James R. Knox
Professor Emeritus, jointly Department of Molecular and Cell Biology
College of Liberal Arts and Sciences,
and Polymer Program, The Institute of Materials Science
University of Connecticut, Storrs CT

Education: B.S. 1963 University of Missouri-Rolla (Chemistry)
Ph.D. 1967 Boston University (Physical Chemistry)

Research and Experience:
1962 Student Researcher, Mallinckrodt Chemical Works, Uranium Division.
1963 Student Researcher, Oak Ridge National Laboratory, Chemical Technology.
1963-66 Graduate research, Boston University Dept. of Chemistry, with Klaas Eriks.
1966-68 NIH Post-Doctoral Fellow, Chemical Crystallography Laboratory,
Oxford University, with C. K. Prout.
1969-70 Post-Doctoral Fellow, Molecular Biophysics and Biochemistry,
Yale University, with H. W. Wyckoff and F. M. Richards.
1970-75 Assistant Professor, jointly in Department of Molecular and Cell Biology, and
Institute of Materials Science, University of Connecticut.
1975-82 Associate Professor.
1982-02 Professor; at-large member of University Senate.
2002 Professor Emeritus.
1977 Visiting Professor, Harvard University Biological Laboratories
with J. L. Strominger.
1981,86 Invited Professor, Universidad de Concepcion, Chile (l mo.).
1983-87 Consultant, Hoffmann-LaRoche Inc.
1988-91 Consultant, Eli Lilly Company.
2001-03 Consultant, PanTherix.

Honors or Distinctions:
NIH Post-Doctoral Fellowship, Oxford University, 1966-68.
Chairman, Session on Protein Structure, American Crystallographic Assoc., 1974.
Author Award, American Chemical Society (Conn. Valley Section) 1983.
Science **218**, 479-481 (1982).
University of Connecticut Distinguished Faculty Research Award, 1984.
Session Chair (Computer Graphics), Symposium on Three-Dimensional
Structures and Drug Action, Tokyo, 1986.
NIH Study Sections: SSS-1-B, 1987-89.
Special reviewer BBCA, 1978; BBCB, 1995.
Advisory Committee, NSF Facility for Macromolecular Computing,
Purdue University, 1988-90.
Advisory Committee, Foundation for Chemical Research,
Univ. of Missouri, Rolla, 1991-99.
Secretary-Treasurer, American Crystallographic Association,
Macromolecular Crystallography SIG, 1992-1994.
Program Committee, Society of Industrial Microbiology, International Conference on
Antibiotic Resistance: Impact on Discovery, 1993-94.
Connecticut Academy of Arts and Sciences, 1994-.

Scientific Committee, International ß-Lactamase Congress, L'Aquila, Italy, 1999.
Editorial Board, The Journal of Biological Chemistry, 2003-2008.
Academy of Chemists and Biochemists, Missouri University of Science and Technology, 2009.
Professional Degree in Chemistry, Missouri University of Science and Technology, 2010.

University Service:
University Senate (elected to four 3-year terms). Faculty Standards Committee, Student/Teacher Evaluation, subcommittee of FSC, Courses and Curriculum Committee.
Faculty/Trustee Dinner Committee (organizer), 4 years.
University Radiation Safety Committee, 8 years, chair 6 years.
Graduate School, Faculty Advisory Council, 6 years. Research Support Committee.
Dean's Advisory Council for Promotion and Tenure, College of Liberal Arts and Sciences, 3 years
Director's Advisory Committee, Institute of Materials Science, 9 years.

Fields of Specialization: physical biochemistry; molecular biophysics.

Research Interests: enzyme structure and mechanism; X-ray crystallography; penicillin-binding enzymes; ß-lactam and vancomycin mechanisms; bacterial antibiotic resistance.

Journal Articles and Book Chapters

110. Knox, J. R. 2012. Before Our Time: Early ß-Lactamase Papers and the People Who Wrote Them. *In* ß-Lactamases, Nova Science Publishers (J.-M. Frere., ed.), Chapt. 1, pp. 1-20.

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108. Venkatesan, A. M., et al. D. M. Shlaes, J. R. Knox and T. S. Mansour. 2006. Structure-activity relationship of 6-methylidene penems bearing 6,5 bicyclic heterocycles as broad-spectrum ß-lactamase inhibitors: Evidence for 1,4-thiazepine intermediates with C7 R stereochemistry by computational methods. J. Med. Chem. 49: 4623-4637.

107. Sun, T., C. R. Bethe, R. A. Bonomo and J. R. Knox. 2004. Inhibitor-Resistant Class A ß-Lactamases: Consequences of the ser130-to-glycine mutation seen in apo and tazobactam structures of the SHV-1 variant. Biochemistry 43: 14111-14117.

106. Nukaga, M., T. Abe, A. M. Venkatesan, T. S. Mansour, A. H. Hujer, R. A. Bonomo and J. R. Knox. 2004. Structure-activity relationship of 6-methylidene penems bearing tricyclic heterocycles as broad-spectrum ß-lactamase inhibitors: Crystallographic structures show unexpected binding of 1,4-thiazepine intermediates. J. Med. Chem. 47: 6556-6568.

105. Murthy, N. S. and J. R. Knox. 2004. Hydration of Proteins: SAXS study of native and methoxy-polyethyleneglycol (mPEG)-modified L-asparaginase and bovine serum albumin in mPEG solutions. Biopolymers 74: 457-466.

104. Nukaga. M., S. Kumar, K. Nukaga, R. F. Pratt and J. R. Knox.·2004. Hydrolysis of third-generation cephalosporins by class C ß-lactamases: Structures of a transition-state analog of cefotaxime in wild-type and extended-spectrum enzymes. J. Biol. Chem. 279: 9344-9352.

103. Nukaga, M., T. Abe, A. M. Venkatesan, T. S. Mansour, R. A. Bonomo and J. R. Knox. 2003. Inhibition of class A and class C ß-lactamases by penems: Crystallographic structures of a novel 1,4-thiazepine intermediate. Biochemistry 42: 13152-13159.

102. Nukaga, M., K. Mayama, A. Hujer, R. A. Bonomo and J. R. Knox. 2003. Ultrahigh resolution structure of a class A ß-lactamase: On the mechanism and specificity of the extended-spectrum SHV-2 enzyme. J. Mol. Biol. 328: 289-301.

101. Sun, T., M. Nukaga, K. Mayama, E. H. Braswell and J. R. Knox. 2003. Comparison of ß-lactamases of classes A and D: 1.5 Å crystallographic structure of the class D OXA-1 oxacillinase. Prot. Sci. 12: 82-91.

100. McDonough, M. A., J. W. Anderson, N. R. Silvaggi, R. F. Pratt, J. R. Knox and J. A. Kelly. 2002. Structures of two kinetic intermediates reveal species specificity of penicillin binding proteins. J. Mol. Biol. 322: 111-122 (Cover article).

99. Vakulenko, S. B., D. Golemi, B. Geryk, M. Suvorov, J. R. Knox, S. Mobashery and S. A. Lerner. 2002. Mutational replacement of Leu-293 in the class C *Enterobacter cloacae* P99 ß-lactamase confers increased MIC to cefepime. Antimicrobial Agents & Chemother. 46: 1966-1970.

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86. Fan, C., P. C. Moews, I.-L. Park, C. T. Walsh and J. R. Knox. 1997. D-Alanine:D-Alanine Ligase: Phosphonate and Phosphinate Intermediates with Wild-type and the Y216F Mutant. Biochemistry 36: 2531-2538.

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45. Bartolone, J. B., G. J. Hite, J. A. Kelly and J. R. Knox. l985. X-ray structure of transpeptidase and its ß-lactam binding site. *In* Recent Advances in the Chemistry of ß-Lactam Antibiotics, pp. 3l8-327, The Royal Society of Chemistry, London.

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23. Huang, S. J., J. P. Bell and J. R. Knox. l976. Design, synthesis and degradation of polymers susceptible to hydrolysis by proteolytic enzymes, *in* Proc. Third Intern. Biodegradation Symp., Appl. Science Publ., Essex, England. Vol. 3, 73l-742.

22. Murthy, N. S. and J. R. Knox. l976. Modification of the Rigaku-Denki goniometer with Kratky collimation for weakly scattering solutions. J. Physics E: Sci. Instr. 9:563-565.

21. Murthy, N. S., J. R. Knox and E. T. Samulski. l976. Order parameter measurements in polypeptide liquid crystals. J. Chem. Physics. 65:4835-4839.

20. Moews, P. C. and J. R. Knox. l976. The crystal structure of 1-decyl a-D- glucopyranoside: Observation of a polar bilayer with hydrocarbon subcell. J. Amer. Chem. Soc. 98:6628-6633.

19. Murthy, N. S. and J. R. Knox. 1976. *E. coli* L-Asparaginase: Small angle x-ray scattering studies. J. Molec. Biol. l05:567-575.

18. Petrie, S. P. and J. R. Knox. l976. Crystallite orientation in heat shrinkable polytetrafluoroethylene. J. Matl. Sci. 11:2173-2174.

17. Knox, J. R., J. A. Kelly, P. C. Moews and N. S. Murthy. 1976 Penicillin ß-lactamase: 5.5Å crystallographic structure and radius of gyration in solution. J. Mol. Biol. 104:865-875.

16. Bhatt, G. M., J. P. Bell and J. R. Knox. l976. Effect of drawing on the unit cell dimensions of crystallities in PET fibers. J. Polymer Sci., Phys. Ed. 14:373-376.

15. Knox, J. R. and P. C. Keck. l975. ß-Methyllanthionine, a sulfur amino acid in subtilin and nisin antibiotics. Acta Cryst. B3l:2698-2700.

14. Knox, J. R. and N. S. Murthy. l974. The conformation of N-acetyl a-D-muramic acid and its relationship to penicillin. Acta Cryst. B30:365-37l.

13. Knox, J. R., P. E. Zorsky and N. S. Murthy. l973. Preliminary crystallographic data for *Escherichia coli* ß-lactamase. J. Mol. Biol. 79:597-598.

12. Knox, J. R. and P. C. Keck. l973. Conformation and absolute configuration of ß-methyl-lanthionine. Biochem. Biophys. Res. Comm. 53:567-57l.

11. Knox, J. R. and H. W. Wyckoff. 1973. A crystallographic study of alkaline phosphatase at 7.7 Å resolution. J. Mol. Biol. 74:533-545.

10. Knox, J. R. l972. Protein molecular weight by x-ray diffraction. J. Chem. Educ. 49:476-479.

9. Wyckoff, H. W., D. Tsernoglou, A. W. Hanson, J. R. Knox, B. Lee and F. M. Richards. 1970. The three-dimensional structure of ribonucleases-S. J. Biol. Chem. 245:305-328.

8. Knox, J. R. and C. K. Prout. l969. The structure of a cysteine complex of molybdenum(V). Acta Cryst. B25:l857-l866.

7. Knox, J. R. and C. K. Prout. 1969. The structure of bis-π-cyclo-pentadienyl(toluene-3,4-dithiolato) molybdenum. Acta Cryst. B25:20l3-2022.

6. Knox, J. R. and C. K. Prout. 1969. The structure of bis-π-cyclo-pentadienyl(2-amino-ethanethiolato) molybdenum iodide. Acta Cryst. B25:2482-2487.

5. Knox, J. R. and C. K. Prout. 1969. The crystal and molecular structure of μ-oxobis-[bis(diethyldithiophosphato) oxomolybdenum(V)] 1,2-dichloro-benzene.Acta Cryst. B25:228l-2285.

4. Knox, J. R. and C. K. Prout. 1969. The structure of a nitrogeno-molybdenum carbene chelate. Acta Cryst. B25:l952-l958.

3. Knox, J. R. and C. K. Prout. 1968. The structure of a molybdenum(V) L-cysteine chelate. Chem. Comm. p. l227.

2. Knox, J. R. and K. Eriks. 1968. The structure of a molybdenum(III) hexa-isothiocyanate monohydrate. Inorg. Chem. 7:84-90.

1. Knox, J. R. and C. K. Prout. 1967. The molecular structure of bis-π-cyclopentadienyl(toluene-3,4-dithiolato) molybdenum. Chem. Comm. p. 1277.

Invited Lectures and Talks

International Union of Crystallography. Moscow, USSR. 1966.
Molybdenum hexaisothiocyanate crystal structure.

Inorganic Chemistry Laboratory, Oxford University, Oxford, UK. 1969.
Structures and stereochemisties of organomolybdenum complexes.

Chemical Society (Britain). University of Keele, U.K. 1969.
The structure of a nitrogen-molybdenum chelate.

International Union of Crystallography. Buffalo, NY. 1969.
Ribonuclease structure and function. (with H. W. Wyckoff et al.)

American Crystallographic Association. Albuquerque, NM. 1972.
Alkaline phosphatase structure at 7.7Å resolution.

American Society for Microbiology. Hartford, CT. 1972.
Purification of penicillinase by affinity chromatography.

American Crystallographic Association. Gainesville, FL. 1973.
ß-Methyllanthionine: A component of nisin and subtilin antibiotics.

American Crystallographic Association. Berkeley, CA. 1974.
N-Acetyl ß-D-muramic acid and its relationship to penicillin.

Protein Crystallography Workshop, Jug End, MA. 1974.
Low resolution structure of *E. coli* penicillinase enzyme.

American Crystallographic Association. Pennsylvania State University. 1974
A comparison of desmearing corrections for small-angle X-ray scattering data.
Session Chairman: Protein Tertiary Structure.

University of Pittsburgh, Departments of Biochemistry and Crystallography. 1975.
Penicillin-binding proteins.

American Crystallographic Association. University of Virginia. 1975.
1-decyl ß D-glucopyranoside: An observation of a polar bilayer.

International Biodegradation Symposium. University of Rhode Island. 1975.
Design, synthesis and degradation testing of polymers susceptible to enzyme hydrolysis
(with S. J. Huang and J. P. Bell).

International Union of Crystallography. Amsterdam. 1975.
Studies of *E. coli* penicillinase enzyme at 5.5Å resolution.

Oxford University, School of Pathology and Department of Molecular Biophysics. l975.
X-ray studies on penicillinase enzyme.

Edinburgh University, Department of Molecular Biology. l975.
X-ray studies on penicillinase enzyme.

American Chemical Society. San Francisco. 1976.
The structure of R-TEM ß-lactamase at 4Å resolution.

Fourth European Crystallography Meeting. Oxford. 1977.
Crystallographic progress on ß-lactamase.

Second Tokyo Symposium on Microbial Drug Resistance. Tokyo. 1977.
Studies on R-TEM penicillinase and on the penicillin receptor enzyme.

The Royal Society, London. 1979.
Secondary and tertiary structure analysis of penicillin-binding proteins.

Newcastle-upon-Tyne, England. ß-Lactamase Workshop. l979.
Structural studies of *E. coli* R-TEM ß-lactamase.

Universidad de Concepcion, Chile. l98l. Invited professor,
UNESCO-sponsored 3-week course on protein structure determination.

Squibb Institute for Medical Research. l98l. Princeton, N.J.
X-ray analysis of penicillin-binding enzymes.

Harvard University, Department of Chemistry. Penicillin-binding enzymes. 1982.

Eli Lilly and Company. Indianapolis, IN. l982.
Crystallographic studies of penicillin-binding proteins.

European Molecular Biology Organization. Workshop on ß-Lactam Antibiotics. l982.
El Escorial, Spain. Structure of a penicillin receptor from *Streptomyces* R6l.

American Chemical Society, Division of Medicinal Chemistry.
Symposium on New Physical Methods in Drug Design. l982. Kansas City, MO.

Hoffmann-LaRoche, Inc., Nutley, N.J. 1982.
Crystallographic visualization of the penicillin-receptor interaction.

Abbott Laboratories, Chicago. 1982.
X-ray studies of a penicillin-sensitive D-alanyl-transpeptidase and the R-TEM ß-lactamase.

American Society for Microbiology, New Orleans. l983.
Divisional Lecture (Antimicrobial Chemotherapy) on structure analysis of ß- lactamases
and transpeptidases.

First Cyprus Conference on New Methods in Drug Research, Cyprus, l983.
The use of X-ray crystallography in the study of drug:enzyme complexes.

Lederle Laboratories, Pearl River, N.Y. The penicillin target enzyme. 1983.

Burroughs-Wellcome Co., Research Triangle Park, N.C. l983.
Structures of penicillin-binding enzymes.

Italian Research Council, Rome. l983.
Symposium on Enzyme-Catalysed Inactivation of Antibiotics, Plenary lecture.

American Chemical Society (Conn. Valley Section). l983. Author Award address.

Royal Society of Chemistry, Cambridge, England. l984. Plenary lecture.
Symposium on Recent Advances in the Chemistry of ß-Lactam Antibiotics.

Olin Corporation, Cheshire, CT. l984.
The D alanyltranspeptidase structure. X-ray diffraction results.

Universite de Liege, Belgium. 1984.
Crystallographic structure of the S.R6l transpeptidase.

Lee-Rio Lecturer, Central Connecticut State University, New Britain, 1984.
X-ray crystallography and ß-lactam design.

Eli Lilly & Co., Indianapolis. l985. Recent structural work on the penicillin target enzyme.

University of Virginia, Department of Biology, Charlottesville, l986.
On the origin of bacterial resistance to penicillin.

Crystallographic, Pharmaceutical and Chemical Societies of Japan, Tokyo. l986.
Symposium on Three-Dimensional Structures and Drug Design, Plenary lecture.

Suntory Institute for Biomedical Research, Osaka. l986. Penicillin-binding enzymes.

Osaka University, Institute of Protein Chemistry. l986. Drug target enzymes.

Pittsburgh Diffraction Conference, Pittsburgh, PA. l986.
Symposium on X-Ray Crystallography and Drug Design. Invited Speaker.
Cell wall synthesizing enzymes and penicillinase. Crystallography to the aid of microbiology.

Universidad de Concepcion, Concepcion, Chile. l986.
Symposium on Chemistry and Physics of Polymers. Plenary Lecture.
Macromolecular crystallography.

Eastman Kodak Laboratories, Rochester, N. Y. l986. X-ray studies of DD-peptidase.

The University of Rochester, Dept. of Biochemistry, Rochester, N. Y. l986.
Cell wall synthesizing enzymes and ß-lactamase.

Lederle Research Laboratories. Pearl River, NY. l986.
Crystallography of transpeptidase and ß-lactamase.

Bristol-Myers Pharmacentral Research Center, Wallingford, CT l986.
The penicillin target enzyme.

The Upjohn Company, Kalamazoo, MI. l987. Penicillin-recognizing enzymes.

The Eli Lilly Company. Indianapolis, IN. l988.
Crystallographic studies of ß-lactamases and cell wall synthesizing enzymes.

Lederle Research Laboratories. Pearl River, NY. l988.
X-ray studies of penicillinase, DD-peptidase, and DD-ligase.

Gordon Research Conference (Bacterial Cell Surfaces). l988.
The structure of the penicillin target enzyme.

Procter and Gamble Company. Cincinnati, OH. l988.
ß-Lactam binding proteins and penicillinase.

University of Michigan School of Medicine, Department of Biological Chemistry. 1989.
New anti-bacterial drug target enzymes.

Becton-Dickinson Company, Research Triangle Park, NC. 1989.
ß-Lactamase as a model for site-directed mutagenesis.

Washington University, School of Medicine, Department of Biological Chemistry,
St. Louis, MO. l989. Enzymes of cell wall biosynthesis.

Eli Lilly and Company. Indianapolis, IN. l989.
Bacterial killing sites: DD-ligase, DD-adding enzyme and DD-peptidase.

The Royal Society of Chemistry, Exeter. 1989.
Symposium on chemical and biochemical problems in molecular recognition.
Structural relations between penicillin-binding enzymes.

American Society for Microbiology. New Orleans. 1989.
Symposium on evolution, structure, and function of ß-lactamases.
Structural relations between penicillin-binding enzymes.

Harvard University Medical School
Department of Biological Chemistry and Molecular Pharmacology. l989.
Structure studies of enzymes of cell wall synthesis.

Beecham Pharmaceuticals Research Division, Betchworth, Surrey, UK, l989.
Crystallography of penicillin-binding proteins.

University of Missouri-Rolla, Department of Chemistry, l989.
Crystallography of proteins with application to drug design.

University of Massachusetts Medical Center, Department of Pharmacology, l989.
Biophysical studies of drug binding enzymes and vancomycin.

National Research Council (Canada), Division of Biological Sciences, Ottawa, l989.
X-ray structure analysis of ß-lactam recognizing enzymes.

Glaxo Group Research Ltd, Medicinal Chemistry, UK, l990.
Penicillinase and cell wall synthesizing enzymes.

SUNY at Buffalo, Department of Medicinal Chemistry, l990.
Symposium on Enzyme Structure and Mechanism as a Basis for Drug Design.
Comparison of penicillin-binding proteins.

Canadian Society for Chemistry, Halifax, N.S. 1990.
Conserved residues and their role in penicillinase catalysis and structure.

Drug Information Association, Hilton Head Island, S.C. 1991.

Symposium on Research Perspectives in Structural Biology and Chemistry.
The design of ß-lactams based on enzyme binding sites.

University of Cinncinati, Department of Chemistry. 1991.
The interaction of penicillins with penicillinase enzyme.

Ohio State University, Biotechnology Center, Columbus, 1991.
Crystallographic studies of bacterial drug targets, especially penicillin-binding enzymes.

Harvard University Medical School
Department of Biological Chemistry and Molecular Pharmacology. 1991.
The role of water molecules in the structure and function of penicillinase.

Wayne State University, Department of Chemistry, Detroit, MI, 1992.
Inhibition of ß-lactamase by clavulanic acid: mechanism from tertiary structure analysis of the enzyme.

Fifth ß-Lactamase Workshop, Holy Island, England, 1992.
A structural basis for understanding the activity of the new SHV and TEM mutants.

Eli Lilly Company, Indianapolis, IN, 1992.
Natural and engineered mutants of ß-lactamase: correlations between structure and altered properties.

Royal Society of Chemistry
International Symposium on Chemistry of Anti-Infective Agents, Cambridge, UK. 1992.
Plenary Lecture. Crystallography of penicillin-binding enzymes.

Wesleyan University, Department of Chemistry, 1992.
Mode of action of clavulanate inhibitor on ß-lactamase enzyme.

American Society for Microbiology, 32nd Interscience Conference on Antimicrobial Agents and Chemotherapy, Anaheim, CA 1992. Session on Evolution of ß-Lactamases. Invited lecture:
ß-lactamase mutants: Correlations between altered properties and tertiary structure.

VA Hospital and Case Western Reserve University, Cleveland, OH
Departments of Infectious Diseases and Biochemistry, 1993.
Understanding the new extended-spectrum ß-lactamase mutants.

SmithKline Beecham, Betchworth, England, 1993. The interaction of class A and C ß-lactamases with mechanism-based inhibitors of the clavulanate type.

The City University of New York, Graduate Center and Lehman College, 1993.
Applications of Crystallography to Antibacterial Drug Design. Sigma Xi lecturer.

American Crystallographic Association annual meeting, Albuquerque, NM, 1993.
New Structures session. Enzymes of bacterial drug resistance: The structure of the cephalosporinase from the *ampC* gene of *Enterobacter cloacae* P99 at 2 Å resolution.

The Albany Conference on Molecular Mechanisms of Drug Resistance, Albany, NY, 1993.
3D structure of ß-lactamases: Understanding their inhibition and mutation.

McMaster University Medical Center, Department of Biochemistry, Hamilton, Ont. 1993.

X-ray structures of bacterial enzymes interacting with b-lactams and vancomycin.

Schering-Plough Research Institute, Kenilworth, NJ. 1993.
The binding of cephalosporins to extended-spectrum ß-lactamases of the SHV family.

Merck Research Laboratories, Rahway, NJ. 1994.
Enzymes of bacterial drug resistance: ß-lactamases, DD-peptidases, and DD-ligase.

Schering-Plough International, Future Horizons in Antibiotic Therapy, Mijas, Spain, 1994.
Atomic-level perspectives of resistance mechanisms.

Gordon Research Conference (Diffraction Methods in Molecular Biology), 1994. Vancomycin resistance: A ternary complex of a D-amino acid ligase with ATP and a phosphinate inhibitor.

American Chemical Society national meeting, Washington DC, 1994.
Division of Biological Chemistry symposium on New Mechanisms and Targets in Antimicrobial Drug Resistance. An atomic-level view of vancomycin resistance.

SmithKline Beecham Pharmaceuticals, King of Prussia, PA, 1994.
Enzymic basis of ß-lactam and vancomycin resistances: X-ray results in 3D.

Brown University, Department of Chemistry, 1995.
Mechanisms of bacterial drug resistance. X-ray structural results in 3D.

University of Montreal School of Medicine, Department of Biochemistry, 1995.
The use of x-ray crystallography to understand drug/enzyme interactions.

Sixth ß-lactamase Workshop, Holy Island, England,.1995.
Structure of a cefotaxime complex of DD-peptidase reveals basis of mutations in low-affinity PBPs and in extended-spectrum ß-lactamases.

Lepetit Research Center, Merion Merrill Dow, Milan, Italy, 1995.
Inhibition of D-ala:D-ala ligase by phoshonates and phosphinates.

Keystone Symposium on Molecular Basis for Drug Resistance in Bacteria, Parasites and Fungi. Park City, Utah, 1996.
Three dimensional structure of ß-lactamases: Is it possible to understand natural mutations providing extended substrate spectrum and inhibitor resistance?

International Congress on Antimicrobial Agents & Chemotherapy (Amer. Soc. Microbiology), New Orleans, 1996.
Session chair and state-of-the-art lecturer: ß-Lactamases: Structure-activity relationships.

Shionogi BioResearch Corp., Lexington, MA, 1997.
Enzymes of bacterial vancomycin resistance.

American Society for Microbiology national meeting, Atlanta, GA, 1998.
Speaker in colloquium on Structure-based Therapeutics. Structural studies of bacterial cell wall enzymes.

ArQule Inc., Medford, MA, 1998. The enzymology of vancomycin resistance.

International Union of Crystallography 18th Congress, Glasgow, Scotland. 1999. Structure of the SHV-1 ß-lactamase and its complex with tazobactam (poster).

International Congress on ß-Lactamases. L'Aquila, Italy. 1999.
Comparison of SHV-1 and TEM-1 ß-lactamase structures. Also, member of Scientific Organizing Committee.

University of Massachusetts Medical School, Department of Biochemistry and Molecular Biology, 1999. Crystallographic structures of enzymes which are the cause of bacterial antibiotic resistance.

Interscience Conference on Antibacterial Agents and Chemotherapy, San Francisco, 1999.
1) Symposium on Cephalosporinases. Crystallographic comparison of two class C ß-lactamases with differing specificity profiles.
2) Moderator, Session on Antibiotic Resistance Enzymes. Structure of the D-ala:D-lactate ligase of *Leuconostoc mesenteroides*, and organism with intrinsic vancomycin resistance.

Southern Methodist University, Department of Chemistry, Dallas, TX, 1999.
Mechanisms of enzymes which inactivate ß-lactam antibiotics.

Wyeth-Ayerst Research (Lederle Laboratories), Pearl River, NY, 2000.
The inhibition mechanism of tazobactam with class A ß-lactamases.

Northwestern University Medical School, Department of Pharmacology and Biological Chemistry, Chicago, IL, 2000.
Enzymes of vancomycin and ß-lactam resistance: a 3D slide presentation of crystallographic structures.

National Institutes of Health, Bethesda, MD, 2000.
Origin and mechanism of bacterial enzymes of antibiotic resistance.

University of Connecticut, Department of Chemistry, Storrs, CT, 2001.
The use of x-ray crystallography to study the structure and function of enzymes.

Pfizer Central Research, Groton, CT, 2002
Structure and mechanism of enzymes of vancomycin and ß-lactam resistance: a 3D slide presentation of crystallographic structures.

Eighth ß-Lactamase Workshop, Holy Island, England, 2002. a) Very high resolution (0.9 Å) structure of SHV-2, an extended-spectrum class A ß-lactamase; b) Structure of an ampicillin acyl intermediate with GC-1, an extended-spectrum class C ß-lactamase; c) Structure of OXA-1, a monomeric class D ß-lactamase.

American Crystallographic Association annual meeting, San Antonio, TX, 2002. A class A ß-lactamase at very high resolution (0.9 Å).

Columbia University Biophysics Program, New York, NY, 2002. Crystallographic structure and catalytic mechanism of enzymes of vancomycin and ß-lactam resistance.

Veterans Administration Hospital and Case Western Reserve University School of Medicine, Cleveland, 2004. Origin and mechanisms of bacterial vancomycin and beta-lactam resistance.

University of Vermont, Department of Molecular Physiology and Biophysics, Burlington, VT, 2004. Origin and mechanisms of bacterial enzymes of vancomycin and beta-lactam resistance.

Society for General Microbiology (Britian), Symposium on Antibiotic Resistance, Heriot-Watt University, Edinburgh, Scotland, 2005. Serine beta-Lactamases: X-ray structures, mechanism, inhibition, and mutation.

Interscience Conference on Antibacterial Agents and Chemotherapy, San Francisco, 2006.
Convenor and chair of Symposium entitled: Beta-Lactamases: Structure meets function in the new millennium.

University of Connecticut, Department of Chemistry, 2007.
Molecular origins and chemical mechanisms of enzymic resistance to antibacterials of the glycopeptide and beta-lactam families.

Tenth Beta-Lactamase Workshop, Eritria, Greece, 2008.
Before Our Time: Early ß-Lactamase Papers and the People Who Wrote Them.