bloom**, Frances H. Arnold, and Claus O. Wilke. “Breaking proteins with mutations: threads and thresholds in evolution.” (News and Views.) *Molecular Systems Biology*. 3:76 (2007)

8) **Jesse D. Bloom**, Alpan Raval, and Claus O. Wilke. “Thermodynamics of neutral protein evolution.” *Genetics.* 175:255-266 (2007)

9) **Jesse D. Bloom**, D. Allan Drummond, Frances H. Arnold, and Claus O. Wilke. “Structural determinants of the rate of protein evolution in yeast.” *Mol. Biol. Evol.* 23:1751-1761 (2006)

10) **Jesse D. Bloom**, Sy T. Labthavikul, Christopher R. Otey, and Frances H. Arnold. “Protein stability promotes evolvability.” *Proc. Natl. Acad. Sci. USA.* 103:5869-5874 (2006)
    ***Faculty of 1000* rated Must Read with three evaluations**

11) Christopher R. Otey, Marco Landwehr, Jeffrey B. Endelman, Kaori Hiraga, **Jesse D. Bloom**, and Frances H. Arnold. “Structure-guided recombination creates an artificial family of cytochromes P450.” *PLoS Biology.* 4:e112 (2006)

12) D. Allan Drummond, **Jesse D. Bloom**, Christoph Adami, Claus O. Wilke, and Frances H. Arnold. “Why highly expressed proteins evolve slowly.” *Proc. Natl. Acad. Sci. USA.* 102:14388-14343 (2005)
    ***Faculty of 1000* rated Must Read with two evaluations**

13) Claus O. Wilke, **Jesse D. Bloom**, D. Allan Drummond, and Alpan Raval. “Predicting the tolerance of proteins to random amino acid substitution.” *Biophysical J.* 89:3714-3720 (2005)

14) **Jesse D. Bloom**, Michelle M. Meyer, Peter Meinhold, Christopher R. Otey, David MacMillan, and Frances H. Arnold. “Evolving strategies for enzyme engineering.” *Curr. Opin. Struct. Biol.* 15:447-452 (2005)

15) **Jesse D. Bloom**, Jonathan J. Silberg, Claus O. Wilke, D. Allan Drummond, Christoph Adami, and Frances H. Arnold. “Thermodynamic prediction of protein neutrality.” *Proc. Natl. Acad. Sci. USA.* 102:606-611 (2005)
Faculty of 1000 **rated Recommended with one evaluation**

16) **Jesse D. Bloom**, Claus O. Wilke, Frances H. Arnold, and Christoph Adami. “A tradeoff between stability and the evolvability of function in a model protein.” *Biophysical J.* 86:2758-2764 (2004)

17) Thomas Scheibel, **Jesse D. Bloom**, and Susan L. Lindquist. “The elongation of yeast prion fibers involves separable steps of association and conversion.” *Proc. Natl. Acad. Sci. USA.* 101:2287-2292 (2004)

18) **Jesse D. Bloom** and Christoph Adami. “Evolutionary rate depends on number of protein-protein interactions independently of gene expression level: response.” *BMC Evolutionary Biology.* 4:14 (2004)

19) **Jesse D. Bloom** and Christoph Adami. “Apparent dependence of protein evolutionary rate on number of protein-protein interactions is linked to biases in protein-protein interaction data sets.” *BMC Evolutionary Biology.* 3:21 (2003)

20) Thomas Scheibel, A. S. Kowal, **Jesse D. Bloom**, and Susan L. Lindquist. “Bidirectional amyloid fiber growth for a yeast prion.” *Current Biology.* 11:366-369 (2001)