Marvin L. Hackert

William Shive Professor of Chemistry and Biochemistry
Associate Dean of the Graduate School
University of Texas at Austin
Austin, TX 78712.

Hackert received his B.S. in Chemistry from Central College (1966), his Ph.D. in Physical Chemistry / Crystallography with Professor Robert Jacobson from Iowa State University (1970), and was an NIH Postdoctoral Fellow with Prof. Michael Rossmann at Purdue University before joining the faculty in the Department of Chemistry at The University of Texas at Austin in 1974. He currently holds the William Shive Centennial Professorship in Biochemistry and serves as Associate Dean of the Graduate School where he is the Director of Graduate Fellowship and Faculty Development Programs.

Hackert is the author or co-author of about 90 research publications in the areas of small molecule and macromolecular structure, has supervised ~20 masters and PhD students, and author of several editions of a Study Guide for General, Organic and Biochemistry texts.

His research interests are in structural molecular biology – investigation of protein structure/function relationships of enzyme systems using the tools of protein crystallography. Recent efforts have focused on members of the 4-OT (4-oxalocrotonate tautomerase) "super-family" of proteins. There are over a hundred 4-OT homologues in the superfamily. Broad reaction functionality within the superfamily has been observed, including isomerization, tautomerization, dehalogenation, and decarboxylation activities, but many of these proteins have unknown functions. The Hackert lab has crystallized and solved about 20 crystal structures from 11 different members within this family, including at least one representative member from each of the five major sub-families they identified for the smaller members of the superfamily.

Another research focus has been on the regulation of ornithine decarboxylases (ODCs) and the roles of antizyme (AZ), antizyme inhibitor

(AZI) and the structures of antizyme complexes with ODC and AZI to understand the regulation of polyamine biosynthesis. Polyamines are small, biogenic amines essential for cell growth and play key roles in DNA replication, apoptosis, transcription, translation, and activation of enzymes. High polyamine levels may suppress cell growth of primary prostate carcinomas and polyamine levels have also been implicated in certain forms of infertility. Inhibitors of polyamine synthesis, inhibitors of ornithine decarboxylase (ODC), have also been used as antiparasitic agents.

In addition to his research and teaching in biochemistry and structural molecular biology, he is recipient of an American Crystallographic Association (ACA) Service Award (1992), a Distinguished Alumni Award from Central College (2007), and Central's Honors Colloquium Speaker (2008).

PROFESSIONAL POSITIONS HELD

International Union for Crytallography (IUCr) - Exec Comm – 2010-present
Am Cryst Assn – Vice-President (2007), President (2008), Past-President (2009)
US Nat Comm Cr (1993-2002; 2007-2008), Chair Elect / Chair (1996-2002);
IUCr – Commission on Marcromolecules (2002-2005);
American Crystallographic Association (ACA) – Co-Chair (with Ray Davis) of Local Committee for ACA meeting in San Antonio (2002);
BioMac SIG of the ACA (Sec-Treas. 1986-89, Chair 1991-92);
ACA Publications Comm. (1988-91, Chair 1991);
Member Local Committee, ACA meeting in Austin (1987);
Advisory Council UCSD Multiwire Area Detector Facility (1986-1995).
Director – Biochemical Institute (1995 -);
Central College - National Advisory Council - 1996 - present

UNIVERSITY SERVICE

Chair – Programming and Building Comm. – Dell Pediatric Research Inst (2006-2009)
Board of Directors – University Coop (2005-2009)
Faculty Council Committee on Financial Aid for Students (2005-present)
University Faculty Council (2000-2005; Chair 2003-2004)
Univ. Texas System Faculty Advisory Group – 1992-92; 2002-2005
Chair – *Ad hoc* Comm. of Faculty Council to Study Student Course-Instructor Surveys (2005-2006) / electronic Course-Instructor Surveys (2006-2007)
Regional Vice-Pres and Treas – Tx Council of Faculty Senates (2003-2005)
University Tuition Policy Committee (2002-2003)
Faculty Advisory Committee on Budgets (2000-2003; Chair 2002-2003)
Graduate Assembly (1989-1995; Chair 1991-92);

GRADUATE SCHOOL SERVICE

Associate Dean of the Graduate School (2005 – present)
Dir. of Faculty Development Programs (Faculty Travel Grants / FRAs / SRAs)
Dir of Graduate Fellowship Programs
Graduate Assembly - Ad hoc member – liaison with Academic Affairs Comm.
UT Institutional Coordinator for NRC Assessment of Research Doctoral Programs
Assisted with SACS accreditation – representing Graduate School issues
Member – PIMAC (Provost's Information Management Advisory Council)
Digital Measures - Work group to develop on-line Faculty Activity Reports.

DEPARTMENTAL SERVICE

Associate Chair; Dept. of Chemistry and Biochemistry (2004-2005)
Chair; Dept. of Chemistry and Biochemistry (1995-2000)
Editor – *Chem. Compositions* (1995-2006)
Graduate Adviser and GSC Chair; Ph.D. in Biochemistry (1986-90)
Graduate Adviser and GSC Chair; Dept. Chem. & Biochem. (1991-95)
Assistant to Chairman Dr. Robert Wyatt (1984-87)

TEACHING EXPERIENCE (UT)

CH387D – Physical Method in Biochemistry and Molecular Biology
CH392G –Biochemistry (Graduate)
CH192G – Biochemistry Student Seminar
CH391L – Advanced Topics in Biochemistry – Protein Structure and Function
CH391L – Advanced Topics in Biochemistry – Protein Crystallography
CH190 – Seminar in Biochemistry
CH370 – Physical Method in Biochemistry
CH369 – Fundamentals of Biochemistry
CH369L – Biochemistry Laboratory
CH339K – Biochemistry I
CH313N/113P – General and Organic Chemistry / Lab
CH314N/114P – Organic and Biological Chemistry / Lab
CH302 – Principles of Chemistry II

GRANT SUPPORT (past 12 months)

Source	Title	Period	Direct Costs / year
Welch Foundation	**X-ray Structural Analysis of Proteins**	6/1/07 – 5/31/10	$50,000 TC/yr

SELECTED PUBLICATIONS **Marvin L. Hackert** (Total ~ 90)

(Publications: 2000-present,)

Knapp, J.E., Carroll, D., Lawson, J.E., Ernst, S.R., Reed, L.J., and Hackert, M.L., "Expression, Purification, and Structural Analysis of the Trimeric Form of the Catalytic Domain of the *Escherichia coli* Dihydrolipoamide Succinyltransferase " *Protein Science*, **9,** 37-48 (2000).

Almrud, J.J., Oliveira, M.A., Kern, A.D., Grishin, N.V., Phillips, M.A. and Hackert, M.L., " Crystal Structure of Human Ornithine Decarboxylase at 2.1Å Resolution: Structural Insights to Antizyme Binding" *J. Molec. Biol.,* **295**, 7-16 (2000).

Hackert, M.L., Kern, A.D., Oliveira, M.A., Almrud, J.J., Carroll, D.W., and Ernst, S.R. "Mouse Ornithine Decarboxylase: Structural Comparisons to Other PLP-Dependent Enzymes" in Biochemistry and Molecular Biology of Vitamin B6 and PQQ-dependent Proteins, ed. A. Iriarte, H.M. Kagen, and M. Martinez-Carrion, Birkhauser Verlag, Basel, 321-326 (2000).

Stamps, S.L., Taylor, A.B., Wang S.C., Hackert, M.L., Whitman, C.P., "Mechanism of the phenylpyruvate tautomerase activity of macrophage migration inhibitory factor: properties of the P1G, P1A, Y95F, and N97A mutants" *Biochemistry*, **39**:9671-8 (2000).

Almrud, JJ, Kern, AD. Wang, SC, Czerwinski, RM, Johnson, WH Jr., Murzin, AG Hackert, ML, Whitman, CP, " The Crystal Structure of YdcE, a 4-Oxalocrotonate Tautomerase Homologue from *Escherichia coli*, Confirms the Structural Basis for Oligomer Diversity" *Biochemistry*, **41**:12010-24 (2002).

Dasgupta, R., Almrud, J.J., Johnson, W.H., Whitman, C.P., and Hackert M.L., "Crystal structures of two 4-OT homologues from *Helicobacter pylori* and *Archaeoglob**us Fulgidus.*"** *Am. Cryst. Assn. Abst*., **31**: (2004)

Hoffman, D.W., Carroll, D., Martinez, N., Hackert, M.L., "Solution Structure of a Conserved Domain of Antizyme: A Protein Regulator of Polyamines", *Biochemistry*, **44**(35):11777-85 (2005).

Almrud, J.J., Poelarends, G.J., Johnson, Jr. W.H,, Serrano, H., Hackert, M.L., and Whitman, C.P., "Crystal Structures of the Wild-type, P1A Mutant, and Inactivated Malonate Semialdehyde Decarboxylase: A Structural Basis for the Decarboxylase and Hydratase Activities" *Biochemistry*, **44**(45): 14818-27 (2005).

Poelarends, G.J., Almrud, J.J.,Serrano, H., Darty, J.E., Johnson, Jr. W.H., Hackert, M.L., and Whitman, C.P., "Evolution Consequences of Enzymatic Activity in the Tautomerase Superfamily: Mechanistic and of the L8R Mutation in 4-Oxalocrotonate Tautomerase" *Biochemistry*, **45**: 7700-08 (2006).

Golubkov, P.A., Johnson, Jr. W.H., Czerwinski, R.M., Person, M.D., Wang, S.C., Whitman, C.P., and Hackert, M.L., "Inactivation of the Phenylpyruvate Tautomerase Activity of Macrophage Migration Inhibitory Factor by 2-Oxo-4-phenyl-3-butynoate." *Bioorganic Chemistry*, **34**(4):183-99 (2006).

Hackert, M.L. and Riggs, A.F. "When Size Matters", *Structure*, **14**:1094-96 (2006).

Almrud, J.J., Dasgupta, R., Czerwinski, R.M., Kern, A.D., Hackert, M.L., and Whitman, C.P., "Kinetic and structural characterization of DmpI from *Helicobacter pylori* and *Archaeoglobus fulgidus*, two 4-oxalocrotonate tautomerase family members". Bio-organic Chemistry (2010) Jul 18, PMID: 20709352.

Guo, Y., Serrano, H., Johnson, Jr. W.H., Ernst, S.E., Hackert, M.L., and Whitman, C.P., "Crystal Structures of Native and Inactivated *cis*-3-Chloroacrylic Acid Dehalogenase: Implications for the Catalytic and Inactivation Mechanisms" Bioorganic Chemistry (2010), in press.