Curriculum Vitae
List of Publications
and Research Funding

Shahriar Mobashery

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Date of Birth: May 17, 1958

Education:

University of Southern California, Los Angeles, California
B.S. Biological Sciences, 1980
B.S. Chemistry, 1981

University of Chicago, Chicago, Illinois
Ph.D. Chemistry, 1985

Experience:

Predoctoral Research; University of Southern California, Department of Chemical Engineering, Professor T.F. Yen's laboratory, 1979-1981.

University of Chicago, Department of Chemistry, Professor Michael Johnston's laboratory, 1981-1985.

Postdoctoral Research; Rockefeller University, Laboratory of Bioorganic Chemistry and Biochemistry, the late Professor Emil Thomas Kaiser's laboratory, 1986-1988.

Assistant Professor; Department of Chemistry, Wayne State University, 1989-1994.

Associate Professor; Department of Chemistry, Wayne State University, 1994-1997.

Professor; Department of Chemistry, Wayne State University, 1997-2003.

Professor; Departments of Pharmacology and Biochemistry and Molecular Biology, Wayne State University, 2000-2003.

Chair; Division of Biochemistry of the Department of Chemistry, 1996-2000.

Director, Institute for Drug Design, 2000-2003.

Navari Family Professor in Life Sciences; Department of Chemistry and Biochemistry; University of Notre Dame, 2003-present.

Membership in Professional Societies:

American Chemical Society
American Association for Advancement of Science
American Society for Microbiology
Sigma Xi
American Society for Biochemistry and Molecular Biology
New York Academy of Sciences
The Protein Society

Honors and Awards:

The Outstanding Senior Recognition Award, University of Southern California, 1980 and 1981
Sigma Xi Award, University of Southern California, 1981
The Rockefeller Postdoctoral Fellowship, 1986-1987
The National Institutes of Health Postdoctoral Fellowship, 1987-1988
The Jane Coffin Child Postdoctoral Fellowship, 1987 (declined)
Award of the Lectureship of the Society of Synthetic Organic Chemistry (Japan), 1995
Career Development Chair Award, WSU, 1996
Award of Excellence in Teaching, 1997
Charles H. Gershenson Distinguished Faculty Fellow, 1999-2001
Honorary Charter Member of the Argentinian Society for Organic Chemistry, 2003-present
Fellow of the American Academy for the Advancement of Science (AAAS), elected 2007
Astellas USA Foundation Award of the American Chemical Society, 2007
Research Achievement Award, University of Notre Dame, 2012
Fellow, Science Without Borders, Brazil, 2014-2016
BioCrossroads First Place New Venture Award, 2018 (with Mayland Chang and Trung Nguyen)
The Emil Thomas Kaiser Award of The Protein Society, 2019

Professional Activities:

Consultant, Salk Institute Biotechnology/Industrial Associates (SIBIA), 1989-1992, Affymax Corp., 1996-1998, Procter & Gamble Pharmaceuticals, 1997-1998, Aurora Biosciences Corp., 1998-1999, Guilford Pharmaceutical Co., 2000-2002, NewBiotics, Inc., 2000-2003, Rigel, Inc., 2003-2004. Cubist Pharmaceutical Co., 2012. Consultant to law firms 1993-present. Achaogen, 2018-2019.

Editorial Board Member of *Pharmaceutical and Medicinal Chemistry,* 1995-2014*, J. Antibiot.,* 1998-2006 and 2012-present*, Letters in Drug Design and Discovery*, 2002-2010; *Open Organic Chemistry Journal*, 2006-2010. *Antimicrob. Agents Chemother.,* 1999-2013. *Cancer Management and Research*, 2008-2015. *Microbial Drug Resistance*, 2009-2017. *J. Biol. Chem.*, 2012-2017. *Bioorganic Chemistry*, 2000-2014; *Current Organic Synthesis*, 2002-present, *Lett. Org. Chem.*, 2002-present; *Mini Reviews in Organic Chemistry*, 2002-present. *Chemical Biology & Drug Design*, 2006-present. *ACS Infectious Diseases*, 2014-present.

Scientific Advisory Board, NewBiotics, Inc. 2000-2003.

Panel Member, NIH Summit on Development of Infectious Diseases Therapeutics, September 2000.

Panel Member, NIH Summit on Development of Infectious Diseases Therapeutics, August 2004.

Section Co-Editor, *Current Opinion in Chemical Biology*, 2003.

American Cancer Society, Advisory Committee on Biochemistry and Endocrinology (Study Section), 1994-1996, 1999-2000.

Member, NIH Bioorganic and Natural Products (BNP) Study Section (became the SBC-B Study Section), 2001-2005.
Member, NIH Drug Discovery and Mechanisms of Antimicrobial Resistance (DDR) Study Section, 2009-2012.
Member, NIH Macromolecular Structure and Function A (MSFA) Study Section, 2018-present.

Ad hoc reviewer for the National Science Foundation, National Institutes of Health, Department of Veterans Affairs, American Chemical Society (Petroleum Research Fund), French Ministry of Research, Swiss National Science Foundation, Israeli Science Foundation, Minnesota Sea Grant Program, Medical Research Council of the United Kingdom, Biotechnology and Biological Sciences Research Council (of the UK), Engineering Research Council of Canada, Health Research Board of Ireland, Netherlands Organisation for Scientific Research (NWO), Natural Sciences and Engineering Research Council of Canada (NSERC), Research Grants Council (RGC) of Hong Kong, Health Research Borad of Ireland, US-Israel Binational Science Foundation, National Science Foundation of Belgium, Japan Society for the Promotion of Science (JSPS), Portuguese Foundation for Science and Technology (FCT), Agency for Science, Technology and Research (A*STAR) Biomedical Research Council (BMRC) of Singapore, U.S.-Israel Binational Science Foundation, French Research Agency (ANR), The Welcome Trust, The MacArthur Foundation, Canadian Institutes of Health Research (CIHR), Indiana CTSI, French National Research Agency (ANR), Indiana Spinal Cord and Traumatic Brain Injury Research (ISCTBIR), The Sir Henry Wellcome Postdoctoral Fellowships, National Science Centre of Poland, L'Agence Nationale de la Recherche (France), South African Medical Research Council, Health Research Council of New Zealand, European Research Council, Killam Research Fellowship (Canada).

Ad hoc reviewer for the following journals (1989-present): *J. Am. Chem. Soc.*, *Proc. Nat. Acad. Sci. U.S.A., Biochemistry*, *Chemistry & Biology, Tetrahedron*, *Tetrahedron Lett.*, *Bioorg. Med. Chem*., *Bioorg. Med. Chem . Lett., J. Med. Chem.*, *J. Biol. Chem*., *J. Biomol. Struc. Dynam*., *J. Org. Chem*., *Proteins: Structure, Function, and Genetics*, *Pharm. Med. Chem*., *J. Chem. Soc. Chem. Comm*., *Antimicrob. Agents Chemother*, *Bioorganic Chemistry, Arch. Biochem. Biophys*, *Protein Engineering, Molecular Medicine Today, J. Antimicrob. Chemother, Organic Prep. Proc. Int*., *Eur. J. Biochem., African J. Biotech., Archives of Biochemistry and BiophysicsJ. Bacteriol., Protein Science, Brit. J. Cancer*, *J. Mol. Biol*., *Medical Principles and Practice, J. Mol. Biol., Biochem. Biophys. Acta*, *Org. Lett., Microbiology, J. Phys. Chem.*, *Inorgan. Chem*., *Molec. Micro*., *ChemBioChem. , Structure, Biochimica et Biophysica Acta, FEMS Micro. Lett., Org. Biomolec. Chem., International Union of Biochemistry and Molecular Biology Life, Biomacromolecules, Langmuir, ACS Chem. Biol., BBA - Proteins and Proteomics, Eur. J. Org. Chem., Nature Reviews Drug Discovery, Natue Nanotechnology, Chemical Biology & Drug Design, Trends in Microbiology, ACS Journal of Combinatorial Chemistry, Int. J. Cancer, Eur. J. Med. Chem., J. Infection, Perspect. Med. Chem., Applied and Environmental Microbiology, Angewandte Chemie, Lett. Drug Design and Discovery, Biochem. Res. International, ChemMedChem, Synthesis, PLoS One, Biophysical J., J. Royal Soc. Interface, Acc. Chem. Res., Expt. Rev. Anti-infec. Ther., J. Pharm. Pharmacol., Future Med. Chem., International J. Mol. Sci.; Cancer Biol & Therapy; Computers in Biology, Chem. Rev. and Medicine; Prot. & Pept. Lett., Med. Chem. Comm., Chemical Science*; *Org. & Biomol. Chem*.; *Chemotherapy*; *Med. Chem. Comm*.; *Annu. Rev. of Biochem*.; *Int. J. Med. Chem.*; *Computers Biol. Medicine*; *Scientific Reports*; *IUBMB Life*; *Molecules; ACS Applied Materials & Interfaces, Appl. Biochem and*

Biotech., *J. Biol. Eng*., *J. Chem. Theory & Comp*., *Global Policy*; *Phosphorus, Sulfur, and Silicon and the Related Elements*; *Philosophical Transactions B*; *Microbiol. Open*; *Chemical Record*; *J. Biol. Phys.; Drug Design, Development and Therapy; J. Braz. Chem. Soc.*; *Front. Microbiol*.; *Cell Chem. Biol*.; *Protein & Peptide Lett*.; *Springer Plus*; *Cell Chemical Biology*; *Microbial Cell Factories*; *eLife; Expt. Rev. Clinic. Parmacol.*; *J. Enz. Inh. Med. Chem*.; *Gene Report*; *J. Infec. Pub. Health*; *Genome Biol. Evolu*.; *J. Complem. Integ. Med.; Braz. J. Phram. Sci*.; *Sci. Report*; *Nat. Chem*.; *Asian J. Org. Chem*.; *Sci. Trans. Med*.; *Cell Chem. Biol*.; *J. Infect. Pub. Health*; *ACS Applied Materials & Interfaces; SAR and QSAR in Environmental Research; Curr. Op. Drug Metabol.*; *Microb. Pathogenesis*; *EMBO J.*; *J. Molec. Medicine*; *J. Molecular Graphics and Modelling; J. Infect. Pub. Health*; *SLAS Discovery*; *Cell Reports*; *Chem. Rev*.; *The Cell Surface*; *Virulence*; *Gene*; *Nat. Micro*.; *J. Cell. Molec. Med*.; *ACS App. Mat. Interf.* and *J. Antibiot.*

ACS Applied Materials & Interfaces

Member, Site Visit Team for the National Cancer Institute, May 1995.
Chairman, The Enzyme Mechanisms Section of the XII Midwest Enzyme Chemistry Conference, October 1992, Chicago, Illinois
Chairman, The Enzyme Mechanisms Section of the Second International Symposium on Bioorganic Chemistry, Fukuoka, Japan, June 1993
Organizer and Chairman, Symposium on "Rational Drug Design and Enzyme Mechanisms", the joint 26th Central Regional/27th Great Lakes Regional ACS meeting, Ann Arbor, Michigan, June1-3, 1994
Organizer and Chairman, Symposium on "Recent Developments in Antibacterials and Mechanisms of Resistance", The Central ACS meeting, Midland, Michigan, May 1997
Organizer, Symposium on "Recent Developments in Antibacterials and Mechanisms of Resistance", Wayne State University, May 1997
Organizer, XVIII Midwest Enzyme Chemistry Conference, Evanston, Illinois, October 1998.
Organizer, Symposium on β-Lactamases, the National Meeting of the American Society for Microbiology, Orlando, Illinois, Florida, 2001.
Who's Who in America, 2002-present.
Who's Who in the World, 2002-present.
Who's Who in Science and Engineering, 2003-present.
Who's Who in Sciences Higher Education (WWSHE), 2004-present.
Organizing Committee Member, Meeting of the International Union of Biochemistry and Molecular Biology (IUBMB), Toronto, Canada, 2003.
Advisory Board Member of the Department of Defense Center of Excellence in Breast Cancer at Wayne State University, 2002-2003.
Co-Editor (with John Richards) for the issue of *Curr. Opin. Chem. Biol.* on Complex Biological Systems (2003).
Co-Editor (with Steve Brickner) for the issue *of Curr. Opin. Microbiol.* on Antibiotics (2007).
Co-Editor (with Didier Mazel) for the *Curr. Opin. Microbiol*., Antimicrobials Section (2012).
Organizer, Conference entitled "Novel Antibiotics, Old and New Targets", June 2008.
Advisory Board Member, Faculty of 1000 Biology, 2008-2010.
Organizer, Symposium entitled "Early Events in Cell Wall Recycling", the 110th American Society for Microbiology General Meeting, San Diego, California, 2010.

Co-founder (with Mayland Chang) of Nupromed, LLC, 2009-present.
Co-Chair (with Jared Silverman), Gordon Research Conference on New Antibacterial Discovery & Development, 2014.
Scientific and Clinical Advisory Board, Valevia Pharmaceuticals, Binningen, Switzerland; 2010-2012.
Board of Directors, Cancer Drug Delivery Research Foundation, 2012-present.
Member, Board of Professors, University of Siena, Italy, 2013-present.
Co-founder (with Mayland Chang) of SalvePeds, LLC, 2017-present.

Publications:

Google Scholar: cited >22,500; H-index 73; i10-index 307

1. Mobashery, S.; Johnston, M. A New Approach to the Preparation of N-Carboxy-α-Amino Acid Anhydrides, *J. Org. Chem.* **1985**, *50*, 2200.

2. Mobashery, S.; Lerner, S. A.; Johnston, M. Conscripting β-Lactamase for Use in Drug Delivery. Synthesis and Biological Activity of a Cephalosporin C_{10}-Ester of an Antibiotic Dipeptide, *J. Am. Chem. Soc.* **1986**, *108*, 1685.

3. Mobashery, S.; Johnston, M. Reactions of *Escherichia coli* TEM β-Lactamase with Cephalothin and with C_{10}-Dipeptidyl Cephalosporin Esters, *J. Biol. Chem.* **1986**, *261*, 7879.

4. Mobashery, S.; Johnston, M. A Novel Approach to Deacylation of Ceph-3-em Esters, *Tetrahedron Lett.* **1986**, *27*, 3333.

5. Mobashery, S.; Johnston, M. Preparation of Ceph-3-em Esters Unaccompanied by $\Delta^3 \rightarrow \Delta^2$ Isomerization of the Cephalosporin, *J. Org. Chem.* **1986**, *51*, 4723.

6. Mobashery, S.; Johnston, M. Inactivation of Alanine Racemase by β-Chloro-L-Alanine Released Enzymatically from Amino Acid and Peptidyl C_{10}-Esters of Deacetylcephalothin, *Biochemistry* **1987**, *26*, 5878.

7. Mobashery, S.; Lerner, S.; Johnston, M. Monitoring β-Lactamase Activity *In Vivo* by ^{13}C Nuclear Magnetic Resonance Spectroscopy, *Antimicrob. Agents Chemother.* **1988**, *32*, 1196.

8. Mobashery, S.; Kaiser, E. T. Identification of Active Site Amino Acid Residues in the Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by Peptide-Based Affinity Inactivators, *Biochemistry* **1988**, *27*, 3691.

9. Radziejewski, C.; Miller, W. T.; Mobashery, S.; Goldberg, A.; Kaiser, E. T. Purification of Recombinant *v-src* Gene-Product from *Saccharomyces Servisiae* and Analysis of Peptidic Substrates to the Enzyme, *Biochemistry* **1989**, *28*, 9047.

10. Mobashery, S.; Ghosh, S.; Tamura, S. Y.; Kaiser, E. T. Design of an Effective Mechanism-Based Inactivator for a Zinc Protease, *Proc. Natl. Acad. Sci. U. S. A.* **1990**, *87*, 578.

11. Mobashery, S.; Doughty, M.; Kaiser, E. T. Inactivation of the Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by a Peptide-Based Affinity Inactivator, *Biopolymers* **1990**, *29*, 131.

12. Ghosh, S. S.; Wu, Y. Q.; Mobashery, S. Peptidic Mechanism-Based Inactivators for Carboxypeptidase A, *J. Biol. Chem.* **1991**, *266*, 8759.

13. Wu, Y. Q.; Mobashery, S. Targeting Renal Dipeptidase (Dehydropeptidase I) for Inactivation by Mechanism-Based Inactivators, *J. Med. Chem.* **1991**, *34*, 1914.

14. Goren, Z.; Heeg, M. J.; Mobashery, S. Facile Chloride Substitution of Activated Alcohols by Triphosgene: Application to Cephalosporin Chemistry, *J. Org. Chem.* **1991**, *54*, 7186.

15. Wilder, R.; Mobashery, S. The Use of Triphosgene in Preparation of N-Carboxy-α-Amino Acid Anhydrides, *J. Org. Chem.* **1992**, *57*, 2755.

16. Zafaralla, G.; Mobashery, S. Facilitation of the $\Delta^2 \rightarrow \Delta^1$ Pyrroline Tautomerization of Carbapenem Antibiotics by the Highly Conserved Arginine-244 of Class A β-Lactamases During the Course of Turnover, *J. Am. Chem. Soc.* **1992**, *114*, 1505.

17. Zafaralla, G.; Manavathu, E. K.; Lerner, S. A.; Mobashery; S. Elucidation of the Role of Arg-244 in the Turnover Processes of Class A β-Lactamases, *Biochemistry* **1992**, *31*, 3847.

18. Ghosh, S. S.; Said-Nejad, O.; Roestamadji, J.; Mobashery, S. The First Mechanism-Based Inactivator for Angiotensin-Converting Enzyme, *J. Med. Chem.* **1992**, *35*, 4175.

19. Imtiaz, U; Billings, E.; Knox, J. R.; Manavathu, E. K., Lerner, S. A.; Mobashery, S. Inactivation of Class A β-Lactamases by Clavulanic Acid: The Role of Arginine-244 in a Proposed Nonconcerted Sequence of Events, *J. Am. Chem. Soc.* **1993**, *115*, 4435.

20. Zafaralla, G.; Mobashery, S. Evidence for a New Enzyme-Catalyzed Reaction Other Than β-Lactam Hydrolysis in Turnover of a Penem by the TEM-1 β-Lactamase, *J. Am. Chem. Soc.* **1993**, *115*, 4962.

21. Levy, O. E.; Taibi, P.; Mobashery, S.; Ghosh, S. S. A Mechanism-Based Inactivation Study of Neutral Endopeptidase 24.11, *J. Med. Chem.* **1993**, *36*, 2408.

22. Imtiaz, U.; Manavathu, E. K.; Lerner, S. A.; Mobashery; S. A Critical Hydrogen Bond by Ser-235 for the Cephalosporinase Activity of the TEM-1 β-Lactamase, *Antimicrob. Agents Chemother.* **1993**, *37*, 2438.

23. Siregar, J. J.; Lerner, S. A.; Mobashery, S. Purification and Characterization of Aminoglycoside 3'-Phosphotransferase Type II, and Kinetic Comparison with a New Mutant Enzyme, *Antimicrob. Agents Chemother.* **1994**, *38*, 641.

24. Grapsas, I.; Cho, Y. J.; Mobashery, S. N-(*t*-Butoxycarbonyloxy)-5-norbornene-*endo*-2,3-dicarboximide, A Reagent for the Regioselective Introduction of the *t*-Butoxycarbonyl (BOC) Protective Group at Unhindered Amines: Application to Aminoglycoside Chemistry, *J. Org. Chem.* **1994**, *59*, 1918.

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26. Imtiaz, U.; Billings, E. M.; Knox, J. R.; Mobashery, S. A Structure-Based Analysis of the Inhibition of Class A β-Lactamases by Sulbactam, *Biochemistry* **1994**, *33*, 5728.

27. Kocs, R.; Roestamadji, J.; Mobashery, S. A Convenient Triphosgene-Mediated Synthesis of Symmetric Carboxylic Acid Anhydrides, *J. Org. Chem.***1994**, *59*, 2913.

28. Ghosh, S. S.; Said-Nejad, O.; Mobashery, S. A Rational Approach for the Design of Mechanism-Based Inactivators for Zinc Proteases, *Peptides: Chemistry, Structure and Biology*, Hodges, R. S. and Smith, J. A. (Eds.), **1994**, 607.

29. Tanaka,Y.; Grapsas, I.; Dakoji, S.; Cho, Y.J.; Mobashery, S. Conscripting the Active-Site Zinc Ion in Carboxypeptidase A in Inactivation Chemistry by a New Type of Irreversible Enzyme Inactivator, *J. Am. Chem. Soc.* **1994**, *116*, 7475.

30. Roestamadji, J.; Mobashery, S. Bis(trichloromethyl)carbonate (triphosgene), *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995** , 575.

31. Grapsas, I.; Mobashery, S. Glyoxylyl Chloride *p*-Toluenesulfonyl Hydrazone, *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 2624.

32. Taibi, P.; Mobashery, S. (Methylcarboxysulfamoyl)triethylammoium Hydroxide (Burgess Reagent) *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 3345.

33. Grapsas, I.; Mobashery, S. *t*-Butoxycarbonylimidazole, *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 835.

34. Grapsas, I.; Mobashery, S. 1-*t*-Butoxycarbonyl-1,2,4-triazole, *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 843.

35. Grapsas, I.; Mobashery, S. 1-N-(*t*-Butoxycarbonyl)-1H-benzotriazole-3-N-oxide, *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 833.

36. Siregar, J.J.; Mobashery, S. Methoxycarbonylsulfamoyl chloride, *Encyclopedia of Reagents for Organic Synthesis*, Paquette, L. A. (Editor-in-Chief), **1995**, 3344.

37. Roestamadji, J.; Grapsas, I.; Mobashery, S. Mechanism-Based Inactivation of Bacterial Aminoglycoside 3'-phosphotransferases, *J. Am. Chem. Soc.* **1995**, *117*, 80.

38. Bulychev, A.; Massova, I.; Lerner, S.A.; Mobashery, S. Penem BRL 42715: An Effective Inactivator for β-Lactamases, *J. Am. Chem. Soc.* **1995**, *117*, 4797.

39. Bulychev, A.; O'Brien, M.E.; Massova, I.; Teng, M.; Gibson, T.A.; Miller, M.J.; Mobashery, S. Potent Mechanism-Based Inhibition of the TEM-1 β-Lactamase by Novel N-Sulfonyloxy β-Lactams, *J. Am. Chem. Soc.* **1995**, *117*, 5938.

40. Taibi, P.; Mobashery, S. Mechanism of Turnover of Imipenem by the TEM β-Lactamase Revisited, *J. Am. Chem. Soc.* **1995**, *117*, 7600.

41. Miyashita, K.; Mobashery, S. Mechanistic Support for the Stepwise Process for Inactivation of Class A β-Lactamases by Clavulanate, *Bioorg. Med. Chem. Lett.* **1995**, *5*, 1043.

42. Fridman, R.; Toth, M.; Pena, D.; Mobashery, S. Activation of Progelatinase B (MMP-9) by Gelatinase A (MMP-2), *Cancer Res.* **1995**, *55*, 2548.

43. Vakulenko, S. B.; Taibi, P.; Toth, M.; Mobashery, S.; Lerner, S. A. Effect of Asp-179 Mutations in TEMpUC19 β-Lactamase on Susceptibility to β-Lactamase, *Antimicrob. Agents Chemother.* **1995**, *39*, 1878.

44. Siregar, J.J.; Miroshnikov, K.; Mobashery, S. Purification, Characterization and Investigation of Mechanism of Aminoglycoside 3'-Phosphotransferase Type Ia, *Biochemistry* **1995**, *34*, 12681.

45. Roestamadji, J.; Grapsas, I.; Mobashery, S. Loss of Individual Electrostatic Interactions between Aminoglycoside Antibiotics and Resistance Enzymes as an Effective Means to Overcoming Bacterial Drug Resistance, *J. Am. Chem. Soc.* **1995**, *117*, 11060.

46. Miyashita, K.; Massova, I.; Taibi, P.; Mobashery, S. Design, Synthesis and Evaluation of a Potent Mechanism-Based Inhibitor for the TEM β-lactamase with Implications for the Enzyme Mechanism, *J. Am. Chem. Soc.* **1995**, *117*, 11055.

47. Miyashita, K.; Massova, I.; Mobashery, S. Quantification of the Extent of Attenuation of the Rate of Turnover Chemistry of the TEM-1 β-Lactamase by the α-1*R*-Hydroxyethyl Group in Substrates, *Bioorg. Med. Chem. Lett.*, **1996**, *6*, 319.

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51. Taibi,P.; Massova, I.; Vakulenko, S.B.; Lerner, S.A.; Mobashery, S. Evidence for Structural Elasticity of β-Lactamases in the Course of Catalytic Turnover of the Novel Cephalosporin Cefepime, *J. Am. Chem. Soc.* **1996**, *118*, 7441.

52. Massova, I.; Martin, P.; de Mel, S.; Tanaka, Y.; Edwards, B.; Mobashery, S. Crystallographic and Computational Insight on the Mechanism of Zinc-Ion-Dependent Inactivation of Carboxypeptidase A by 2-Benzyl-3-Iodopropanoate, *J. Am. Chem. Soc.* **1996**, *118*, 12479.

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54. Massova, I.; Fridman, R.; Mobashery, S. Structural Insights into the Catalytic Domains of Human Matrix Metalloprotease-2 and Human Matrix Metalloprotease-9: Implications for Substrate Specificities, *J. Mol. Mod.* **1997**, *3*, 17.

55. Massova, I.; Mobashery, S. Molecular Bases for Interactions between β-Lactam Antibiotics and β-Lactamases, *Acct. Chem. Res.* **1997**, *30*, 162.

56. Bulychev, A.; Massova, I.; Miyashita, K.; Mobashery, S. Nuances of Mechanisms and Their Implications for Evolution of the Versatile β-Lactamase Activity: from Biosynthetic Enzymes to Drug Resistance Factors, *J. Am. Chem. Soc.* **1997**, *119,* 7619.

57. Olson, M. W.; Gervasi, D. C.; Mobashery, S.; Fridman, R. Kinetic Analysis for the Binding of the Latent and Active Forms of the Human Matrix metalloprotease-2 and -9 to TIMP-1 and TIMP-2, *J. Biol. Chem.* **1997**, *272*, 29975.

58. Massova, I.; Pirkle, H.; Edwards, B. F. P.; Mobashery, S. Insight into the Three-Dimensional Structure of Crotalase: Implications for Biological Activity and Substrate Specificity, *Bioorg. Med. Chem. Lett.* **1997**, *7*, 3139.

59. Massova, I; Mobashery, S. Kinship and Diversification of Bacterial Penicillin-Binding Proteins and β-Lactamases, *Antimicrob. Agents Chemother.* **1998**, *42*, 1.

60. Hsu-Chou, R. S. Y.; Mobashery, S.; Yen, T. F. Denitrogenation of Shale Oil by Oxime Formation from Pyrroles, *Energy Sources* **1998**, *20*, 857-866.

61. Massova, I.; Kotra, L. P.; Mobashery, S. Structural Insight into the Binding Motifs for Calcium Ion and the Non-Catalytic Zinc in Matrix Metalloproteases, *Bioorganic Med. Chem. Lett.* **1998**, *8*, 853.

62. Grapsas, I.; Mobashery, S. Synthetic Strategies for Regioselective Structural Modifications of Multifunctional Aminoglycoside Antibiotics, *Recent Res. Devel. in Organic Chem.* **1998**, *1*, 469.

63. Grapsas, I.; Massova, I.; Mobashery, S. ^{1}H-NMR Analysis of Copper-Aminoglycoside Complexes in Solution and Its Implications for Regioselective Modification of Multifunctional Aminoglycoside Antibiotics, *Tetrahedron* **1998**, *54*, 7705.

64. Vakulenko, S. B., Geryk, B.; Kotra, L. P.; Mobashery, S.; Lerner, S. A., Selection and Characterization of β-Lactam/β-Lactamase Inactivator-Resistant Mutants Following PCR Mutagenesis of the TEM-1 β-Lactamase Gene, *Antimicrob. Agents Chemother.* **1998**, *43*, 1542.

65. Massova, I.; Kotra, L. P.; Fridman, R.; Mobashery, S. Matrix Metalloproteases: Structures, Evolution and Diversification, *FASEB J.* **1998**, *12*, 1075.

66. Kotra, L. P.; Mobashery, S. β-Lactam Antibiotics, β-Lactamases, and Bacterial Resistance, *Bull. Pasteur Institute* **1998**, *96*, 139.

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20. Chang, M.; Mobashery, S. Acceleration of Diabetic Wound Healing. PCT/US2015/051252, filed 9/21/15; WO2016/044844, published March 26, 2016.

21. Chang, M.; Mobashery, S.; Ding, D. Compounds for the Treatment of Clostridium difficile infection. PCT/US2017/051185, filed September 12, 2017; WO2018/049404, published March 15, 2018.

Invited Lectures:

1. Purdue University, Department of Chemistry, Identification of Active Site Amino Acid Residues in Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by Peptide-Based Affinity Inactivators, Nov., 1987.

2. Washington University, Department of Chemistry, Identification of Active Site Amino Acid Residues in Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by Peptide-Based Affinity Inactivators, Nov., 1987.

3. Brandeis University, Department of Biochemistry, Identification of Active Site Amino Acid Residues in Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by Peptide-Based Affinity Inactivators, Nov., 1987.

4. Wayne State University, Department of Chemistry, Identification of Active Site Amino Acid Residues in Catalytic Subunit of Bovine Cyclic AMP-Dependent Protein Kinase by Peptide-Based Affinity Inactivators, Dec., 1987.

5. Salk Institute Biotechnology/Industrial Associates, Active Site Structures of Protein Kinases, Jan., 1989

6. Wayne State University, Department of Biochemistry, Design of Mechanism-Based Inactivators for Zinc Proteases, Feb., 1989.

7. Schering-Plough Corporation, New Designs for Aminoglycoside Drugs, July, 1989.

8. Wayne State University, Department of Pharmaceutical Chemistry, Conscripting Active Site Metals in Metalloproteases in the Chemistry of Mechanism-Based Inactivation., Oct., 1990.

9. Schering-Plough Corporation, Mechanisms of Resistance to β-Lactam and Aminoglycoside Antibiotics, July, 1991.

10. Department of Medicinal Chemistry, University of Michigan, Mechanisms of Turnover of Substrates and Irreversible Inactivation by Mechanism-Based Inactivators of Class A β-Lactamases, Ann Arbor, Michigan, October 1991.

11. Department of Biochemistry, Wayne State University, Mechanisms of Turnover of Substrates and Irreversible Inactivation by Mechanism-Based Inactivators of Class A β-Lactamases, Detroit, Michigan, January 1992.

12. Regeneron Pharmaceuticals, Inc., Mechanistic Processes of Class A β-Lactamases, Tarrytown, New York, March 1992.

13. The Fifth β-Lactamase Workshop, A Structure-Based Insight into the Inactivation Chemistry of Class A β-Lactamases by Clavulanate, Holy Island, England, April 1992.

14. Department of Chemistry, University of Cincinnati, Biochemical Basis for Bacterial Resistance to β-lactam Antibiotics, November 1992.

15. Department of Nutrition and Food Sciences, Wayne State University, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, November 1992.

16. Department of Chemistry, Wayne State University, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, November 1992.

17. The Upjohn Co., A Structure-Based Analysis of the Processes of the Class A β-Lactamases, February 1993.

18. Ajinomoto Co., β-Lacam Drug Resistance in Bacteria: Mechanistic Insight into the Processes of Class A β-Lactamases, Kawasaki, Japan, June 1993.

19. Ono Pharmaceutical Co., Conscripting the Catalytic Machinery of Enzymes in Development of Pharmaceuticals: Rational Design of the First Generation of Mechanism-Based Inactivators for Zinc Proteases, Osaka, Japan, June 1993.

20. Protein Engineering Research Institute, β-Lactam Drug Resistance in Bacteria: Mechanistic Insight into the Processes of Class A β-Lactamases, Osaka, Japan, June 1993.

21. Suntory Biomedical Institute, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, Osaka, Japan, June 1993.

22. Second International Symposium on Bioorganic Chemistry, Mechanistic Insight from Modeling on the Inactivation Chemistry of β-Lactamases by Clavulanate, Fukuoka, Japan, June 1993.

23. Department of Chemistry, Scripps Institute, Overcoming Resistance to β-Lactam Drugs, La Jolla, California, November 1993.

24. University of Detroit, Department of Chemistry, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, January 1994.

25. Wayne State University, Department of Pharmacology, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, January 1994.

26. Schering-Plough Corporation, Mechanisms of Resistance to β-Lactam and Aminoglycoside Antibiotics, January 1994.

27. Department of Biological Chemistry, University of Michigan, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, The Enzyme Discussion Group, February 1994.

28. University of California at Santa Cruz, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, Department of Chemistry, February 1994.

29. Department of Chemistry, University of Minnesota, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, March 1994.

30. The joint 26th Central Regional/27th Great Lakes Regional ACS meeting, Mechanism-Based Inactivation of Zinc Proteases, Ann Arbor, Michigan, June 1994.

31. Gordon Conference on Enzymes, Cofactors, and Metabolic Pathways, Overcoming Resistance to β-Lactam Drugs: Novel Strategies for Inhibition of β-Lactamases, New Hampshire, July 1994.

32. Department of Chemistry, State University of New York at Buffalo, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, September 1994.

33. Department of Chemistry, Michigan Technological University, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, September 1994.

34. American Society for Microbiology National Meeting, Prospect for the Use of β-Lactamase Inhibitors in Clinic for the Next 15 Years; Orlando, Florida, October 1994.

35. Department of Chemistry, Indiana University (Bloomington), A Structure-Based Analysis of the Processes of the Class A β-Lactamases, November 1994.

36. SmithKline-Beecham Pharmaceutical Co., A Structure-Based Analysis of the Processes of the Class A β-Lactamases, Brockham Park, UK, November 1994.

37. Department of Chemistry, University of Exeter, A Structure-Based Analysis of the Processes of the Class A β-Lactamases, Exeter, UK, November 1994.

38. Department of Biochemistry, University of Liège, Mecanismes de Resistance des β-Lactam Antibiotiques Causés par le TEM β-Lactamase, Liège, Belgium, November 1994.

39. Department of Chemistry, Ecole Supérieure de Chimie Industrielle de Lyon, Mecanismes de Resistance des β-Lactam Antibiotiques Causés par le TEM β-Lactamase, Lyon, France, November 1994.

40. Laboraroire de Pharmacologie et de Toxicologie Fondamentales, Centre National de la Recherche Scientifique, S., Mecanismes de Resistance des β-Lactam Antibiotiques Causés par le TEM β Lactamase, Toulouse, France, November 1994.

41. Cornell University School of Medicine, Molecular Basis for Bacterial Resistance to β-Lactam Antibiotics, New York, December 1994.

42. Department of Chemistry, Oakland University, Resistance to β-Lactam Antibiotics, January 1994.

43. The First International Workshop on Enzyme Inhibitor Design, Design of Mechanism-Based Enzyme Inactivators as Potential Pharmaceuticals, Pohang, Korea, February 1995.

44. Dong-A Pharmaceutical Co., Design of Mechanism-Based Enzyme Inactivators as Potential Pharmaceuticals, Seoul, Korea, February 1995.

45. The Sixth β-Lactamase Workshop, Holy Island, Novel Mechanism-Based Inhibitors for β-Lactamases, UK, April 1995.

46. Plenary Lecture, 13th Summer Symposium on Organic Synthesis, Mobashery, S., Design and Synthesis of Biologically Active Compounds, Fukuoka city, Japan, July 1995.

47. Kyoto Pharmaceutical University, Department of Medicinal Chemistry, Overcoming Resistance to Antibiotic, Kyoto, Japan, August 1995.

48. Osaka University, Faculty of Pharmaceutical Sciences, Overcoming Resistance to Antibiotic, Osaka, Japan, August 1995.

49. Suntory Institute for Bioorganic Research, Overcoming Resistance to Antibiotic, Osaka, Japan, August 1995.

50. Affymax Corp., Overcoming Resistance to Antibiotic, Santa Clara, California, September 1995.

51. 35th Interscience Conference on Antimicrobial Agents and Chemotherapy, Turnover of the Fourth-Generation Cephalosporin Cefepime by the TEM-1 β-Lactamase: Evidence for Conformational Flexibility of Enzyme, San Francisco, September 1995.

52. Department of Chemistry, Case Western Reserve University, Cleveland, Chemical Strategies for Overcoming Resistance to Antibiotics, Ohio, September 1995.

53. Pharmacia-Upjohn Co., Overcoming Resistance to Antibiotic, Kalamazoo, MI, November 1995.

54. International Chemical Congress of Pacific Basin Societies, Overcoming Resistance to Antibiotic, Honolulu, December 1995.

55. Wyeth-Ayerst Research/Lederle laboratories, Mechanisms of β-Lactamases and the Challenge of Inhibition, Pearl River, New York, March 1996.

56. School of Pharmaceutical Sciences, Beijing Medical University, The People's Republic of China, Mechanisms of β-Lactamases and the Challenge of Inhibition, May 1996.

57. National Laboratory of Natural and Biomimetic Drugs, Beijing Medical University, The People's Republic of China, Beta-lactamases: Evolution of a Versatile Bacterial Catalyst, May 1996.

58. Interscience Conference on Antimicrobial Agents and Chemotherapy, Mechanism of Deacylation for Class A β-Lactamases, New Orleans, Louisiana, September 1996.

59. Schering-Plough Corp., Overcoming Resistance to Antibiotic, Kenilworth, NJ, October 1996.

60. Sixteenth Midwest Enzyme Chemistry Conference, Chicago, Illinois, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic enzymes to Drug Resistance Factors, October 1996.

61. Case Western Reserve University, Department of Pharmacology, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic enzymes to Drug Resistance Factors, October 1996.

62. Stanford University, Department of Chemistry, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic enzymes to Drug Resistance Factors, November 1996.

63. University of Michigan at Dearborn, Overcoming Resistance to Antibiotic, November 1996.

64. Wayne State University, Department of Chemistry, Frontiers of Science Lecture Series, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, December 1996.

65. Affymax Corp., Santa Clara, California, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, December 1996.

66. McMaster University, Department of Biochemistry, Hamilton, Ontario, Canada, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, December 1996.

67. University of Waterloo, Department of Chemistry, Waterloo, Ontario, Canada, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, December 1996.

68. Schering-Plough Corp., Kenilworth, New Jersey, Cephalosporin-Aminoglycoside Conjoint Antibacterials, December 1996.

69. Southern Methodist University, Department of Chemistry, Dallas, Texas, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, January 1997.

70. University of Texas, Department of Chemistry, Arlington, Texas, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, January 1997.

71. Duke University, Department of Chemistry, Durham, North Carolina, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, January 1997.

72. Bristol-Myers Squibb, Wallingford, Connecticut, Bacterial β-lactamases: Nuances of Mechanisms and Challenge of Inhibition, March 1997.

73. Universität des Saarlandes, Department of Pharmaceutical Chemistry, Overcoming Resistance to Antibiotic, Saarbrücken, Germany, March 1997.

74. University of Bern, Department of Chemistry, Evolution of Versatile Bacterial Catalysts: From Biosynthetic enzymes to Drug Resistance Factors, Bern, Switzerland, April 1997.

75. Hoffmann-La Roche Pharmaceutical Co., Evolution of Versatile Bacterial Catalysts: From Biosynthetic enzymes to Drug Resistance Factors, Basel, Switzerland, April 1997.

76. Centre National de la Recherche Scientifique, Toulouse, France, Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic Enzymes to Drug Resistance Factors, April 1997.

77. University of Toledo, Department of Medicinal Chemistry, Bacterial β-lactamases: Nuances of Mechanisms and Challenge of Inhibition, April 1997.

78. Symposium on Antibacterial Drug Resistance and New Developments in Antibiotics, Wayne State University, "Enzymes of Drug Resistance", May 1997.

79. Gordon Conference on Bioorganic Chemistry, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors ", Andover, New Hampshire, June 1997.

80. Abbott Pharmaceutical Co., "Bacterial β-lactamases: Nuances of Mechanisms and Challenge of Inhibition, July 1997.

81. Procter & Gamble Pharmaceuticals, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors ", Cincinnati, Ohio, August 1997.

82. Notre Dame University, "Evolution of the Versatile β-lactam Hydrolase Activity: From Biosynthetic enzymes to Drug Resistance Factors", Notre Dame, Indiana, September, 1997.

83. Department of Biochemistry, WSU, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Detroit, MI, October 1997.

84. The Fifth International Symposium on Protease Inhibitors and Biological Control, "Computational Insight into Structures, Substrate Preference and Inhibition by Protein Inhibitors of Human Gelatinases", Brdo, Slovenija, October, 1997.

85. Department of Biochemistry, Albert Einstein College of Medicine, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", October 1997.

86. Consiglio Nazionale delle Ricerche, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Bologna, Italy, October 1997

87. Kresge Eye Institute, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Detroit, MI, November 1997.

88. Wyeth-Ayerst Research/Lederle laboratories"Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Pearl River, New York, January 1998.

89. Aurora Biosciences Corporation, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", San Diego, CA, March 1998.

90. Hoechst-Marion-Roussel Pharmaceutical Co, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Paris, France, March 1998.

91. Institut de Pharmacologie et de Biologie Structurale, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", Toulouse, France, March 1998.

92. Oxford University, The Centre for Molecular Sciences, "Bacterial β-lactamases: Nuances of Mechanisms and Challenge of Inhibition", Oxford, U.K., April 1998.

93. The Seventh β-Lactamase Workshop, "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", Holy Island, UK, April 1998.

94. Department of Pharmacology, Wayne State University, "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", April 1998.

95. Bristol-Myers Squibb, Wallingford, Connecticut, "Selection of Novel Resistance to Expanded-Spectrum β-Lactam Antibiotics", August 1998.

96. Symposium on *Unravelling the Biological and Pathological Functions of Proteolytic Enzymes*, Wayne State University School of Medicine, "Strategies for Inhibition of Proteases", October, 1998.

97. Schering Plough Corp., "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", November 1998.

98. Southern Illinois University, Department of Chemistry, "Evolution of the Versatile β-lactam Hydrolase Activity: from Biosynthetic enzymes to Drug Resistance Factors", January 1999.

99. Washington University, Department of Chemistry, "Antibiotics: The Twentieth-Century Miracle Drugs and How They Are Being Tarnished", January 1999.

100. Ohio State University of "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", April, 1999.

101. Georgia Institute of Technology, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", April, 1999.

102. International Meeting on β-Lactamase-Mediated Resistance: Molecular Aspects and Clinical Implications, L'Aquila, "Structural and Mechanistic Bases for Evolution of β-Lactamases", Italy, June 1999.

103. Department of Chemistry, Universitad Islas Baleares, "Modelización de Interacciones Enzima-Sustrato", Palma Mallorca, Spain, June 1999.

104. University of Grenole, Grenoble, France, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", June 1999.

105. Consiglio Nazionale delle Ricerche, "Chemical Strategies is Design of Inhibitors for Proteases", Bologna, Italy, June 1999.

106. Interscience Conference on Antimicrobial Agents and Chemotherapy, "High-Resolution Imaging of the Assembly of the Bacterial Outer-membrane", San Francisco, California, September 1999.

107. University of Iowa, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", September, 1998.

108. International Proteolysis Society: Proetase Consortium, Mackinac, Michigan, “Strategies for Protease Inhibition”, October 1999.

109. Loyola University of Chicago, "Antibiotics: Twentieth Century "Magic Bullets" and How They are being tarnished", Chicago, November 1999.

110. The Second International Conference on Protease Inhibitors, Gainsville, “New Methodology for Inhibition of Proteases”, December 1999.

111. University of Alberta, "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", Edmonton, Canada, December 1999.

112. Michigan State University, Department of Biochemistry, "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", February 2000.

113. Purdue University, Department of Medicinal Chemistry, "Structural and Mechanistic Implications for Evolution of β-Lactamases from Penicillin-Binding Proteins", March 2000.

114. Launching Ceremony for the Institute for Scientific Computing, Wayne State University, “Drug Discovery and Computational Chemistry”, April 2000.

115. Cerus Science Retreat: New Opportunities & Competing Technologies, "Overcoming Resistance to Antibiotics", Santa Cruz, California, May 2000.

116. Guilford Pharmaceutical Company, “Methodology for Mechanism-based Inhibition of Zinc-Dependent Proteases”, Baltimore, June 2000.

117. Gordon Research Conference on Enzymes, Coenzyme, and Metabolic Pathways, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", July 2000.

118. University of Michigan, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", September 2000.

119. Wayne State University, Department of Pharmacology, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", October 2000.

120. Vanderbilt University, “β-Lactam Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", October 2000.

121. The Developmental Therapeutics Program, WSU, “β-Lactam Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", November 2000.

122. Michigan State University, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", December 2000.

123. International Chemical Congress of Pacific Basin Societies ("Pacifichem 2000"), "Antibiotics: Twentieth Century "How Bacteria Cross-Link Their Cell Walls: Target for Antibiotics", Honolulu, December 2000.

124. DARPA, "Bacterial Envelope", San Francisco, January 2001.

125. Karmanos Cancer Institute, "Gelatinases and Cancer Metastasis: Insights into the Complex Processes of Enzyme Inhibition and Zymogen Activation", February 2001.

126. University of Western Ontario, "β-Lactam Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", February 2001.

127. Florida State Universitry, "Gelatinases and Cancer Metastasis: Insights into the Complex Processes of Enzyme Inhibition and Zymogen Activation", March 2001

128. Keynote Lecture, Bioferma Chair Lectureship, University of Murcia, Spain, Antibioticos: El Milagro Medico del Siglo Veinte y Como Estan Perdiendo Efectividad Terapeutica", March 2001.

129. University of Murcia, Spain, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", March 2001.

130. University of the Baleares Islands, Spain, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", March 2001.

131. Indiana University, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", March 2001.

132. Plenary Lecture, National Meeting of the Korea Chemical Society, Seoul, Korea, "Matrix Metalloproteinases: Sturctures, Function, and Inhibition", April 2001.

133. Symposium on Chemical Genomics, Pohang University of Science and Technology, Pohang, Korea, "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", April 2001.

134. DuPont Pharmaceuticals Co., "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", Wilmington, April 2001.

135. NewBiotics Pharmaceuticals Co., "Cross linking of the bacterial cell wall by penicillin-binding proteins, and how this activity has given rise to antibiotic resistant determinants", San Diego, April 2001.

136. Trends in Drug Research, 13th Noordwijkerhout-Camerino Symposium, "Antibiotic Design for Validated Targets", Noordwijkerhout, Netherlands, May 2001.

137. The 101th General Meeting of the American Society for Microbiology, “Bichemical and Structural Insights into Class D β-lactamases”, Orlando, May 2001.

138. Plenary Lecture, in *Trends in Organic Chemistry* of the Swedish Royal Academy of Sciences, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, Stockholm, Sweden, May 2001.

139. American Chemical Society, Great Lakes Regional Meeting, “Novel Aminoglycosides by Design”, Grand Rapids, June 2001.

140. The 222nd National Meeting of the American Chemical Society, Symposium on "Inhibition of Enzymes Important in Medicine", “Matrix metalloproteinases: structures, function, and inhibition", Chicago, Illinois, August 2001.

141. Bioinformatics and Structural Modeling Workshop, Istanbul, Turkey, "Applications of Molecular Modeling to Systems of Importance to Biological Sciences", September 2001.

142. Institute of Molecular Chemistry, University of Amsterdam, The Netherlands “Cancer Metastasis and Matrix metalloproteinases: structures, function, and inhibition", September 2001.

143. Department of Chemistry, University of Montreal, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, Montreal, Canada, December 2001.

144. Frontiers of Science Lecture, Department of Chemistry, Wayne State University, “Matrix metalloproteinases: structures, function, and inhibition”, January 2002.

145. National Institute of Child Health, Perinatology Research Branch, “Matrix metalloproteinases: structures, function, and inhibition”, January 2002.

146. National Academy of Sciences, Institute of Medicine, Forum on Emerging Infections, Washington, D.C., Emergence of Multiple Mechanisms of Resistance to Antibacterials, February 2002.

147. Ohio Sate University, Department of Biochemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, March 2002.

148. The Eight β-Lactamase Workshop, "Inhibitor-Resistant β-Lactamases", Holy Island, UK, March, 2002.

149. Case-Western Reserve University, Department of Pharmacology, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, April 2002.

150. Frontiers in Medicinal Chemistry Lecture, University of Utah, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, April 2002.

151. The 223rd National Meeting of the American Chemical Society, Symposium on "Carbohydrate Chemistry", “Retailoring Aminoglycoside Antibiotics Based on Ribosomal Target Structure and Mechanistic Considerations", Orlando, April 2002.

152. Antimicrobial Research Centre, McMaster University, Canada, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, May 2002.

153. University of Toronto, Canada, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, May 2002.

154. International Conferewnce on Genomics, Proteomics and Bioinformatics, “Design of Novel Antibiotics that Bind to the Bacterial Ribosomal Acyltransfer Site”, St Petersburg, Russia, June 2002.

155. ImClone Corp., “Matrix Metalloproteinases and Their Involvement in Cancer Metastasis", New York, August 2002.

156. The 224rd National Meeting of the American Chemical Society, Symposium on "metalloproteases", “Matrix Metalloproteinases and Their Involvement in Cancer Metastasis", Boston, August 2002.

157. Washington State University, Department of Chemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, September 2002.

158. University of Connecticut, “Protein and Polymer Science in the 21st Century” Symposium in the Honor of Professor James Knox, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, September 2002.

159. University of Washington, Department of Chemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, October 2002.

160. University of Notre Dame, Department of Chemistry and biochemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, October 2002.

161. Pharmacia Symposium on Molecular Target-Based Cellular and Animal Models, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, October 2002.

162. Tufts University, Department of Chemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, October 2002.

163. Ohio Wesleyan University, Department of Chemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, November 2002.

164. Purdue University, Department of Chemistry, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, November 2002.

165. Baylor College of Medicine, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, January 2003.

166. Center for Biological Modeling, Michigan State University, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, January 2003.

167. University of Washington, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, February 2003.

168. Chemistry Colloquia, University of Nebraska, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, April 2003.

169. Fargo Conference on Metalloproteinases, “Inhibition and Activation of Gelatinases”, Fargo, North Dakota, May 2003.

170. IUPAC Symposium on New Targets for Antibacterials, “New Designer Antibiotics; Old and New Targets”, Amsterdam, Netherlands, June 2003.

171. Rigel Inc., “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, South San Francisco, July 2003.

172. Symposium on “Biomolecular Structure, Cellular Structure and Drug Discovery”, International Union of Biochemistry and Molecular Biology Congress, Toronto, Canada, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, July 2003.

173. Gordon Research Conference on Matrix Metalloproteinases, "Contributions of Molecular Dynamics to Biochemistry of MMPs", Big Sky, Montana, August 2003.

174. Science Advisory Council, University of Notre Dame, “Science at the Interface of Chemistry and Biology”, September 2003.

175. Plenary Lecture, The XIV National Symposium in Organic Chemistry of the Argentinian Society of Organic Chemistry, “Antibioticos: El Milagro Medico del Siglo Veinte y Como Estan Perdiendo Efectividad Terapeutica”, Rosario, Argentina, November 2003.

176. Instituto de Biologia de Rosario, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, Rosario, Argentina, November 2003.

177. Chemistry Colloquium Speaker, Wichita State University, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, December 2003.

178. Andrews University, "Bacterial Cell Wall, the Ribosome, and Antibiotics", March 2004.

179. Chemical Biology Lecture Series, University of Illinois at Urbana-Champaign, “Antibacterials as Wonder Drugs and How Their Effectiveness Is Being Compromised”, April 2004.

180. The 14th European Congress of Clinical Microbiology and Infectious Diseases (ECCMID), “Resistance to β-Lactam Antibiotics in *Staphylococcus aureus*”, Prague, Czech Republic, May 2004.

181. University of Parma, "Bacterial Cell Wall, the Ribosome, and Antibiotics", May 2004.

182. National Meeting of the American Society for Microbiology, “BlaR of *Staphylococcus aureus* and Its Involvement in Signal Transduction of Antibiotic Resistance”, New Orleans, May 2004.

183. Second Chianti Meeting on Proteases, “Design and Synthesis of a Selective Mechanism-Based Inhibitor for Gelatinases, Which Inhibit Metastasis in a Mouse Model of T-Cell Lymphoma”, Siena, May 2004.

184. Symposium on “Biomolecular Structure, Cellular Structure and Drug Discovery”, International Union of Biochemistry and Molecular Biology Congress, Toronto, Canada, “Drug Design at the Interface of Chemistry and Biology”, July 2004.

185. Plenary Lecture, International Symposium on the Frontiers of Chemistry in Honor of Professor Dong Kim, Pohang University of Science and Technology, "Bacterial Cell Wall, the Ribosome, and Antibiotics", Pohang, Republic of Korea, August 2004.

186. Walther Cancer Institute Retreat, "Design and Synthesis of a Selective Mechanism-Based Inhibitor for Gelatinases, Which Inhibit Metastasis and Proliferation in Animal Models for Lymphoma and Prostate Cancer", Notre Dame, August 2004.

187. International Meeting on Inhibition of Matrix Metalloproteinases: Expanding the Horizons, "Design and Synthesis of a Selective Mechanism-Based Inhibitor for Gelatinases", New York City, October 2004.

188. Northwestern University, "Bacterial Cell Wall, the Ribosome, and Antibiotics", November 2004.

189. University of Kentucky, "Bacterial Cell Wall, the Ribosome, and Antibiotics", March 2005.

190. The 9th β-Lactamase Meeting, "Bacterial Cell Wall", Leonessa, Italy, June 2005.

191. The 9th β-Lactamase Meeting, "Crystal Structure of the Acylated β-Lactam Sensor Domain of BlaR1 from *Staphylococcus aureu*", Leonessa, Italy, June 2005.

192. The Burnham Institute, "Mechanism-Based Approaches for Biological Intervention of Disease", San Diego, July 2005.

193. Schering-Plough Corp, "Design, Synthesis and Evaluation of a Selective Mechanism-Based Inhibitor for Gelatinases as a Strategy in Intervention of Cancer Metastasis", Cambridge, MA, August 2005.

194. National Meeting of the American Chemical Society, "Circumventing Antibiotic Resistance", Washington DC, September 2005.

195. New Developments in Synthetic Organic Chemistry of Natural Product and Medicine, "Bacterial Cell Wall, the Ribosome, and Antibiotics", Kyoto, Japan, September 2005.

196. University of Osaka, School of Pharmacy, "Bacterial Cell Wall, the Ribosome, and Antibiotics", Osaka, Japan, September 2005.

197. University of Osaka, Graduate School of Medicine, "Evaluation of a de Novo Designed Selective Mechanism-Based Inhibitor for Gelatinases as a Strategy in Intervention of Cancer Metastasis and Alleviation of the Consequences of Stroke", Osaka, Japan, September 2005.

198. Osaka Prefecture University, "Bacterial Cell Wall, the Ribosome, and Antibiotics", Osaka, Japan, September 2005.

199. World High Technology Society 3rd Annual Congress, Shanghai, China, October, 2005

200. University of California at San Diego, "Bacterial Cell Wall, the Ribosome, and Antibiotics", January 2006.

201. Frontier of Science Lecture, Case-Western University, "Bacterial Cell Wall, the Ribosome, and Antibiotics", January 2006.

202. University of Minnesota, Department of Medicinal Chemistry, "Bacterial Cell Wall, the Ribosome, and Antibiotics", February 2006.

203. University of Hong Kong, Department of Chemistry, "Bacterial Cell Wall, the Ribosome, and Antibiotics", April 2006.

204. Hong Kong University of Science and Technology, "Bacterial Cell Wall, the Ribosome, and Antibiotics", May 2006.

205. University of Hong Kong, Department of Microbiology, "Emergence of *Staphylococcus aureus* as a Clinical Scourge", May 2006.

206. University of Minnesota, Center for Drug Design, "Emergence of *Staphylococcus aureus* as a Clinical Scourge", June 2006.

207. Merck & Co., "Emergence of *Staphylococcus aureus* as a Clinical Scourge", Rahway, NJ, August 2006.

208. American Chemical Society National Meeting, "Synthesis and Three-Dimensional Structure of a Fragment of the Bacterial Cell Wall Peptidoglycan", San Francisco, September 2006.

209. North Eastern Structure Symposium: Structural Insights into Macromolecular Assemblies, "Three-Dimensional Structure of the Bacterial Cell Wall Peptidoglycan", University of Connecticut, September 2006.

210. Northern Illinois University, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", January 2007.

211. Delhi University, Department of Chemistry, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", New Delhi, India, March 2007.

212. Third International Symposium on Current Trends in Drug Discovery Research, "Control of Extra-cellular Matrix Degradation by Small Molecules in Prevention of Disease", Lucknow, India, February 2007.

213. Second International Conference on Pharmaceutical Sciences & Practice, "Control of Extra-cellular Matrix Degradation by Small Molecules in Prevention of Disease", Ooty, India, February 2007.

214. University of Montreal, Department of Chemistry, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Montreal, Canada, March 2007.

215. The Merck Frosst Lecture, Simon Fraser University, "Bacterial Cell Wall, the Ribosome, and Antibiotics", Vancouver, Canada, March 2007.

216. The Rising Lecture, Oregon State University, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", April 2007.

217. IUPAC Symposium on New Targets for Antibacterials, "The *Mec* and *Bla* Operons and Resistance to Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", April 2007.

218. The Ohio State University, Department of Chemistry Colloquium, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", April 2007.

219. The 107th General Meeting of the American Society for Microbiology, "Regulation of β-Lactam Antibiotic Resistance in Methicillin-Resistant *Staphylococcus aureus* and Its Origins", Toronto, Cananda, May 2007.

220. International Conference on the Chemistry of Antibiotics and other Bioactive Compounds (ICCA-10), "Bacterial Cell Wall", Vanderbilt University, August 2007.

221. Albany Molecular, "Bacterial Cell Wall and Antibiotics", September 2007.

222. University of Pennsylvania, "Bacterial Cell Wall", October 2007.

223. Pasteur Institute, French Society of Microbiology, "Antibiotic Resistance Mechanisms in Methicillin-Resistant *Staphylococcus Aureus*", Paris, France, December 2007.

224. The Peptidoglycan Symposium at the University of Wisconsin, "Structure of the Bacterial Peptidoglycan", December 2007.

225. University of California, Davis, "Bacterial Cell Wall and Antibiotics", Jan 2008.

226. University of New Orleans, "Bacterial Cell Wall and Antibiotics", Jan 2008.

227. Grand Valley State University, "Bacterial Cell Wall", Feb. 2008.

228. Vanderbilt University Institute for Chemical Biology, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Jan 2008.

229. Keynote Speaker, The 28th Annual Symposium in the Pharmacological Sciences and Biorelated Chemistry, University of Michigan, "Chemistry of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", March 2008.

230. American Chemical Society National Meeting, "Role of the Active Site Zinc Ion of Matrix Metalloproteinases in Enzyme Activation and Its Subversion in the Process of Selective Inhibition", New Orleans, April 2008.

231. Merck & Co., "Bacterial Cell Wall", Rhaway, NJ, April 2008.

232. University of New Orleans, "Bacterial Cell Wall", New Orleans, April 2008.

233. The 10th β-Lactamase Meeting, "Penicillin-Binding Protein 5 of *Escherichia coli* and Its Implications for β-Lactamases, Eretria, Greece, June 2008.

234. Universitat Autonoma de Barcelona, "Mechanism of Matrix Metalloproteinase Activation and the Process of Selective Inhibition", Barcelona, Spain, June 2008.

235. Molecular Biology Institute of Barcelona (CSIC), “Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)”, Barcelona, Spain, June 2008.

236. Instituto de Quimica-Fisica Rocasolano, Spanish National Research Council, "Bacterial Cell Wall", Madrid, Spain, June 2008.

237. NovaBay Pharmaceuticals, Inc., “Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)”, Emeryville, CA, July 2008.

238. Theravance Pharmaceutical Co., "Bacterial Cell Wall", San Francisco, CA, Aug. 2008.

239. The Astellas Award Lecture, American Chemical Society National Meeting, "Bacterial Cell Wall", Philadelphia, August 2008.

240. Plenary Lecture, The XII International Congress of Bacteriology and Applied Microbiology of the International Union of Microbiology Societies (IUMS), “Bacterial Cell Wall, Its Regulation and Involvement in Antibiotic Resistance”, Istanbul, Turkey, August, 2008.

241. Université Catholique de Louvain, “Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)”, Brussels, Belgium, September 2008.

242. Harvard University, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Boston, September 2008.

243. University of Rosario, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Rosario, Argentina, November, 2008.

244. University of Missouri-Columbia School of Medicine, "Role of the Active Site Zinc Ion of Matrix Metalloproteinases in Enzyme Activation and Its Subversion in the Process of Selective Inhibition", Columbia, December 2008.

245. Indiana University School of Medicine—Northwest, "Bacterial Cell Wall", December 2008.

246. Plenary Lecture, The Ninth Winter Conference on Bioorganic & Medicinal Chemistry “Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)”, Steamboat, Colorado, January 2009.

247. University of Georgia, “Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)”, Athens, March 2009.

248. Workshop on Biomedical Research, “Bacterial Cell Wall”, University of Notre Dame, March 2009.

249. New York University, “Bacterial Cell Wall”, April 2009

250. The National Meeting of the American Society for Microbiology, “Bacterial Cell Wall”, Philadelphia, May 2009.

251. Gordon Conferences on Matrix Metalloproteinases, “Progression of Studies on Mechanism-based Inhibitors for Gelatinases”, Diablerets, Switzerland, August 2009.

252. Distinguished Lecture, Academia Sinica, "Bacterial Cell Wall", Taipei, Taiwan, September 2009.

253. Distinguished Lecture, Academia Sinica, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Taipei, Taiwan, September 2009.

254. AstraZeneca, "Bacterial Cell Wall", Waltham, MA, September 2009.

255. The J. Clarence Karcher Lecture, University of Oklahoma, "Bacterial Cell Wall", Norman, OK, October 2009.

256. The Meeting of the UK-Canada Bacterial Cell Wall Biosynthesis Network, "Turnover of the Bacterial Cell Wall", Warwick, The United Kingdom, November 2009.

257. Texas Tech University, "Bacterial Cell Wall", Lubbock, Texas, November 2009.

258. Texas Tech University, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Lubbock, Texas, November 2009.

259. Consejo Superior de Investigaciónes Científicas (CSIC), "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Madrid, Spain, December 2009.

260. University of Toledo, "Bacterial Cell Wall", Toledo, Ohio, March 2010.

261. Gordon Research Conference on New Antibacterial Drug Discovery and Development, "The BlaR Protein and Its Involvement in Methicillin-Resistance in *Staphylococcus aureus*", Galveston, TX, March 2010.

262. Indiana University School of Medicine, Department of Biochemistry, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Indianapolis, Indiana, April 2010.

263. Purdue University, "Bacterial Cell Wall", West Lafayette, Indiana, April 2010.

264. Frontiers in Biomedical Research, "Mechanism of Matrix Metalloproteinase Activation and the Process of Selective Inhibition", Fargo, May 2010.

265. The 110th General Meeting of the American Society for Microbiology, "Cell Wall Turnover", San Diego, May 2010.

266. The Second Sigma-Aldrich Symposium, "Pared Celular Bacteriana", Unidad Zacatenco, Mexico, April 2010.

267. Gordon Research Conference on Bioorganic Chemistry, "Bacterial Cell Wall Turnover", Andover, New Hampshire, June 2010.

268. World Congress of Pharmacy & Pharmaceutical Sciences 2010, 70th International Congress of Pharmaceutical Federation, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Lisbon, Portugal, August 2010.

269. Cubist Pharmaceuticals, "Bacterial Cell Wall", Boston, October 2011.

270. The Inaugural Indiana Medicinal Chemistry Symposium, "Resistance to β-Lactam Antibiotics in Methicillin-Resistance in *Staphylococcus aureus*", Indianapolis, October 2010.

271. University of Kansas, "Bacterial Cell Wall", November 2010.

272. Brigham Young University, "Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Provo, January 2011.

273. El Colegio Nacional (counterpart to the US National Academy of Sciences), "Elucidation of Mechanisms of Diseases of Matrix and Their Pharmaceutical Intervention", Mexico City, Mexico, February 2011.

274. Molecular Biosciences Lecture, Wichita State University, "Resistance to β-Lactam Antibiotics in Methicillin-Resistance *Staphylococcus aureus*", Wichita, March 2011.

275. York University, "Bacterial Cell Wall", Toronto, Canada, April 2011.

276. Distinguished Lecture, Florida International University, "Bacterial Cell Wall", Miami, April 2011.

277. The Cold Spring Harbor Laboratory: Antibiotic Resistance: Past, Present, Future, New York, May 2011.

278. The 94th Canadian Chemistry Conference, "Resistance to β-Lactam Antibiotics in Methicillin-Resistance *Staphylococcus aureus*", Montreal, Canada, June 2011.

279. Gordon Research Conference on Matrix Metalloproteinases, "Stopping and Smelling the Roses: Tools in Elucidation of the Details of MMP-Dependent Diseases", Rhode Island, August, 2011.

280. University of Missouri, Pathology Grand Rounds/Translational Biomedicine Seminar Series, "From Mechanistic Understanding to Medicinal Intervention: Diabetic Wound Healing and Methicillin-Resistant *Staphylococcus aureus*", Columbia, October 2012.

281. University of South Florida, "Bacterial Cell Wall", Tampa, December 2011.

282. Frontiers in Drug Discovery Lecture, Medical University of South Carolina, "Pharmacological Protection of Neurons Subsequent to Stroke and Traumatic Brain Injury", Charleston, March 2012.

283. The 243rd ACS National Meeting, Early Events in Recycling of Bacterial Cell Wall, San Diego, March 2012.

284. The 243rd ACS National Meeting, β-Lactam Antibiotic-Resistance Machineries in Gram-Negative and Gram-Positive Bacteria, San Diego, March 2012.

285. The 243rd ACS National Meeting, Mechanism of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA), San Diego, March 2012.

286. Second International Helmholtz-Institute for Pharmaceutical Symposium, Mechanism of Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA). Saarbrücken, Germany, June 2012.

287. University of Sienna, School of Medicine, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), July 2012.

288. Global Health Colloquium, University of Notre Dame, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), September 2012.

289. Cubist Pharmaceutical Co., How *Staphylococcus aureus* became Methicillin-Resistant *Staphylococcus aureus* (MRSA), September 2012.

290. The 6th Brazilian Symposium on Medicinal Chemistry, Medicinal Chemistry for Diseases of Matrix, Canela, Rio Grande do Sul, Brazil, October 2012.

291. Office of Naval Research, Washington, D.C., Traumatic Brain Injury, November 2012.

292. Universidade Federal do Rio Grande do Sul, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Bacterial Cell Wall, Brazil, November 2012.

293. University of Maryland, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), February 2013.

294. University of Maryland, Baltimore County, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), January 2013.

295. University of Notre Dame, Interdisciplinary Science Seminar, Intervention of Diseases of Extracellular Matrix, March 2013.

296. The Smissman Award Symposium Honoring Richard Silverman, Therapeutic Intervention in Neurological Diseases of Matrix, ACS Spring Meeting, New Orleans, April 2013.

297. The 5th Chicago Organic Symposium, Organic Chemistry and Elucidation of Complex Biological Systems, June 2013.

298. Baxter Pharmaceutical Company, Bacterial Cell Wall, Its Synthesis, Recycling and Link to Antibiotic Resistance, July 2013.

299. The United States National Academy of Sciences, The Complex Resistance Machineries for β-Lactam Antibiotics in Gram-Negative and Gram-Positive Bacteria, Washington, DC, September 2013.

300. Congreso Argentino de Microbiologia, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Buenos Aires, September 2013.

301. University of Rosario, Cell-Wall Recycling and Links to Virulence and Antibiotic Resistance in Gram-Negative Bacteria, Rosario, Argentina, September 2013.

302. The Watanabe Lecture, The Fifth August M. Watanabe Symposium in Biotechnology, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Indiana University, October 2013.

303. Florida International University, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Indiana University, October 2013.

304. International Union of Biochemistry and Molecular Biology Conference on Host-Microbe Interactions, How *Staphylococcus aures* became Methicillin-Resistant *Staphylococcus aures* (MRSA), Marrakesh, Morocco, November 2013.

305. Annual Meeting of the American Association of Pharmaceutical Scientists (AAPS), Pharmacological Protection of Neurons Subsequent to Stroke and Traumatic Brain Injury, San Antonio, November 2013.

306. The Eck Institute Retreat, The University of Notre Dame, Cell-Wall Recycling and Links to Virulence and Antibiotic Resistance in Gram-Negative Bacteria, January 2014.

307. Merck & Co., "How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA)", Kenilworth, NJ, February 2014.

308. Department of Pharmacology, Case Western Reserve University, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Cleveland, April 2014.

309. Society for General Microbiology, Annual Meeting, Early Events in Recycling of Cell Wall, Liverpool, UK, April 2014.

310. Universidade Federal do Rio Grande do Sul, Cell-Wall Recycling and Links to Virulence and Antibiotic Resistance in Gram-Negative Bacteria, Porto Alegre, Brazil, April 2014.

311. Universidade Federal do Rio Grande do Sul, Power of Biomedical Interdisciplinary/Multidisciplinary Research, Porto Alegre, Brazil, April 2014.

312. The 12th β-Lactamase Conference, Allostery in the Function of Penicillin-Binding 2a of Methicillin-Resistant *Staphylococcus aureus* (MRSA), Gran Canaria, Spain, June 2014.

313. Universidad de La Laguna, Descubrimiento del Sitio Alostérico en PBP2a, Santa Cruz de Tenerife, Islas Canarias, Spain, June 2014.

314. The Nankai University, Power of Biomedical Interdisciplinary/Multidisciplinary Research Applied to Discovery of Antibiotics, Tianjin, China, July 2014.

315. The Nankai University, Organic Chemistry and Elucidation of Complex Biological Systems, Tianjin, China, July 2014.

316. Universidade de São Paulo, Instituto de Química, Organic Chemistry and the Elucidation of Complex Biological Systems, São Paulo, Brazil, August 2014.

317. Universidade Estadual de Campinas, Organic Chemistry and the Elucidation of Complex Biological Systems, Campinas, Brazil, August 2014.

318. Universidade Federal de Rio de Janeiro, Organic Chemistry and the Elucidation of Complex Biological Systems, Campinas, Brazil, August 2014.

319. Eli Lilly Grand Rounds Lecture, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), Indianapolis, August 2014.

320. Palacky University of Olomouc, Allostery in Catalysis by Penicillin-Binding Protein 2a of Methicillin-Resistant *Staphylococcus aureus* (MRSA), Antibiotic Resistance and Discovery of New Antibiotics, Olomouc, Czech Republic September 2014.

321. Miami University, Department of Chemistry, Power of Biomedical Interdisciplinary/Multidisciplinary Research Applied to Discovery of Antibiotics October 2014.

322. The Scott Medal Symposium in honor of John Blanchard, Cell-Wall Recycling and Signaling in Bacteria, Texas A & M University, October 2014.

323. Leloire Institute, Cell Wall as Target for Discovery of Novel Antibiotics, Buenos Aires, Argentina, May 2015.

324. University of Rosario, Bacterial Cell Wall, Synthesis of Its Components and Its Biochemistry, Rosario, Argentina, May 2015.

325. Universidad de Montevideo, "Cell Wall as Target for Antibiotics", Montevideo, Uruguay, May 2015.

326. Joint Great Lakes/Central Regional ACS Meeting, Allostery in Catalysis by Penicillin-Binding Protein 2a of Methicillin-Resistant *Staphylococcus aureus* (MRSA), Grand Rapids, May 2015.

327. Ohio State University, Cell Wall as Target for Discovery of Novel Antibiotics, Columbus, Ohio, June 2015.

328. The 98th National Meeting of the Canadian Society for Chemistry, Cell Wall as Target for Antibiotics, Ottawa, Canada, June 2015.

329. Universidad de la República, Cell Wall as Target for Antibiotics, Montevideo, Uruguay, August 2015.

330. The Great Wall Symposium, Cell Wall as Target for Discovery of Novel Antibiotics, Florence, Italy, September 2015.

331. The 9th General Meeting of the International Proteolysis Society, Cell-Wall Proteolysis in Signalling in *Pseudomonas aeruginosa*, a Nexus for the Induction of Antibiotic Resistance, Penang, Malaysia, October 2015.

332. Nankai University, Antibiotic Resistance in Methicillin-Resistant *Staphylococcus aureus* and Involvement of Allostery in the Function of Penicillin-Binding Protein 2a, Tianjin, China, October 2015.

333. Faculty of Chemistry, Pontificia Universitad Católica de Chile, Cell Wall as Target for Discovery of Novel Antibiotics, November 2015, Santiago de Chile.

334. Department of Biochemistry, Pontificia Universitad Católica de Chile, Pharmacological Protection of Neurons Subsequent to Stroke and Traumatic Brain Injury, November 2015, Santiago de Chile.

335. School of Medicine, Pontificia Universitad Católica de Chile, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), November 2015, Santiago de Chile.

336. University of Alberta, Cell Wall as Target for Antibiotics, Alberta, Canada, November 2015.

337. The International Chemical Congress of Pacific Basin Societies ("Pacific Chem"), Cell Wall as Target for Discovery of Novel Antibiotics, Honolulu, December 2015.

338. Northwestern University School of Medicine, Cell-Wall Recycling and Signaling in Bacteria, January 2016, Chicago.

339. American Society for Biochemistry and Molecular Biology (ASBMB), the 2016 Annual Meeting, New Antibiotics for the Post-Antibiotic Era, April 2016, San Diego.

340. Purdue University, Department of Medicinal Chemistry, Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Its Subversion in Discovery of Novel Antibiotics, April 2016, West Lafayette.

341. North Carolina State University, Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Its Subversion in Discovery of Novel Antibiotics, April 2016, Raleigh.

342. Universidad de Rioja, Discovery of the Allosteric Site in PBP2a, May 2016, Logroño, Spain.

343. Dovetailing of Experiment and Computation in Biomedical Sciences, The Second Heidelberg-Notre Dame Summer School in Computational Chemistry, Notre Dame, July 2016.

344. The Joint Symposium in Chemical Sciences University of Notre Dame/Pontificia Universidad Católica, New Antibiotics for the Post-Antibiotic Era, Santiago de Chile, September 2016.

345. National Meeting of the German Pharmaceutical Society (DPhG), New Antibiotics for the Post-Antibiotic Era, October 2016, Munich, Germany.

346. University of Heidelberg, Research at the Interface of Chemistry and Biology: Discovery of Novel Antibacterial Agents, Heidelberg, Germany, October 2016.

347. Keynote Speaker, The 12th Midwest Carbohydrate and Glycobiology Symposium (MCGS), Muropeptides and Signaling in Gram-Negative Bacteria, Mount Pleasant, October 2016.

348. The 26th Keck Annual Research Conference, New Antibiotics for the Post-Antibiotic Era, October 2016, Houston.

349. Fundación MEDINA, Resistance to β-Lactam Antibiotics in Methicillin-Resistant *Staphylococcus aureus* (MRSA) and Its Subversion in Discovery of Novel Antibiotics, November 2016, Granada, Spain.

350. The 25th Enzyme Mechanisms Conference, Nexus Among Cell-Wall Turnover, Antibiotic Resistance and Virulence in *Pseudomonas aeruginosa*, January 2017, St. Petersburg, Florida.

351. The 13th beta-Lactamase Meeting, Nexus between Cell-Wall Turnover and β-Lactam Antibiotic Resistance, June, 2017, Santo Stefano di Sessanio, Italy.

352. Universidad Nacional Autónoma de México (UNAM), Nexus Among Cell-Wall Turnover, Antibiotic Resistance and Virulence in *Pseudomonas aeruginosa*, October 2017, Mexico City, Mexico.

353. Instituto Politécnico Nacional, Centro de Investigación y Estudios Avanzados (CINVESTAV), Nexus Among Cell-Wall Turnover, Antibiotic Resistance and Virulence in *Pseudomonas aeruginosa*, October 2017, Mexico City, Mexico.

354. Hong Kong University of Science and Technology, Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, Hong Kong, November 2017.

355. New Antibacterial Discovery & Development Gordon Research Conference, Targeting *Clostridium difficile* with Novel Classes of Antibiotics, March 2018, Ventura, California.

356. The Frontiers in Science Lecture, Case Western University, Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, April 2018.

357. John Carroll University, Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, April 2018.

358. The 101st Canadian Chemistry Conference, Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, Edmonton, Alberta, May 2018.

359. The William S. Middleton Award Symposium of the Department of Veterans Affairs in honor of Robert Bonomo, Veterans Affair Medical Center of Cleveland, Bugecins Revisited, Cleveland, Ohio, May 2018.

360. The 15th Congress of Chemotherapeutic Pharmacology, New Antibiotics for the Post-Antibiotic Era, Chongqing, China, June 2018.

361. Plenary Lecture, Annual Meeting of the American Society of Pharmacognosy (ASP), Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, Lexington, KY, July 2018.

362. Frederick L. Hovde Distinguished Lecture, Purdue University, Complex Biological Machineries: Bacterial Cell Wall, Its Turnover and Link to Antibiotic Resistance, August 2018.

363. Indiana University School of Medicine Northwest, How *Staphylococcus aureus* Became Methicillin-Resistant *Staphylococcus aureus* (MRSA), August 2018.

364. University of Toronto, Department of Biochemistry, Cell-Wall Recycling in *Pseudomonas aeruginosa* and the Nexus to Antibiotic Resistance, Toronto, Canada, May 2019.

365. Plenary Lecture, The Emil Thomas Kaiser Award Lecture, Cell-Wall Recycling in *Pseudomonas aeruginosa* and the Nexus to Antibiotic Resistance, The 33rd Protein Society Annual Symposium, Seattle, June 2019.

366. Keynote Lecture, 17th International Conference on Pseudomonas, Cell-Wall Recycling in *Pseudomonas aeruginosa* and the Nexus to Antibiotic Resistance, Putrajaya, Malaysia, July 2019.

367. Plenary Lecture, The 15th Midwest Carbohydrate and Glycobiology Symposium, Cell-Wall Recycling in *Pseudomonas aeruginosa* and the Nexus to Antibiotic Resistance, Notre Dame, IN, September 2019.

368. University of Illinois at Urbana-Champaign, The Chemistry-Biochemistry Interface Lecture, Cell-Wall Recycling in Gram-Negative Bacteria and the Nexus to Antibiotic Resistance, Urbana-Champaign, September 2019.

369. International Course on Antibiotics and Resistance (ICARe), Resistance to Aminoglycoside Antibiotics, Les Pensières, Annecy, France, October 2019.

370. Keynote Lecture, Midwest Enzyme Chemistry Conference (MECC), Cell-Wall Recycling in *Pseudomonas aeruginosa* and the Nexus to Antibiotic Resistance, Chicago, October 2019.

371. University of Illinois at Chicago, Department of Medicinal Chemistry & Pharmacognosy, Cell-Wall Recycling in Gram-Negative Bacteria and the Nexus to Antibiotic Resistance, Chicago, November 2019.

372. Boise State University, Cell-Wall Recycling in Bacteria and the Nexus to Antibiotic Resistance, Boise, March 2020.

373. Georgia State University, Cell-Wall Recycling in Bacteria and the Nexus to Antibiotic Resistance, Atlanta, April 2020.

374. The Pacific Chem Meeting, symposium "Advances in Glycan Engineering and Glycans from the Microbial World," Cell-Wall Recycling in Gram-Negative Bacteria, Honolulu, December 2020.

375. The Pacific Chem Meeting, symposium "Chemical and Biological Strategies to Address Antimicrobial Resistance," In Search of Adjuvants for Antibacterials, Honolulu, December 2020.

376. Plenary Lecture, The 50th Annual Meeting of the Argentinian Society of Biophysics, Cell-Wall Recycling in Gram-Negative Bacteria, Rosario, Argentina, November 2021.

Lectures to General Audience:

1. Devine-Child High School, Southfield, MI, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", January 1998.

2. Universidad de Murcia, Murcia, Spain, "Antibioticos: Pasado, Presente, y Futuro", April 2001.

3. University of Hong Kong, Hong Kong, China, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", May 2006.

4. The Merck Frosst Lecture, Simon Fraser University, Vancouver, Canada, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", March 2007.

5. Reunion Weekend Lecture, University of Notre Dame, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", June 2009.

6. Windmoor Lecture, University of Notre Dame, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", March 2012.

7. Hesburgh Lecture, Notre Dame Club of Ventura County, California, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", March 2014.

8. Hesburgh Lecture, Notre Dame Club of Northeastern New York, Albany, "Antibiotics: The Twentieth-Century "Silver Bullets" and How They Are Being Tarnished", March 2018.