ALEXANDER S. MANKIN

*curriculum vitae*

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# EDUCATION:

1978 M.S. in Chemistry, *cum laude*, Moscow University, Russia.

1982 Ph.D. in Bioorganic Chemistry, Belozersky Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow University, Russia

1989 Doctor of Sciences in Molecular Biology, Moscow University, Russia

# ACADEMIC CAREER:

2011-present Professor. Director. Center for Biomolecular Sciences (former Center for Pharmaceutical Biotechnology) and Department of Medicinal Chemistry, University of Illinois at Chicago.

2002-2010 Professor. Associate Director. Center for Pharmaceutical Biotechnology and Department of Medicinal Chemistry, University of Illinois at Chicago.

1998-2002 Associate Professor. Center for Pharmaceutical Biotechnology and Department of Medicinal Chemistry, University of Illinois at Chicago.

1993-1998 Assistant Professor. Center for Pharmaceutical Biotechnology and Department of Medicinal Chemistry, University of Illinois at Chicago.

1991-1992 Research Associate. H. Noller lab, University of California, Santa Cruz, USA

1991 Visiting Professor. P. Forterre lab, University of Paris at Orsay, France

1989-1990 Visiting Scientist. R. Garrett lab. University of Copenhagen, Denmark

1984-1988 Senior Research Scientist. Belozersky Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow University, Russia

1982-1984 Postdoctoral Research Associate. Belozersky Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow University, Russia

1978-1982 PhD trainee. Belozersky Laboratory of Molecular Biology and Bioorganic Chemistry, Moscow University, Russia

**AWARDS:**

2014 Alexander A. Neyfakh Collegiate Professorship

2014 Distinguished UIC Professorship

2014 Fellow, American Academy of Microbiology

2013 Paul R. Dawson Biotechnology Award, AACP

2011 Outstanding Service Recognition. American Society for Microbiology

2008 The UIC Researcher of the Year Award (Basic Sciences)

2006 ICAAC Program Committee Award

2005 The University Scholar Award

1993 Hans Vahlteich Research Award

1991 Plasmid Foundation Research Scholarship

1990 FEBS Research Scholarship

**TEACHING AWARDS:**

2006 Professor recognition Award Nominee, Class 2008.

2005 Excellence in Teaching Award

2001 UIC Center for Excellence in Teaching and Learning, Teacher Recognition Program Award

1999 Teacher of the year award (P1 class)

1998 Teacher of the year award (P1 class)

## FUNDED GRANTS (PI on all the listed grants):

2016 Melinta Therapeutics ($ 59,126 total) *Melinta Macrolides*

2015-2016 CEMPRA Pharmaceuticals ($ 88,165 total) *Mode of action of solithromycin*

2013-2016 NSF MCB 1244455 ($ 951,357 total) *Nascent peptide-dependent translation arrest*

2013-2017 NIH R01 GM106386 ($1,212,200 total) *Molecular mechanisms of action of macrolide antibiotics*.

2012-2016 NIH RO1 GM104370 ($ 1,212,200 total) *Programmed translation arrest controlled by nascent peptides and antibiotics.*

2012-2015 DARPA, Living Foundries ($ 785,466 total). *Engineering the tethered ribosome for optimizing incorporation of unnatural amino acids.*

2012-2014 NIH RO3 DA035191 ($ 79,750). *Inhibitors of bacterial protein synthesis with new modes of action.*

2010-2011 Trius Pharmaceutical (DTRA) ($2,161,180 total) *Broad spectrum antibacterial therapeutics from marine natural products.*

2009-2011 Chicago Biomedical Consortium SPARK Award ($13,500) (Mankin, Sontheimer and Stayley co- PIs) *Noncoding RNA Structure, Function and Evolution.*

2008-2013 NSF ($540,000 total) *Interaction of the ribosome with the nascent peptide.*

2008-2012 US-Israel Binational Science Foundation ($117,200) *Identifying Functional Sites in the Ribosome* (together with Dr. Mandel-Gurfreund, Tdechnion, Haifa, Israel).

2007-2012 NIH RO1 ($1,532,906 total cost) *New mechanism of resistance to oxazolidinone antibiotics in Staphylococcus aureus*.

2007-2008 Department of Defense ($144,848 total cost) *Institute for Advanced Pharmaceutical Sciences* (PI on Project 1).

2007-2009 CEMPRA Pharmaceuticals ($145,960 total cost) *Characterizing interactions of CEM-101, a ketolide, with the bacterial ribosome.*

2006-2007 Pfizer, Inc. ($112,949 total cost) *Binding site of new lincosamides and macrolides in bacterial ribosomes*.

2005-2008 NSF ($450,000 total) *Interaction of the ribosome with the nascent peptide.*

2004-2005 Pfizer, Inc. ($141,000 total cost) *Binding site of oxazolidinones on mitochondrial ribosomes*.

2003-2008 NIH U19, Projects 1 and 2. ($2,488,985 5-yr direct cost) *New antibiotic inhibitors of the B. anthracis ribosome* (PI on Projects 1 and 2)

2000-2004 NIH RO1 ($1,115,526 total). *Ribosomal peptidyl transferase center*

2000-2001 Schering-Plough ($88,555 total). *Interaction of everninomicin with ribosome and mechanism of everninomicin action.*

2000-2001 Abbott Laboratories ($78,403 total) *ABT-773 binding site on the ribosome and mini-gene mediated resistance.*

1999-2000 Pharmacia & Upjohn ($162,000 total) *Interaction of oxazolidinone antibiotics with the ribosome.*

1998-2001 NIH R21, Fogarty, FIRCA ($60,000 direct cost) *Ribosomal peptidyl transferase center.*

1997-2001 NIH RO1 ($690,000 total) *Interactions of antibiotics with rRNA*.

1997-1999 Hoechst-Marion-Roussel research grant, ($168,000 total) *Interactions of ketolides with the ribosomal RNA.*

1996-1998 Rhone-Poulenc Rorer research grant ($110,000 total) *Pristinamycin binding site on the ribosome.*

1996-1997 OVCR Award for invention development ($10,000) *Isolation of functional peptides from a random peptide library.*

1995-1998 NSF Research Grant ($300,000 total) *Isolation and characterization of functional rRNA fragments.*

1994-1995 ACS (Illinois Division) Research Grant ($35,000) *Sparsomycin receptor site in the ribosomal RNA*

1993-1995 Hans Vahlteich Research Award ($75,000) *Drug-ribosome interactions*

1993 UIC CRB Research Grant ($5,385) *Ribosomal fragments*

# PHARMACEUTICAL INDUSTRY CONSULTING / SCIENTIFIC ADVISORY BOARDS:

2014 Consulting, Advent Venture Partners, UK

2013 Consulting, Piramal Enterprises, India

2012 Consulting, C10 Pharma AS (Norway)

2008-2010 Consulting, CEMPRA Pharmaceuticals

2004-2006 Consulting, Ribonovix, Inc.

2003 Consulting, Kosan Pharmaceutical

2000-2007 Consulting, Pfizer, Inc.

2000-2002 Advisory Board, The UIC/NIH Center for Botanical Dietary Research

2000-2001 Consulting, Schering-Plough

2000-2001 Consulting, Abbott Laboratories

1998-2003 Consulting, Pharmacia & Upjohn

1997-1999 Consulting, Hoechst-Marion-Roussel

1996-1997 Consulting, Rhone-Poulenc Rorer

**EDITORIAL BOARDS OF PEER-REVIEW JOURNALS**

Perspectives in Medicinal Chemistry

Antibiotics

**PEER REVIEWER FOR SCIENTIFIC JOURNALS:**

Nature, Nature Structural and Molecular Biology, Nature Communications, Science, Science Reports, Cell, Molecular Cell, Structure, EMBO Journal, Proceedings of National Academy of Sciences USA, Journal of Molecular Biology, Nucleic Acids Research, Journal of Bacteriology, Journal of Biological Chemistry, RNA, Journal of Medicinal Chemistry, Peptides, EMBO reports, Antimicrobial Agents and Chemotherapy, Molecular Microbiology, PLoS.

### REVIEWER FOR GRANTING AGENCIES:

2015 NIH, NSF, Dynasty Foundation

2014 NIH, NIAID, NSF Ad Hoc reviewer

2012. 2013 Nationals Science Foundation, Graduate Research Awards

2011,2013 Israel Science Foundation

2011 Austrian Science Foundation

2011 Agence Nationale de la Recherche, France

2011 United States-Israel Binational Science Foundation

2011 Ministry of Education and Science, Russia

2010 NSF, Division of Molecular and Cellular Biosciences

2010 NIH, NIAID

2010 Deutsche Forschungsgemeinschaft (Germany)

2009 NSF, Division of Molecular and Cellular Biosciences

2009 NIH, ARRA, NIAID. Ad hoc grant reviewer

2003 NIH Study Section (NIGM), Physiological Chemistry (Ad hoc)

2003-2005 NSF, Division of Molecular and Cellular Biosciences

2001-2007 NSF. Division of Molecular and Cellular Biosciences

2001 Deutsche Forschungsgemeinschaft (Germany)

2000 The Welcome Trust, Molecular and Cell Panel

2000-2007 Austrian Science Foundation

1998, 2000 NIH Study Section (NIGM), Molecular and Cellular Biology (Ad hoc)

### ADVISORY BOARDS, COMMITTEES, OTHER ADMINISTRATIVE DUTIES:

2013-2014 Committee Member, Evaluation Agency for Research and Higher Education, France

2014-2016 Advisory board, Department of Medicinal Chemistry and Pharmacognosy, UIC

2009-2011 Co-organizer, Chicago RNA Club

2008-2014 Chicago Biomedical Consortium. Panel of reviewers

2006-2012 Morrison Rogosa Award Review Committee, ASM

2004-2012 Advisory board, Department of Medicinal Chemistry and Pharmacognosy, UIC

2004-2007 (Chair) Promotion and Tenure Committee, Dpt. Med. Chem. P-Cog., UIC

2004-present Educational Policy Committee (Co-chair) , Dpt. Med. Chem. P-Cog., UIC

2003-present Associate Director, Center for Pharmaceutical Biotechnology, UIC

2003-2005 Educational Policy Committee, College of Pharmacy, UIC

2002-2003 Department Head search committee

2002-2003 Student-Faculty relations Committee, College of Pharmacy, UIC

2001-present Advisory Board, Department of Medicinal Chemistry and Pharmacognosy, UIC

2000-2002 Scientific Advisory Board, The UIC/NIH Center for Botanical Dietary

 Supplement Research in Women's Health

2000-2002 Chair, DNA Sequencing Facility User Committee, UIC

2000-2001 Molecular Biol. Research Building, Common Equipment Committee, UIC

2000-2001 Curriculum Committee, Graduate Program in Medicinal Chemistry, UIC

**SELECTED INVITED TALKS AND SEMINARS:**

2016 DFG Forschergruppe, Hamburg, Germany

2016 UMASS School of Medicine, Worcester, MA

2016 Moscow State University, Belozersky Institute, Moscow, Russia

2015 Yale University, Dpt Microbial Pathogenesis, New Haven, CT

2015 Revolution Medicines, Redwood City, CA

2015 FEBS Meeting, Berlin, Germany

2015 Duke University, Dpt. of Biochemistry, Durham, NC

2015 European Biophysic Congress, Dresden, Germany

2015 Re-Entering Antibacterial Drug Development Summit, Boston, MA

2014 Midwest Pathogenesis Meeting, Chicago, IL

2014 UIC, Medical Sciences Training Program

2014 Institute Pasteur, Paris, France

2014 Rush Medical College, Chicago, IL

2014 Dept. Microbiology, University of Illinois, Chicago, IL

2013 The Uppsala University, Sweden

2013 Gene Center, Munich University, Germany

2013 The Ribosome (Zing Conference), Napa, CA.

2013 The Molecular Biology School, Puschino, Russia

2013 Institute for Physicochemical Biology, Moscow University, Russia

2012 Institute of Genetics and Molecular/Cellular Biology, Strasbourg, France

2012 Mechanisms of gene expression. Homburg, Germany

2012 UIUC, Urbana-Champaign, IL

2012 University of Rochester, Rochester, NY

2012 McMaster University, Hamilton, Canada

2012 Indiana University, Bloomington, IN

2012 Olivet Nazarene University, Bourbonaise, IL

2011 Meeting of the Molecular Biology Society of Japan. Yokohama, Japan

2011 Kyoto Sangyo University. Seminar. Kyoto, Japan

2011 Spirin symposium ‘Translation and the Ribosome’. Moscow, Russia

2011 ASBMB Symposium Systems Biology. Salt Lake City, UT

2011 Antibiotics and Translation Symposium. Tartu University, Tartu,Estonia

2011 J. Menninger retirement seminar. University if Iowa, Iowa City, IA

2011 Suddath Symposium, Georgia Tech, Atlanta, GA

2010 From the RNA World to the Clinic. Janelia Farm Research Campus, VA.

2010 tRNA Workshop, Aveiro, Portugal.

2010 Current Issues of Ribosomal Structure and Function, Berlin, Germany

2010 The Ribosome Meeting, Orvieto, Italy

2009 RNA conference, Chicago Biomedical Consortium, Chicago, IL

2009 Temple University, Philadelphia, PA

2009 RNA Meeting, Madison, WI

2009 Frankfurt University, Germany

2009 Gene Center, University of Munich, Germany

2009 Conversation in Structural Biology, Albany, NY

2008 RNA Meeting, Berlin, Germany

2008 Ribosome Minisymposium, Berlin, Germany

2008 Innsbruck Biocenter, Austria

2008 CEMPRA Pharmaceuticals, Chapel Hill, NC.

2007 The Ribosome Meeting, Cape Cod, MA

2007 Intersci. Conference on Antimicrobial Agents and Chemotherapy, Chicago

2007 CINVESTAV, Mexico City, Mexico

2007 Indiana University School of Medicine, Gary, IN

2007 RNA meeting, CBC Bioconsortium, Chicago, IL

2006 SUNY, New York, NY

2006 Weizmann Institute, Rehovot, Israel

2006 Technion University, Haifa, Israel

2006 Pfizer, Groton, CT

2006 University of Patras, Greece

2005 University of Tartu, Estonia

2005 Moscow State University, Belozersky Institute, Russia

2005 Vicouron Pharmaceutical, Freemont, CA

2004 US-Japan Cooperative Science Program, Kyoto, Japan

2004 ENANTA Pharmaceuticals, Watertown, MA

2004 Ohio State University, Dpt. of Microbiology, Columbus, OH

2004 Ribonovix, Detroit, MI

2004 Pfizer, Ann Arbor, MI

2004 Rib-X Pharmaceuticals, CT

2003 Belozersky Insti. of Physico-Chemical Biology, Moscow State University.

2003 Stowers Institute, Kansas City, MS

2003 Congress of International Union of Biochemistry, Montreal, Canada.

2003 Pharmacia Corporation, MI

2003 Wayne State University, Detroit, MI

2002 Pfizer Research Institute, Groton, CT

2002 Pharmacia Corporation, MI

2002 Spatiotemporal Network of RNA information, Tsukuba, Japan

2002 The Ribosome meeting, Queenstown, New Zealand.

**PUBLICATIONS** (corresponding author(s) underlined):

128. Gupta, P., Liu, B., Klepacki, D., Gupta, V., Schulten K., Mankin, A.S., Vazquez-Laslop, N. (2016) The nascent polypeptide assists the ribosome in discriminating between chemically distinct molecules**.** *Nature Chem. Biol.,12, 153-158.* (Highlighted in Nature Chemical Biology News & Views, Recommended by Faculty of 1000)

127. Gagnon, M.G., Roy, R.N., Lomakin, I.B., Florin, T., Mankin, A.S., Steitz, T.A. (2016) Structures of proline-rich peptides bound to the ribosome reveal a common mechanism of protein synthesis inhibition. Nucl. Acids Res., *ebub ahead of print*.

126. Almutairi, M.M., Park, S.R., Rose, S., Hansen, D.A., Vázquez-Laslop, N., Douthwaite, S., Sherman, D.H., Mankin, A.S. (2015) Resistance to ketolide antibiotics by coordinated expression of rRNA methyltransferases in a bacterial producer of natural ketolides. *Proc. Natl. Acad. Sci. USA*, 112, 12956-12961.

125. Orelle, C., Carlson, E.D., Szal, T., Florin, T., Jewett, M.C., Mankin, A.S. (2015) Protein synthesis by ribosomes with tethered subunits. *Nature* 524, 119-124. (Accompanied by News and Views article, Highlighted in Nature News, Chemistry & Biology, The Scientist, Chemical & Engineering News, The Verge, Scientific American, Nature Methods, Recommended by Faculty of 1000).

124. Kannan, K., Kanabar, P., Schryer, D., Florin, T., Oh, E., Bahroos, N., Tenson, T., Weissman, J.S., Mankin, A.S. (2014) The general mode of translation inhibition by macrolide antibiotics. *Proc. Natl. Acad. Sci. USA* 111, 15958-15963.

123. Polikanov,Y.S., Osterman, I.A., Szal, T., Tashlitsky, V.N., Serebryakova, M.V., Kusochek, P., Bulkley, D., Malanicheva, I.A., Efimenko, T.A., Efremenkova, O.V., Konevega, A.L., Shaw, K.J., Bogdanov, A.A., Rodnina, M.V., Dontsova, O.A., Mankin, A.S., Steitz, T.A., Sergiev. P.V. (2014) Amicoumacin A inhibits translation by stabilizing mRNA interaction with the ribosome. *Mol. Cell* 56, 531-540.

122. Polikanov,Y.S., Szal, T., Jiang, F., Gupta, P., Matsuda, R., Shiozuka, M., Steitz, T.A., Vázquez-Laslop N., Mankin, A.S. (2014) Negamycin interferes with decoding and translocation by simultaneous interaction with rRNA and tRNA. *Mol. Cell* 56, 541-550.

121. Sothiselvam, S., Liu, B., Han, W., Ramu, H., Klepacki, D., Atkinson, G.C., Brauer, A., Remm, M., Tenson, T., Schulten, K., Vázquez-Laslop, N., Mankin, A.S. (2014) Macrolide antibiotics allosterically predispose the ribosome for translation arrest. *Proc. Natl. Acad. Sci. USA* 111, 9804-9809.

120. Vázquez-Laslop, N., Mankin, A.S. (2014) Protein accounting in the cellular economy. *Cell*, 157, 529-531.

119. Vázquez-Laslop, N., Mankin, A.S. (2014) Triggering peptide-dependent translation arrest by small molecules: ribosome stalling modulated by antibiotics. In: Regulatory Nascent Polypeptides (Ito, K., *ed*). Springer (Tokyo), pp. 165-186.

118. Arenz, S., Ramu, H., Gupta, P., Berninghausen, O., Beckmann, R., Vázquez-Laslop, N., Mankin, A.S., Wilson, D.N. (2014) Molecular basis for erythromycin-dependent ribosome stalling during translation of the ErmBL leader peptide. *Nat. Commun.* 5, 3501 DOI 10.138/ncomms4501.

117. Martínez, A.K., Gordon, E., Sengupta, A., Shirole, N., Klepacki, D., Martinez-Garriga, B., Brown, L.M., Benedik, M.J., Yanofsky, C., Mankin, A.S., Vazquez-Laslop, N., Sachs, M.S., Cruz-Vera, L.R. (2014) Interactions of the TnaC nascent peptide with rRNA in the exit tunnel enable the ribosome to respond to free tryptophan. *Nucl. Acids Res.*, 42, 1245-1256.

116. Gupta, P., Kannan, K., Mankin, A.S., Vázquez-Laslop, N. (2013) Regulation of gene expression by macrolide-induced ribosomal frameshifting. *Mol. Cell* 52, 629-642. (*Nature*, News and Views; *Mol Cell*, Issue Highlight; *Mol. Cell*, preview article; Recommended by *Faculty of 1000*)

115. Orelle, C., Carlson, S., Kaushal, B., Almutairi, M.M., Liu, H., Ochabowicz, A., Quan, S., Pham, V.C., Squires, C.L., Murphy, B.T., Mankin, A.S. (2013) Tools for characterizing bacterial protein synthesis inhibitors. *Antimicrob. Agents Chemother.* 57, 5994-6004.

114. Gupta, P., Sothiselvam, S., Vázquez-Laslop, N., Mankin, A. S. (2013) Deregulation of translation due to posttranscriptional modification of rRNA explains why erm genes are inducible. *Nat. Commun.*, 4, 1984. (Recommended by *Faculty of 1000*)

113. Orelle, C., Szal, T., Klepacki, D., Shaw, K.J., Vázquez-Laslop, N., Mankin, A.S. (2013) Identifying the targets of aminoacyl-tRNA synthetase inhibitors by primer extension inhibition. *Nucl. Acids Res.* 10, 526.

112. LaMarre, J., Mendes, R.E., Szal, T., Schwarz, S., Jones, R.N., Mankin, A.S. (2013) The genetic environment of the cfr gene and the presence of other mechanisms account for the very high linezolid resistance of the *Staphylococcus epidermidis* isolate 426-3147L. *Antimicrob. Agents Chemother* 57, 1173-1179. (reviewed: MDlinx)

111. Kannan, K., Vázquez-Laslop, N., Mankin, A. S. (2012) Selective proteins synthesis by ribosomes with a drug-obstructed exit tunnel. *Cell*, 151, 508-520.(Highlighted in Cell Preview, Nat.Rev.Microbiol., ACS Chemical Biology, The Scientist, Chemistry and Biology) (Recommended by *Faculty of 1000*)

110. LeTourneau N, Vimal P, Klepacki D, Mankin A, Melman A. (2012) Synthesis and antibacterial activity of desosamine-modified macrolide derivatives. *Bioorg. Med. Chem. Lett.* 22, 4575-4578.

109. Locke, J. B., Rahawi, S., LaMarre, J. M., Mankin, A. S., Shaw, K. J. (2012) Genetic environment and stability of *cfr* in methicillin-resistant *Staphylococcus aureus* CM05. *Antimicrob. Agents Chemother*. 56, 332-340.

108. Kannan, K., Mankin, A. S. (2011) Macrolide antibiotics in the ribosome exit tunnel: species-specific binding and action. *Ann. N. Y. Acad. Sci.*, 1241, 33-47

107. LaMarre, J. M, Howden, B. P., Mankin, A. S. (2011) Inactivation of the indigenous methyltransferase RlmN in *Staphylococcus aureus* increases linezolid resistance *Antimicrob. Agents Chemother*. 55, 2989-2991 (Recommended by *Faculty of 1000*)

106. LaMarre, J. M., Locke, J.B., Shaw, K.J., Mankin, A. S. (2011) Low fitness cost of the multidrug resistance gene *cfr*. *Antimicrob. Agents Chemother.* 55, 3714-3719.

105. Vázquez-Laslop, N., Mankin, A.S. (2011) Picky nascent peptides do not talk to foreign ribosomes. *Proc. Natl. Acad. Sci. USA* 108, 5931-5932.

104. Vazquez-Laslop, N., Klepacki, D., Mulhearn, D.C., Krasnykh, O., Franzblau, S.G, Mankin, A.S. (2011) Role of antibiotic ligand in nascent peptide–dependent ribosome stalling. *Proc. Natl. Acad. Sci. USA,* 108, 10496-10501.

103. Ramu, H., Vázquez-Laslop, N., Klepacki, D., Dai, Q., Piccirilli, J., Micura, R., Mankin, A.S. (2011) Nascent peptide in the ribosome exit tunnel affects functional properties of the A-site of the peptidyl transferase center. *Mol. Cell*, 41, 321-330. (Recommended by *Faculty of 1000*)

102. David-Eden, H., Mankin, A.S., Mandel-Gutfreund, Y. (2010) Structural signatures of antibiotic binding sites on the ribosome. *Nucl. Acids Res.* 38, 5982-5994.

101. Vázquez-Laslop, N., Ramu, H., Klepacki, D., Kannan, K., Mankin, A.S. (2010) The key function of a conserved and modified rRNA residue in the ribosomal response to the nascent peptide. *EMBO J.*, 29, 3108-3117.

100. Llano-Sotelo, B., Dunkle, J.A., Klepacki, D., Zhang, W., Fernandes, P., Cate, J.H.D., Mankin, A.S. (2010) Binding and action of CEM-101, a new fluoroketolide antibiotic that inhibits protein synthesis. *Anitmicrob. Agents. Chemother.* 54, 4961-4970.

99. Dunkle, J.A., Xiong, L., Mankin, A.S., Cate, J.H.D. (2010) Structures of the *Escherichia coli* ribosome with antibiotics bound near the peptidyl transferase center explain spectra of drug action. *Proc. Natl. Acad. Sci. USA* 107, 17152-17157.

98. Yan,F., LaMarre, J.M., Röhrich, R., Wiesner, J., Jomaa, H., Mankin, A.S., Galonić-Fujimori, D. (2010) RlmN and Cfr are radical SAM enzymes involved in methylation of ribosomal RNA. *J. Am. Chem. Soc.*132, 3953-3964. (Recommended by *Faculty of 1000*)

97. Auerbach, T., Mermershtain, I., Davidovich, C., Bashan, A., Belousoff, M., Wekselman, I., Zimmerman, E., Xiong, L., Klepacki, D., Arakawa, K., Kinashi, H., Mankin, A.S., Yonath, A. (2010) The structure of ribosome-lankacidin complex reveals ribosomal sites for synergistic antibiotics. *Proc. Natl. Acad. Sci. USA* 107, 1983-1988.

96. Llano-Sotelo, B., Kleapcki, D., Mankin A.S. (2009) Selection of small peptides, inhibitors of translation. *J. Mol. Biol.* 391, 813-819. (Recommended by *Faculty of 1000*)

95. Llano-Sotelo, B., Hickerson, R.P, Lancaster, L., Noller, H.F., Mankin A.S. (2009) Fluorescently-labeled ribosomes as a tool for analyzing antibiotic binding. *RNA* 15, 1597-1604.

94. Katz, L. and Mankin, A.S. (2009) Macrolides. In Encyclopedia of Microbiology (Third Edition), (Schaechter M., ed.) Elsevier Press, pp. 529-558.

93. Ramu, H., Mankin, A. and Vazquez-Laslop, N. (2009) Programmed drug-dependent ribosome stalling. *Mol. Microbiol.* 71, 811-824.

92. Siibak, T., Peil, L., Xiong, L., Mankin A., Remme, J., Tenson, T. (2009) Erythromycin- and chloramphenicol-induced ribosomal assembly defects are secondary effects of protein synthesis inhibition. *Antimicrob. Agents. Chemother.* 53, 563-571. (Recommended by *Faculty of 1000*)

91. Mankin, A.S. (2008) Macrolide myths. *Curr. Opin. Microbiol.*, 11, 414-421.

90. Toh, S,-M., Mankin, A.S. (2008) An indigenous posttranscriptional modification in the ribosomal peptidyl transferase center confers resistance to an array of protein synthesis inhibitors. *J. Mol. Biol.*, 14, *593-597*.

89. Vazquez-Laslop, N., Thum, C., Mankin, A.S. (2008) Molecular mechanism of drug-dependent ribosome stalling. *Mol. Cell* 30, 190-202. (Recommended by *Faculty of 1000*)

88. Smith, L.K., Mankin, A.S. (2008) Transcriptional and translational control of the *mlr* operon, which confers resistance to seven classes of protein synthesis inhibitors. *Antimicrob. Agents Chemother.* 52, 1703-1712.

87. Bailey, M., Chettiath, T., Mankin, A.S. (2008) Induction of *erm*(C) expression by ‘non-inducing’ antibiotics. *Antimicrob. Agents. Chemother.* 52, 866-874.

86. Toh, S,-M., Xiong, L., Bae, T., Mankin, A.S. (2008) The methyltransferase YfgB/RlmN is responsible for modification of adenosine 2503 in 23S rRNA. *RNA* 14, *98-106*.

85. Mankin, A.S., Polacek, N. (2008) SPARK: A new peptidyl transferase activity assay. *Methods Mol. Med.* 142, 107-116.

84. Samant, S., Lee, H., Ghassemi, M., Chen, J., Cook, J.L., Mankin, A.S., Neyfakh, A.A. (2008) Nucleotide biosynthesis is critical for growth of bacteria in human blood. *PLoS Pathogen* 4, e37.

83. Yassin, A., Mankin, A.S. (2007) Potential new antibiotic sites in the ribosome revealed by deleterious mutations in RNA of the large ribosomal subunit. *J. Biol. Chem*., 282, 24329-24342.

82. Leach, K.L., Swaney, S.M., Colca, J.R., McDonald, W.G., BlinnJ.R., Thomasco, L.M., Gadwood, R.C., Shinabarger, D. , Xiong, L., Mankin, A.S. (2007) The site of action of oxazolidinone antibiotics in living bacteria and in human mitochondria. *Mol. Cell*, 26, 393-402.

81. Toh, S.-M, Xiong, L., Arias, C.A., Villegas, M.V., Lolans, K., Quinn, J., Mankin, A.S. (2007) Acquisition of a natural resistance gene renders a clinical strain of methicillin-resistant *Staphylococcus aureus* resistant to the synthetic antibiotic linezolid. *Mol. Microbiol.* 64, 1506-1514.

80. Mankin, A.S. (2006) Antibiotic blocks mRNA path on the ribosome. *Nat. Struct. Mol. Biol.* 13, 858-860.

79. Tenson, T., Mankin, A.S. (2006) Antibiotics and the ribosome. *Mol. Microbiol.* 59,1664-1677.

78. Sherman, D., Xiong, L., Mankin, A.S., Melman, A. (2006) Synthesis and biological investigation of new 4''-malonyl tethered derivatives of erythromycin and clarithromycin. *Bioorg. Med. Chem. Lett*. 16, 1506-1509.

77. Mankin, A.S. (2006) Nascent peptide in the birth canal of the ribosome. *Trends. Biochem. Sci*. 31, 11-13, 2006.

76. Maguire, B.A., Beniaminov, A.D., Ramu, H., Mankin, A.S., Zimmermann, R.A. (2005) A protein component at the heart of an RNA machine: the importance of protein L27 for the function of the bacterial ribosome. *Mol. Cell* 20, 427-435. (Recommended by *Faculty of 1000*)

75. Yassin, A., Fredrick, K., Mankin, A.S. (2005) Deleterious mutations in small subunit ribosomal RNA identify functional sites and potential targets for antibiotics. *Proc. Natl. Acad. Sci. USA.* 102, 16620-16625.

74. Polacek, N., Mankin, A.S. (2005) The ribosomal peptidyl transferase center: structure, function, evolution, inhibition. *Crit. Revs. Biochem. Molec. Biol.* 40, 285-311.

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**PATENTS:**

Method of Screening to Find New Antibiotics. U.S. Patent 5,958,695 (1999).

 Inventor: Alexander Mankin

Mapping New Sites of Antibiotic Action in the Ribosome. International Publication Number WO 2006/121703. Inventors: Alexander Mankin and Aymen Yassin

Identification and Use of Peptide Inhibitors of Protein Synthesis. U.S. Patent 8,648,035 (2014). Inventors: Alexander Mankin, Beatrice Llano-Sotelo, Dorota Klepacki

**PAST TRAINEES AND THEIR CURRENT POSITIONS**

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