

Romas J. Kazlauskas

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& The Biotechnology Institute

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Expertise: biocatalysis, protein engineering

2003- *University of Minnesota*, Twin Cities, MN, Dept. of Biochemistry, Molecular Biology and Biophysics & The Biotechnology Institute, Associate Professor 2003-07; Professor, 2007-present

Using evolution to design new biocatalysts

2009-13 *Seoul National University*, Seoul, Korea, Dept of Chem. & Biol. Engineering
visiting WCU Professor with Byung-gee Kim, Lignin Biorefinery

1988-2003 *McGill University*, Montréal, QC, Department of Chemistry, Assistant Professor 1988-94; Associate Professor 1994-2002; Professor, 2002-03

Bioorganic Chemistry: Organic syntheses and resolutions using enzymes. Rapid screening techniques.

2002-03 *KTH-Royal Institute of Technology* (Stockholm), Dept. of Biotechnology, Visiting Prof. with Karl Hult; Protein Engineering of New Catalytic Activity

1995-96 *University of Stuttgart*, Institute for Applied Biochemistry, Visiting Professor with Rolf D. Schmid ; Site-Directed Mutagenesis of Lipases

1985-88 *General Electric Company*, Schenectady, NY, Staff Scientist
Research Area: Synthesis Using Enzymes

Resolution of chiral monomers for polymer synthesis. Used coenzyme analogs to improve enzyme-catalyzed oxidations.

1982-85 *Harvard University*, Cambridge, MA, Postdoctoral Fellow w/ George M. Whitesides
Research Area: Bioorganic Chemistry

Synthesis of acetyl phosphate and analogs for regeneration of ATP.

1978-82 *Massachusetts Institute of Technology*, Cambridge, MA, Graduate Student
Ph. D. 1982; Thesis Advisor: Mark S. Wrighton

Research Area: Mechanisms of Organometallic Reactions

1974-78 *Cleveland State University*, Cleveland, OH, Student
B.S. 1978; Chemistry with engineering

Awards

Honorary doctorate, KTH-Royal Institute of Technology, Stockholm, 2013

IUPAC Fellow, 2006

Biocat2004 Award for Contributions to Biocatalysis (Hamburg)

Pfizer Distinguished Lecturer, Colorado State University 1998

National Institutes of Health Postdoctoral Fellow 1983-84

National Science Foundation Graduate Fellow 1979-81

American Institute of Chemists Outstanding Senior Award 1978

Cleveland State University President's Award 1978

Selected publications from >100 peer-reviewed publications

U. T. Bornscheuer, R. J. Kazlauskas (2004) Catalytic promiscuity in biocatalysis: using old enzymes to form new bonds and follow new pathways. *Angew. Chem. Intl. Ed.* **43**, 6032-40,

P. Bernhardt, K. Hult, R. J. Kazlauskas (2005) Molecular basis of perhydrolase activity in serine hydrolases. *Angew. Chem., Intl. Ed.* **44**, 2742-6.

S. Park, K. L. Morley, G. P. Horsman, M. Holmquist, K. Hult, R. J. Kazlauskas (2005) Focusing mutations into the *P. fluorescens* esterase binding site increases enantioselectivity more effectively than distant mutations. *Chem. Biol.* **12**, 45-54.

A. Mezzetti, J. Schrag, C. S. Cheong, R. J. Kazlauskas (2005) Mirror-image packing in enantiomer discrimination: Molecular basis for the enantioselectivity of *Burkholderia cepacia* lipase toward 2-methyl-3-phenyl-1-propanol. *Chem. Biol.* **12**, 427-37.

K. L. Morley, R. J. Kazlauskas (2005) Improving enzyme properties: when are closer mutations better? *Trends Biotechnol.* **23**, 231-7.

P. F. Mugford, V. P. Magloire, R. J. Kazlauskas (2005) Unexpected subtilisin-catalyzed hydrolysis of a sulfinamide bond in preference to a carboxamide bond in *N*-acyl sulfinamides. *J. Am. Chem. Soc.* **127**, 6536-7.

K. Okrasa, R. J. Kazlauskas (2006) Manganese carbonic anhydrase as a new peroxidase. *Chem. Eur. J.* **12**, 1587-96.

P. Mugford, U. Wagner, Y. Jiang, K. Faber, R. Kazlauskas (2008) Enantiocomplementary enzymes: Classification, molecular basis for their reversed enantiopreference and prospects for mirror-image biotransformations. *Angew. Chem. Intl. Ed.* **47**, 8782-93.

H. Jochens, K. Stiba, C. Savile, R. Fujii, J.-G. Yu, T. Gerassencov, R. J. Kazlauskas, Uwe T. Bornscheuer (2009) Converting an esterase into an epoxide hydrolase. *Angew. Chem. Intl. Ed.* **48**, 3532-5.

R. J. Kazlauskas, U. T. Bornscheuer (2009) Finding better protein engineering strategies. *Nat. Chem. Biol.* **5**, 526-9.

J. H. Park, H. J. Ha, W. K. Lee, T. Génereux-Vincent, R. J. Kazlauskas (2009) Molecular basis for the stereoselective ammoniolysis of *N*-alkyl aziridine-2-carboxylates catalyzed by *Candida antarctica* lipase B. *ChemBioChem* **10**, 2213-22.

S. Duncan, Q. Jing, A. Katona, R. J. Kazlauskas, J. Schilling, U. Tschirner, W. Wafa AlDajani (2010) Increased saccharification yields from aspen biomass upon treatment with enzymatically generated peracetic acid. *Appl. Biochem. Biotechnol.* **160**, 1637-52.

D. T. Yin, P. Bernhardt, K. L. Morley, Y. Jiang, J. D. Cheeseman, J. D. Schrag, R. J. Kazlauskas (2010) Switching catalysis from hydrolysis to perhydrolysis in *P. fluorescens* esterase. *Biochemistry* **49**, 1931-42.

S. K. Padhi, R. Fujii, G. A. Legatt, S. L. Fossum, R. Berchtold, R. J. Kazlauskas (2010) Switching from an esterase mechanism to a hydroxynitrile lyase mechanism requires only two amino acid substitutions. *Chem. Biol.* **17**, 863-71.

D. T. Yin, Q. Jing, W. Wafa AlDajani, S. Duncan, U. Tschirner, J. Schilling, R. J. Kazlauskas (2011) Improved pretreatment of lignocellulosic biomass using enzymatically-generated peracetic acid. *Bioresour. Technol.* **13**, 5183-92.

U. T. Bornscheuer, G. Huisman, R. J. Kazlauskas, S. Lutz, J. Moore, K. Robins (2012) Engineering the third wave of biocatalysis. *Nature*, **2012**, 485, 185-94.

D. T. Yin, R. J. Kazlauskas (2012) Revised molecular basis of the promiscuous carboxylic acid perhydrolase activity in serine hydrolases. *Chem. Eur. J.* **18**, 8130-9.

D. T. Yin, V. Purpero, R. Fujii, Q. Jing, R. J. Kazlauskas (2013) New structural motif in serine hydrolases for carboxylic acid perhydrolase *Chem. Eur. J.*, **19**, 3037-46.