ANNA MARIE PYLE
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Yale University and Howard Hughes Medical Institute
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A. FIELDS OF SPECIALIZATION:

Structure and function of large RNA molecules: ribozymes, introns, lncRNAs and viral RNA; Mechanisms of RNA-stimulated helicases and signaling enzymes; Small molecule targeting of RNA structure.

B. ACADEMIC TRAINING:

1986-1990 Ph.D., Chemistry, Columbia University
1981-1985 B.A., Chemistry, *magna cum laude*, Princeton University
1983-1985 Program Certificate in Science Policy, Woodrow Wilson School of Princeton University

C. POSITIONS:

Yale University, Molecular, Cellular and Developmental Biology and Chemistry, Sterling Professor (2018-present)
Yale University, Molecular, Cellular and Developmental Biology and Chemistry, William Edward Gilbert Professor (2010-2018)
Howard Hughes Medical Institute, Investigator (1997-present)
Yale University, Molecular Biophysics and Biochemistry, Professor (2002-2010)
Columbia University, Biochemistry and Molecular Biophysics, Professor (2001-2002); Associate Professor, Tenure (1997-2001); Assistant Professor (1992-1997)
University of Colorado, Postdoc research with Dr. Thomas R. Cech. Jane Coffin Childs Fellow (1990-1992)
Columbia University, Graduate research with Dr. Jacqueline K. Barton. New transition metal complexes for recognition of double-stranded DNA (1986-1989)

D. HONORS:

Awards and Distinguished Fellowships:

Sterling Professor of Molecular, Cellular and Developmental Biology, Yale University (2018)
Novartis Lecture, University of Pennsylvania (2018)
Gomberg Lecture, University of Michigan (2018)
Jerry A. Weisbach Memorial Lecture, Rockefeller University (2018)
Blavatnik Fund for Innovation Award, New Haven (2017, 2018 and 2019)
Plenary Lecturer, ASBMB Annual Meeting, San Diego, CA (2016)
Elected Member, Connecticut Association of Science and Engineering (2016)
Keynote Speaker, Keystone Meeting on Positive-Strand Viruses (2016)
Green Lectureship in Enzymology, University of Wisconsin, Madison (2016)
Distinguished Lecturer, Frontiers in Chemistry, Case Western Reserve University (2013)
Michael Gait Award and Lectureship, Cambridge University (2013)
R. Gaurth Hansen Lecturer, Utah State University (2012)
Stupka Memorial Lecturer, Iowa State University (2011)
Distinguished Visitor, European Molecular Biology Laboratory, Heidelberg (2011)
Karl Friedrich Bonhoeffer Lecturer in Biophysics, Max Planck Institute Göttingen (2011)
Fellow of the American Association for the Advancement of Science (2007)
Endowed Chair, The William Edward Gilbert Professorship, Yale University (2005)
Member of the American Academy of Arts and Sciences (2005)
Mayor's Award for Excellence in Science and Technology, New York (2002)
Investigator, Howard Hughes Medical Institute (1997-present)
NSF National Young Investigator Award (1994-1999)
Beckman Young Investigator (1994-1996)
Searle Scholars Award (1993-1996)
Irma T. Hirschl and Monique Weill-Caulier Career Scientist Award (1992-1997)
Jane Coffin Childs Memorial Fund Postdoctoral Fellowship (1990-1992)
Pegram Award, Columbia University (1989)
J. Malcolm Miller Teaching Award, Columbia University (1986)

E. PROFESSIONAL ASSOCIATIONS AND ACTIVITIES:

University Service:

Quantitative Biology Strategic Planning Committee, Yale University (2018)
Yale University Science Strategy Committee (2016-2018)
Chair, Committee for Design and Construction of the Yale Science Building (2014-present)
Faculty Resource Committee, Yale University (2014-2018)
Budget Advisory Committee, Yale University (2013-present)
Presidential Search Committee, Yale University (2012)
Yale Committee on Cooperative Research (2012-2015)
Physical Sciences Advisory and Tenure Appointments Committee; Yale University (2011-2013)
FASTAP Committee for restructuring of the Yale tenure system (2007-2010)
Advisory Board, Yale West Campus Institute for Systems Biology (2009-2013)
Divisional Director for Biological Sciences, Yale University (2004-2008)
Biological Sciences Advisory and Tenure Appointments Committee; Yale University (2003-2008)
Executive Committee for the Yale Molecular Virology Program (2007-2012)
Member: Yale Molecular Virology Program (2007-present)
Member: Yale Cancer Center (2006-present)
Yale Medical School Strategic Planning Committee (2005)
Yale BSAC Subcommittee on Computational Biology (2004)
Yale Wilbur Cross Medalist Selection Committee (Fall 2004-2008)
Search Committee for the Dean of Columbia Medical School (2002)
Dean's Committee on Strategic Planning for Columbia Health Sciences (2001)
Committee for Selection of Louisa Gross Horwitz Prize Awardees (2000-2002)

External Scientific Activities and Service:

President, RNA Society (2019-present)
Telluride Science Research Center Advisory Board Member (2019-present)
Max Planck Institute for Biophysical Chemistry, Göttingen, Advisory Board Member (2019-present)
Arrakis Therapeutics Scientific Advisory Board Member (2016-present)
Vice-Chair, Brookhaven National Laboratory Science and Technology Steering Committee (2013-present)
National Synchrotron Light Source II Biological Beamline Advisory Team (2009-present)
Chair, NIH Study Section MSFA (2014-2016); Member, NIH Study Section MSFE (2010-2013)
External Review Panel, EMBL Outstation at Grenoble, France (2013)
American Society for Biochem. & Molecular Biology (ASBMB) Nominating Committee (2010-2013)
Member, NIH Study Section MGB (2004-2007)

Editorial Boards and Editorial Service:

Co-Editor (with David Christianson)*, Methods in Enzymology (2013-present)*
Board of Reviewing Editors*, eLife (2017-present)*
Editorial Board Member, *The RNA Journal* (1998-2005, 2019-present)
Associate Editor, *Journal of Molecular Biology* (2019-present); Editorial Board Member *(2007-2018)*
Editor: *Current Opinion Structural Biology (2006)* ***Vol 16;*** *(2011)* ***Vol 21;*** *(2016)* ***Vol 36***
Editorial Board*, Nucleic Acids Research (1995-2005)*

Meeting Organization:

Telluride Meeting, Co-founder and Co-organizer (2014, 2016 and 2018)
Keystone Meeting on Structural Biology of Cellular Processes, Co-Organizer (2012)
American Society of Biochemistry & Molecular Biology Annual Meeting, Co-Organizer (2008)
Nucleic Acids Gordon Conference, Organizer (2004, 2021)
FASEB Helicase Meeting, Chair (2003); Co-Chair (2001); Nucleic Acid Enzymes Meeting, Chair (2002).
Proteins that Bind RNA (Meeting Series Founder and Organizer, 1998 and 2001)
RNA Society Meeting, Co-Organizer (1998, 2015, 2020)

Memberships:

American Society for Microbiology (ASM)
American Society for Biochemistry and Molecular Biology (ASBMB)
American Association for the Advancement of Science (AAAS)

American Chemical Society (ACS)
The RNA Society
The Biophysical Society

F. TEACHING EXPERIENCE:
Professor in Charge: "Molecular Biology", MCDB 200; Yale University, 2012-present.
Professor in Charge: "Biochemical and Biophysical Approaches in Molecular and Cell Biology", Yale University, 2011-2015.
Founder and Professor in Charge: "Macromolecular Interactions & Dynamic Properties", Yale University, 2004-2011.
Contributing Lecturer and co-founder: "Enzyme Mechanisms", Yale University, 2004.
Contributing Lecturer and co-founder: "Macromolecular Structure and Biophysical Analysis", Yale University, 2004- 2010.
Professor in Charge: "Structure and Chemistry of Proteins and Nucleic Acids" Yale University, 2003.
Contributing lecturer: "Eukaryotic Molecular Biology" Yale University; 2004.
Founder and lecturer: "Structure and Function of Nucleic Acids", Columbia University, 1994-2002
Contributing lecturer: "Advanced Eukaryotic Molecular Genetics", Columbia University, 1996-2002.
Contributing lecturer: "Eukaryotic Molecular Biology" and "Biochemistry", Columbia University, 1992-2002.

G. PATENTS:
1. U.S. PATENT #5,872,241 "Multiple Component RNA Catalysts and Uses Thereof". Filed January 25, 1995. Awarded to Anna Marie Pyle and William Michels, February 16, 1999.
2. Patent pending #20160046943: "Interferon Production Using Short RNA Duplexes". Filed September 14, 2015 by Anna Marie Pyle, Andrew S. Kohlway and Dahai Luo.
3. International Patent pending #PCT/US18/39738: "Improved Reverse Transcriptase and Methods of Use". Filed June 27, 2018 by Anna Marie Pyle and Chen Zhao.
4. Provisional application pending #62/687,606: "Combination Treatments Using RIG-I Agonists". Filed June 20, 2018 by Anna Marie Pyle, Akiko Iwasaki, Olga Fedorova, Xiaodong Jiang.
5. Provisional application pending #62/743,387: "RIG-I Agonists and Methods of Using Same". Filed October 9, 2018 by Anna Marie Pyle, Akiko Iwasaki.
6. Provisional application pending # 62/743,369: "Combination Treatments Using RIG-I Agonists". Filed June 20, 2018 by Anna Marie Pyle, Akiko Iwasaki, Olga Fedorova, Xiaodong Jiang.
7. Provisional application pending # 62/622,287: "Compositions and Methods for Inhibiting Group II Intron RNA". Filed January 2, 2018 by Anna Marie Pyle, Olga Fedorova, Eric Gunnar Jagdmann, Michael Van Zandt, Lin Yuan, Albert DeBerardinis.

H. PUBLICATIONS:
188. " RIG-I recognition of RNA targets: The influence of terminal base-pair sequence and overhangs on affinity and signaling ", Xiaoming Ren, Melissa M. Linehan, Akiko Awasaki and Anna Marie Pyle, *Cell Reports* (2019) in press.

187. "RNA Binding Activates RIG-I by Releasing an Autorepressed Signaling Domain", Thayne Dickey, Bo Song and Anna Marie Pyle. *Science Advances* (2019), eaax3641. PMID: 31616790.

186. "Intratumoral delivery of RIG-I agonist SLR14 induces robust antitumor responses", Xiaodong Jiang, Viswanathan Muthusamy, Olga Fedorova, Daniel J. Kim, Marcus Bosenberg, Anna Marie Pyle, and Akiko Iwasaki, *Journal of Experimental Medicine* (2019) [Epub ahead of print]. PMID: 31601678.

185. "Discovery of N-Substituted 3-Amino-4-(3-boronopropyl)pyrrolidine-3-carboxylic Acids as Highly Potent Third-Generation Inhibitors of Human Arginase I and II", Michael C. Van Zandt, G. Erik Jagdmann, Darren L. Whitehouse, Min Ji, Jennifer Savoy, Olga Potapova, Alexandra Cousido-Siah, Andre Mitschler, Eduardo I. Howard, Anna Marie Pyle, Alberto D. Podjarny, *J Med Chem.* (2019) 62, 8164-8177. PMID: 31408339.

184. "Sensitive detection of structural features and rearrangements in long, structured RNA molecules", Rebecca L. Adams, Nicholas C. Huston, Rafael C. Tavares and Anna Marie Pyle, *Methods Enzymol.* (2019) 623, 249-289. PMID: 31239050.

183. "Phylogenetic analysis with improved parameters reveals conservation in lncRNA structures", Rafael C. Tavares, Anna Marie Pyle and Srinivas Somarowthu, *J Mol Biol.* (2019) 431, 1592-1603. PMID: 30890332.

182. "RIG-I selectively discriminates against 5'-monophosphate RNA", Xiaoming Ren, Melissa M. Linehan, Akiko Iwasaki and Anna Marie Pyle, *Cell Rep.* (2019) 26, 2019-2027. PMID: 30784585.

181. "Small molecules that target group II introns are potent antifungal agents", Olga Fedorova, G. Erik Jagdmann Jr., Rebecca L. Adams, Lin Yuan, Michael C. Van Zandt and Anna Marie Pyle, *Nat Chem Biol.* (2018) 14, 1073-1078. PMID: 30323219.

180. "Therapeutically active RIG-I agonist induces immunogenic tumor cell killing in breast cancers", David L. Elion, Max E. Jacobson, Donna J. Hicks, Bushra Rahman, Violeta Sanchez, Paula I. Gonzalez-Ericsson, Olga Fedorova, Anna Marie Pyle, John T. Wilson and Rebecca S. Cook, *Cancer Res.* (2018) 78, 6183-6195. PMID: 30224377.

179. "Regional Differences in Airway Epithelial Cells Reveal Tradeoff between Defense against Oxidative Stress and Defense against Rhinovirus", Valia T. Mihaylova, Yong Kong, Olga Fedorova, Lokesh Sharma, Charles S. Dela Cruz, Anna Marie Pyle, Akiko Iwasaki and Ellen F. Foxman, *Cell Rep.* (2018) 24, 3000-3007. PMID: 30208323.

178. "microRNA-122 amplifies hepatitis C virus translation by shaping the structure of the internal ribosomal entry site", Philipp Schult, Hanna Roth, Rebecca L. Adams, Caroline Mas, Lionel Imbert, Christian Orlik, Alessia Ruggieri, Anna Marie Pyle and Volker Lohmann, *Nat Commun.* (2018) 9, 2613. PMID: 29973597.

177. "A minimal RNA ligand for potent RIG-I activation in living mice", Melissa M. Linehan, Thayne H. Dickey, Emanuela S. Molinari, Megan E. Fitzgerald, Olga Potapova, Akiko Iwasaki and Anna Marie Pyle, *Sci. Adv.* (2018) 4, E1701854. PMID: 29492454.

176. "Environmentally triggerable retinoic acid-inducible gene I agonists using synthetic polymer overhangs", CR Palmer, ME Jacobson, Olga Fedorova, Anna Marie Pyle and John T. Wilson, *Bioconjug Chem.* (2018) 29, 742-747. PMID: 29350913.

175. "An ultra-processive, accurate reverse transcriptase encoded by a metazoan group II intron", Chen Zhao, Fei Liu and Anna Marie Pyle, *RNA.* (2018) 24, 183-195. PMID: 29109157.

174. "NS3 from HCV strain JFH-1 is an unusually robust helicase that is primed to bind and unwind viral RNA", Ting Zhou, Xiaoming Ren, Rebecca L. Adams and Anna Marie Pyle, *J. Virol.* (2017) 92, 01253-17. PMID: 29070684.

173. "The SMAD3 transcription factor binds complex RNA structures with high affinity", Thayne H. Dickey and Anna Marie Pyle, *Nucleic Acids Res.* (2017) 45, 11980-11988. PMID: 29036649.

172. "Structural basis for IL-1α recognition by a modified DNA aptamer that specifically inhibits IL-1α signaling", Xiaoming Ren, Amy D. Gelinas, Ira von Carlowitz, Nebojsa Janjic and Anna Marie Pyle, *Nat Commun.* (2017) 8, 810. PMID: 28993621.

171. "The group II intron maturase: a reverse transcriptase and splicing factor go hand in hand", Chen Zhao and Anna Marie Pyle, *Curr Opin Struct Biol.* (2017) 47, 30-39. PMID: 28528306.

170. "Functional RNA structures throughout the Hepatitis C Virus genome", Rebecca L. Adams, Nathan Pirakitikulr and Anna Marie Pyle, *Curr Opin Virol.* (2017) 24, 79-86. PMID: 28511116.

169. "Structural insights into the mechanism of group II intron splicing", Chen Zhao and Anna Marie Pyle, *Trends Biochem Sci.* (2017) 42, 470-482. PMID: 28438387.

168. "Selective RNA targeting and regulated signaling by RIG-I is controlled by coordination of RNA and ATP binding", Megan E. Fitzgerald, David C. Rawling, Olga Potapova, Xiaoming Ren, Andrew Kohlway and Anna Marie Pyle, *Nucleic Acids Res.* (2017) 45, 1442-1454. PMID: 28180316.

167. "Opportunities and challenges in RNA structural modeling and design", Tamar Schlick and Anna Marie Pyle, *Biophys J.* (2017) 113, 282-289. PMID: 28162235.

166. "Visualizing the secondary and tertiary architectural domains of lncRNA RepA", Fei Liu, Srinivas Somarowthu and Anna Marie Pyle, *Nature Chemical Biology* (2017) 13, 282-289. PMID: 28068310.

165. "Inverted repeat Alu elements in the human lincRNA-p21 adopt a conserved secondary structure that regulates RNA function", Isabel Chillon and Anna Marie Pyle, *Nucleic Acids Res.* (2016) 44, 9462-9471. PMID: 27378782.

164. "Group II intron self-splicing", Anna Marie Pyle, *Annu Rev Biophys.* (2016) 45, 183-205. PMID: 27391926.

163. "Transcriptome analysis of human cumulus cells reveals hypoxia as the main determinant of follicular senescence", Emanuela Molinari, Bar Haim, Anna Marie Pyle and Pasquale Patrizio, *Mol Hum Reprod.* (2016) 22, 866-876. PMID: 27268410.

162. "Crystal structures of a group II intron maturase reveal a missing link in spliceosome evolution", Chen Zhao and Anna Marie Pyle, *Nat Struct Mol Biol.* (2016) **23**, 558-565. PMID: 27136328.

161. "Editorial overview: Nucleic acids and their protein complexes", David M. Lilley and Anna Marie Pyle, *Curr Opin Struct Biol.* 2016, 36:vii-viii. PMID: 26948825.

160. "The Coding Region of the HCV Genome Contains a Network of Regulatory RNA Structures", Nathan Pirakitikulr, Andrew Kohlway, Brett D. Lindenbach and Anna Marie Pyle, *Molecular Cell.* (2016) **62**, 111-120. PMID: 26924328.

159. "Challenges in RNA structural modeling and design", Anna Marie Pyle and Tamar Schlick, *J Mol Biol.* (2016) **428**, 733-735. PMID: 26876599.

158. "Crystal structure of group II intron domain 1 reveals a template for RNA assembly", Chen Zhao, K.R. Rajashankar, Marco Marcia and Anna Marie Pyle, *Nature Chemical Biology* (2015) **11**, 967-972. PMID: 26502156.

157. "Establishing the role of ATP for the function of the RIG-I innate immune sensor", David C. Rawling, Megan E. Fitzgerald and Anna Marie Pyle, *Elife* (2015) Sep 15:4, pii: e09391. PMID: 26371557.

156. "Native purification and analysis of long RNAs", Isabel Chillón Gazquez, Marco Marcia, Michal Legiewicz, Fei Liu, Srinivas Somarowthu and Anna Marie Pyle, *Methods Enzymol.* (2015) **558**, 3-37. PMID: 26068736.

155. "HOTAIR forms an intricate and modular secondary structure", Srinivas Somarowthu, Michal Legiewicz, Isabel Chillón Gazquez, Marco Marcia, Fei Liu and Anna Marie Pyle, *Mol Cell* (2015) **58**, 353-361. PMID: 25866246.

154. "Rediscovering RNA", Anna Marie Pyle, *RNA* (2015) **21**, 714-715. PMID: 25780205.

153. "Temperature-dependent innate defense against the common cold virus limits viral replication at warm temperature in mouse airway cells", Ellen F. Foxman, Megan E. Fitzgerald, Bethany R. Wasik, Lin Hou, Hongyu Zhao, Paul E. Turner, Anna Marie Pyle and Akiko Iwasaki, *Proc. Natl. Acad. Sci. USA* (2015) **112**, 827-832. PMID: 25561542.

152. "Looking at LncRNAs with the Ribozyme Toolkit", Anna Marie Pyle, *Mol Cell* (2014) **56**, 13-17. PMID: 25280101.

151. "The RIG-I ATPase core has evolved a functional requirement for allosteric stabilization by the Pincer domain", David Rawling, Andrew Kohlway, Dahai Luo, Steve C. Ding and Anna Marie Pyle, *Nucleic Acids Res.* (2014) **42**, 11601-11611. PMID: 25217590.

150. "The linker region of NS3 plays a critical role in the replication and infectivity of hepatitis C virus", Andrew Kohlway, Nathan Pirakitikulr, Steve C. Ding, Feng Yang, Dahai Luo, Brett D. Lindenbach and Anna Marie Pyle, *J. Virol.* (2014) **88**, 10970-10974. PMID: 24965468.

149. "An evolving arsenal: viral RNA detection by RIG-I-like receptors", Megan E. Fitzgerald, David C. Rawling, Adriana Vela and Anna Marie Pyle, *Curr Opin Microbiol.* (2014) **6,** 76-81. PMID: 24912143.

148. "Parts, assembly and operation of the RIG-I family of motors", David C. Rawling and Anna Marie Pyle, *Curr Opin Struct Biol.* (2014) **25,** 25-33. PMID: 24878341.

147. "Principles of ion recognition in RNA: insights from the group II intron structures", Marco Marcia and Anna Marie Pyle, *RNA* (2014) **4,** 516-527. PMID: 24570483.

146. "Dicer-related helicase 3 (DRH-3) forms an obligate dimer for recognizing 22G-RNA", Megan Fitzgerald, Adriana Vela and Anna Marie Pyle, *Nucleic Acids Res.* (2014) **42**, 3919-3930. PMID: 24435798.

145. "Coordinating the party: assembly factors and ribogenesis", Anna Marie Pyle, *Mol Cell.* (2013) **52,** 469-470. PMID: 24267447.

144. "Visualizing the ai5γ group IIB intron", Srinivas Somarowthu, Michal Legiewicz, Kevin S. Keating and Anna Marie Pyle, *Nucleic Acids Res.* (2013) **42**, 1947-1958. PMID: 24203709.

143. "Solving nucleic acid structures by molecular replacement: examples from group II intron studies", Marco Marcia, Elisabeth Humphris-Narayanan, Kevin S. Keating, Srinivas Somarowthu, K. Rajashankar and Anna Marie Pyle, *Acta Crystallogr D Biol Crystallogr.* (2013) **69,** 2174-2185. PMID: 24189228.

142. "Hepatitis C virus RNA replication and virus particle assembly require specific dimerization of the NS4A protein transmembrane domain", Andrew Kohlway, Nathan Pirakitikulr, Francisco N. Barrera, Olga Potapova, Donald M. Engelman, Anna Marie Pyle and Brett D. Lindenbach*, J Virol.* (2013) **88**, 628-642. PMID: 24173222.

141. "Non-coding RNAs: A story of networks and long distance relationships", Marina Ostankovitch and Anna Marie Pyle, *J Mol Biol.* (2013) **425,** 3577-3581. PMID: 23911549.

140. "Defining the functional determinants for RNA surveillance by RIG-I", Andrew Kohlway, Dahai Luo, David C. Rawling, Steve C. Ding and Anna Marie Pyle, *EMBO Rep.* (2013) **14,** 772-779. PMID: 23897087.

139. "Predicted group II intron lineages E and F comprise catalytically active ribozymes", Vivian Nagy, Nathan Parakitikulr, Katherine I. Zhou, Isabel Chillon, Jerome Luo and Anna Marie Pyle, *RNA* (2013) **19,** 1266-1278. PMID: 23882113.

138. "Now on display: a gallery of group II intron structures at different stages of catalysis", Marco Marcia, Srinivas Somarowthu and Anna Marie Pyle, *Mob DNA* (2013) **4,** 14. PMID: 23634971.

137. "Duplex RNA activated ATPases (DRAs): Platforms for RNA sensing signaling and processing", Dahai Luo, Andrew Kohlway and Anna Marie Pyle, *RNA Biol.* (2013) **10,** 111-120. PMID: 23228901.

136. "Visualizing group II intron catalysis through the stages of splicing", Marco Marcia and Anna Marie Pyle, *Cell* (2012) **151,** 497-507. PMID: 23101623.

135. "The thermodynamic basis for viral RNA detection by the RIG-I innate immune sensor", Adriana Vela, Olga Fedorova, Steve O. Ding and Anna Marie Pyle, *J Biol Chem*. (2012) **287,** 42564-42573. PMID: 23055530.

134. "Visualizing the determinants of viral RNA recognition by innate immune sensor RIG-I", Dahai Luo, Andrew Kohlway, Adriana Vela and Anna Marie Pyle, *Structure* (2012) **20,** 1983-1988. PMID: 23022350.

133. "RCrane: semi-automated RNA model building", Kevin S. Keating and Anna Marie Pyle, *Acta Cryst.* (2012) **68**, 985-995. PMID: 22868764.

132. "Molecular mechanics of RNA translocases", Steve C. Ding and Anna Marie Pyle, *Methods Enzymol.* (2012) **511,** 131-147. PMID: 22713318.

131. "The brace for a growing scaffold: Mss116 protein promotes RNA folding by stabilizing an early assembly intermediate", Olga Fedorova and Anna Marie Pyle, *J Mol Biol.* (2012) **422,** 347-365. PMID: 22705286.

130. "Crystal structure of a group II intron in the pre-catalytic state", Robert T. Chan, Aaron R. Robart, Kanagalaghatta R. Rajashankar, Anna Marie Pyle and Navtej Toor, *Nat Struct Mol Biol.* (2012) **19,** 555-557. PMID: 22484319.

129. "Discrete RNA libraries from pseudo-torsional space", Elisabeth Humphris-Narayanan and Anna Marie Pyle, *J Mol Biol.* (2012) **421,** 6-26. PMID: 22425640.

128. "Structural insights into RNA recognition by RIG-I", Dahai Luo, Steve C. Ding, Adriana Vela, Andrew Kohlway, Brett D. Lindenbach and Anna Marie Pyle, *Cell* (2011) **147,** 409-422. PMID: 22000018.

127. "The molecular interactions that stabilize RNA tertiary structure: RNA motifs, patterns, and networks", Samuel E. Butcher, Anna Marie Pyle, *Acc Chem Res.* (2011) **44,** 1302-1311. PMID: 21899297.

126. "RNA helicases and remodeling proteins", Anna Marie Pyle, *Curr Opin Chem Biol.* (2011) **15,** 636-642. PMID: 21862383.

125. "A new way to see RNA", Kevin S, Keating, Elisabeth L. Humphris and Anna Marie Pyle, *Q Rev Biophys.* (2011) **44,** 433-466. PMID: 21729350.

124. "The ever-growing complexity of nucleic acids: from small DNA and RNA motifs to large molecular assemblies and machines", Anna Marie Pyle and Zippora Shakked, *Curr Opin Struct Biol.* (2011) **21,** 293-295. PMID: 21565486.

123. "Mechanism of Mss116 ATPase Reveals Functional Diversity of DEAD-Box Proteins", Wenxiang. Cao, Maria M. Cowman, Steve Ding, Arnon Henn, Elizabeth R. Middleton, Michael J. Bradley, Elizabeth Rhoades, David D. Hackney, Anna Marie Pyle and Enrique M. De La Cruz, *J Mol Biol.* (2011) **409,** 399-414. PMID: 21501623.

122. "Unmasking the active helicase conformation of NS3 from Hepatitis C virus", Steve C. Ding, Andrew S. Kohlway and Anna Marie Pyle, *J Virol.* (2011) **85,** 4343-4353. PMID: 21325413.

121. "Visualizing ATP-dependent RNA translocation by the NS3 helicase from HCV", Todd C. Appleby, R. Anderson, Olga Fedorova, Anna Marie Pyle, X Liu, Kathy M. Brendza, John R. Somoza, *J Mol Biol.* (2011) **405,** 1139-1153. PMID: 21145896.

120. "The acidic domain of hepatitis C virus NS4A contributes to RNA replication and virus particle assembly", T. Phan, Andrew Kohlway, Peniel Dimberu, Anna Marie Pyle and Brett D. Lindenbach, *J Virol.* (2011) **85,** 1193-1204. PMID: 21047963.

119. "Single-molecule analysis of Mss116-mediated group II intron folding", Krishanthi S. Karunatilaka, Amanda Solem, Anna Marie Pyle and David Rueda, *Nature* (2010) **467,** 935-939. PMID: 20944626.

118. "Touching RNA", Anna Marie Pyle, *The Scientist* (2010) **24,** 34-39.

117. "Dual roles for the Mss116 cofactor during splicing of the ai5γ group II intron", Nora Zingler, Amanda Solem and Anna Marie Pyle, *Nucleic Acids Res.* (2010) **38,** 6602-6609. PMID: 20554854.

116. "Double stranded RNA-dependent ATPase DRH-3: insight into its role in RNA silencing in Caenorhabditis elegans", Christian Matranga and Anna Marie Pyle, *J Biol Chem.* (2010) **285,** 25363-25371. PMID: 20529861.

115. "The tertiary structure of Group II introns: implications for Biological Function and Evolution", Anna Marie Pyle, *Crit Rev Biochem Mol Biol.* (2010) **45,** 215-232. PMID: 20446804.

114. "Semiautomated model building for RNA crystallography by using a directed rotameric approach", Kevin S. Keating and Anna M. Pyle, *Proc Natl Acad Sci* USA (2010) **107,** 8177-8182. PMID: 20404211.

113. "Protein facilitated folding of group II intron ribozymes", Olga Fedorova, Amanda Solem and Anna Marie Pyle, *J Mol Biol.* (2010) **397,** 799-813. PMID: 20138894.

112. "The 2'-OH group at the group II intron terminus acts as a proton shuttle to permit reverse splicing", Michael Roitzsch, Olga Fedorova and Anna Marie Pyle, *Nat Chem Biol.* (2010) **6,** 218-224. PMID: 20118939.

111. "The NPH-II helicase displays efficient DNA-RNA helicase activity and a pronounced purine sequence bias", Sean Taylor, Amanda Solem, Jane Kawaoka and Anna Marie Pyle, *J Biol Chem.* (2010) **285,** 11692-11703. PMID: 20110368.

110. "Tertiary architecture of the Oceanobacillus; iheynesis group II intron", Navtej Toor, Kevin S. Keating, Olga Fedorova, Kanagalaghatta Rajashankar, Jimin Wang and Anna Marie Pyle, *RNA* (2010) **16,** 57-69. PMID: 19952115.

109. "A structural analysis of the group II intron active site and implications for the spliceosome", Kevin S. Keating, Navtej Toor, Philip S. Perlman and Anna Marie Pyle, *RNA* (2010) **16,** 1-9. PMID: 19948765.

108. "How to drive your helicase in a straight line", Anna Marie Pyle, *Cell* (2009) **139,** 458-459. PMID: 19879832.

107. "Structural insights into RNA splicing", Navtej Toor, Kevin S. Keating and Anna Marie Pyle, *Curr Opin Struct Biol.* (2009) **19,** 260-266. PMID: 19943210.

106. "The linear form of a group II intron catalyzes efficient autocatalytic reverse-splicing, establishing a potential for mobility ", Michael Roitzsch and Anna Marie Pyle, *RNA* (2009) **15,** 473-482. PMID: 19168748.

105. "The NS4A protein from hepatitis C virus promotes RNA-coupled ATP hydrolysis by the NS3 helicase", Rudolf K. Beran, Brett D. Lindenbach and Anna M. Pyle, *J Virol.* (2009) **83,** 3268-3275. PMID: 19153239.

104. "Establishing a mechanistic basis for the large kinetic steps of the NS3 helicase", Victor Serebrov, Rudolf K. Beran and Anna Marie Pyle, *J Biol Chem.* (2009) **284,** 2512-2521. PMID: 19010782.

103. "Structural Basis for Exon Recognition by a Group II Intron", Navtej Toor. Kanagalaghatta Rajashankar, Kevin S. Keating and Anna M. Pyle, *Nat Struct Mol Biol.* (2008) **15,** 1221-1222. PMID: 19010782.

102. "Protein-facilitated ribozyme folding and catalysis", Nora Zingler, Amanda Solem and Anna Marie Pyle, *Nucleic Acids Symp Ser* (Oxf). *No. 52* (2008), **52**, 67-68. PMID: 18776256.

101. "The GANC Tetraloop: A novel motif in the Group IIC intron structure", Kevin S. Keating, Navtej Toor and Anna Marie Pyle, *J Mol Biol.* (2008) **383,** 475-481. PMID: 18773908.

100. "Hepatitis C viral NS3-4A protease activity is enhanced by the NS3 helicase", Rudolf K.F. Beran and Anna Marie Pyle, *J Biol Chem.* (2008) **283,** 29929-29937. PMID: 18723512.

99. "Group II introns and their protein collaborators", Amanda Solem, Nora Zingler, Anna Marie Pyle and Jennifer Li-Pook-Than (2008) in *Non-Protein Coding RNAs* (ed.N.G. Walter et al.), Ch. 8.

98. "A conserved element that stabilizes the group II intron active site", Olga Fedorova and Anna Marie Pyle, *RNA* (2008) **14**, 1048-1056. PMID: 18441048.

97. "Group II Introns: Catalysts for splicing, genomic change and evolution", Anna Marie Pyle (2008) in *Ribozymes and RNA Catalysis* (ed. D.M.J. Lilley and F. Eckstein), pp. 201-228. Royal Society of Chemistry, Cambridge.

96. "Crystal structure of a self-spliced group II intron", Navtej Toor, Kevin S. Keating, Sean D. Taylor and Anna Marie Pyle, *Science* (2008) **320,** 77-82. PMID: 18388288.

95. "Translocation and unwinding mechanisms of RNA and DNA helicases", Anna Marie Pyle, *Ann Rev Biophys.* (2008) **37**, 317-336.

94. "RNA backbone consensus all-angle conformers and modular string nomenclature (an RNA Ontology Consortium contribution)", Jane S. Richardson, Bohdan Schneider, Laura W. Murray, Gary J. Kapral, Robert M. Immormino, Jeff J. Headd, David C. Richardson, D. Ham, E. Hershkovits, L.D. Williams, Kevin S. Keating, Anna Marie Pyle, D. Micallef, J. Westbrook and H.M. Berman, *RNA* (2008) **14,** 465-481. PMID:18192612.

93. "Three essential and conserved regions of a group II intron are proximal to the 5'-splice site", Alexandre de Lencastre and Anna Marie Pyle, *RNA* (2008) **14,** 11-24. PMID: 18039742.

92. "A kinetic intermediate that regulates proper folding of a group II intron RNA", Christina Waldsich and Anna Marie Pyle, *J Mol Biol.* (2008) **375,** 572-580. PMID: 18022197.

91. "The serine protease domain of hepatitis C viral NS3 activates RNA helicase activity by promoting the binding of RNA substrate", Rudolf K. Beran, Victor Serebrov and Anna Marie Pyle, *J Biol Chem.* (2007) **282,** 34913-34920. PMID: 17921146.

90. "Evaluating and learning from RNA pseudotorsional space: Quantitative validation of a reduced representation for RNA structure", Leven M. Wadley, Kevin S. Keating, Chuck M. Duarte and Anna Marie Pyle, *J Mol Biol.* (2007) **372,** 942-957. PMID: 17707400.

89. "The C terminus of hepatitis C virus NS4A encodes an electrostatic switch that regulates NS5A hyperphosphorylation and viral replication", Brett D. Lindenbach, Bela M. Pragai, Roland Montserret, Rudolf K. Beran, Anna Marie Pyle, Francois Penin, and Charles M. Rice, *J Virol.* (2007) **81,** 8905-8918. PMID: 17581983.

88. "Spring-loaded mechanism of DNA unwinding by hepatitis C virus NS3 helicase", Sua Myong, Michael M. Bruno, Anna Marie Pyle, and T. Ha, *Science* (2007) **317,** 513-516. PMID: 17656723.

87. "Tinkering with transcription factor proteins: the role of transcription factor adaptation in developmental evolution", Günter P. Wagner and Anna Marie Pyle, Novartis Found.Symp. (2007) **284,** 116-125; discussion 125-129, 158-163. PMID: 17710850.

86. "Folding of group II introns: a model system for large, multidomain RNAs?", Anna Marie Pyle, Olga Fedorova and Christina Waldsich, *Trends Biochem Sci.* (2007) **32,** 138-145. PMID: 17289393.

85. "Calculation of pK(a)s in RNA: On the structural origins and functional roles of protonated nucleotides", Chris L. Tang, Emil Alexov, Anna Marie Pyle and Barry Honig, *J Mol Biol.* (2007) **366,** 1475-1496. PMID: 17223134.

84. "Group II intron folding under near-physiological conditions: collapsing to the near-native state", Olga Fedorova, Christina Waldsich and Anna Marie Pyle, *J Mol Biol.* (2007) **366,** 1099-1114. PMID: 17196976.

83. "Alternative roles for metal ions in enzyme catalysis and the implications for ribozyme chemistry", Roland K.O. Sigel and Anna Marie Pyle, *Chem Rev.* (2007) **107,** 97-113. PMID: 17212472.

82. "A folding control element for tertiary collapse of a group II intron ribozyme", Christina Waldsich and Anna Marie Pyle, *Nat Struct Mol Biol.* (2007) **14**, 37-44. PMID: 17143729.

81. "A DEAD protein that activates intron self-splicing without unwinding RNA", Amanda Solem, Nora Zingler and Anna Marie Pyle, *Mol Cell* (2006) **24,** 611-617. PMID: 17188036.

80. "The receptor for branch-site docking within a group II intron active site", Stephanie Hamill and Anna Marie Pyle, *Mol Cell* (2006) **23,** 831-840. PMID: 16973435.

79. "Robust translocation along a molecular monorail: the NS3 helicase from hepatitis C virus traverses unusually large disruptions in its track", Rudolf K. Beran, Michael M. Bruno, Heath A. Bowers, Eckhard Jankowsky and Anna Marie Pyle, *J Mol Biol.* (2006) **358,** 974-982. PMID: 16569413.

78. "Nucleic acids an Editorial Overview", edited by Anna Marie Pyle and Jonathan Widom, *Curr. Opin. Struct. Biol.* (2006) **16**, 267-269.

77. "RNA translocation and unwinding mechanism of HCV NS3 helicase and its coordination by ATP", Sophie Dumont, Wei Cheng, Victor Serebrov, Rudolf Beran, Ignacio Tinoco Jr., Anna Marie Pyle and Carlos Bustamante, *Nature* (2006) **439,** 105-108. PMID: 16397502.

76. "RNA Structure and Function", Anna Marie Pyle (2006) in *Nucleic Acids in Chemistry and Biology*, 3rd edition (ed. G. M. Blackburn et al.), pp. 253-293. The Royal Society of Chemistry, Thomas Graham House, Cambridge, UK.

75. "Group II Introns: Ribozymes That Splice RNA and Invade DNA", Anna Marie Pyle and Alan M. Lambowitz (2006) in *The RNA World*, 3rd edition (ed. R.F. Gesteland et al.), pp. 469-505. Cold Spring Harbor Laboratory Press, Cold Spring Harbor, New York.

74. "Nucleotide Analog Interference Mapping and Suppression: Specific Applications in Studies of RNA Tertiary Structure, Dynamic Helicase Mechanism and RNA-Protein Interactions", Olga Fedorova, Marc Boudvillain, Jane Kawaoka and Anna Marie Pyle (2005) in Handbook of RNA Biochemistry (ed. R.K. Hartmann et al.) pp. 259-293. Wiley-VCH Verlag GmbH & Co. KGaA, Weinheim.

73. "An obligate intermediate along the slow folding pathway of a group II intron ribozyme", Linhui J. Su, Christina Waldsich and Anna Marie Pyle, *Nucleic Acids Res.* (2005) **33,** 6674-6687. PMID: 16314300.

72. "Linking the group II intron catalytic domains: Tertiary contacts and structural features of domain 3", Olga Fedorova and Anna Marie Pyle, *EMBO J.* (2005) **24,** 3906-3916. PMID: 16252007.

71. "Capping by branching: a new ribozyme makes tiny lariats", Anna Marie Pyle, *Science* (2005) **309,** 1530-1531. PMID: 16141065.

70. "A Single active-site region for a group II intron", Alexandre DeLencastre, Stephanie Hamill and Anna Marie Pyle, *Nat Struct Mol Biol.* (2005) **12,** 626-627. PMID: 15980867.

69. "Choosing between DNA and RNA: the polymer specificity of RNA helicase NPH-II", Jane Kawaoka and Anna Marie Pyle, *Nucleic Acids Res.* (2005) **33,** 644-649. PMID: 15681616.

68. "Prediction of functional tertiary interactions and intermolecular interfaces from primary sequence data", Phillip S. Pang, Eckhard Jankowsky, Leven M. Wadley and Anna Marie Pyle, *J. Exp. Zoolog B Mol Dev Evol.* (2005) **304,** 50-63. PMID: 15595717.

67. "The identification of novel RNA structural motifs using COMPADRES: an automated approach to structural discovery", Leven M. Wadley and Anna Marie Pyle, *Nucleic Acid Res.*, (2004) **32,** 6650-6659. PMID: 15608296.

66. "DNA repair: big engine finds small breaks", Anna Marie Pyle, *Nature*, (2004) **432,** 157-158. PMID: 15538349.

65. "Periodic cycles of RNA unwinding and pausing by hepatitis C virus NS3 helicase", Victor Serebrov and Anna Marie Pyle, *Nature*, (2004) **430,** 476-480. PMID: 15269774.

64. "Backbone tracking by the SF2 helicase NPH-II" , Jane Kawaoka, Eckhard Jankowsky and Anna Marie Pyle, *Nat Struct Mol Biol.*, (2004) **11,** 526-530. PMID: 15146171.

63. "Solution structure of domain 5 of a group II intron ribozyme reveals a new RNA motif", Roland K.O. Sigel, Dipali G. Sashital, Dana L. Abramovitz, Arthur G. Palmer III, Samuel E. Butcher and Anna Marie Pyle, *Nat Struct Mol Biol.* (2004) **11,** 187-192. PMID: 14745440.

62. "An alternative route for the folding of large RNAs: Apparent two-state folding by a group II intron ribozyme", Linhui J. Su, Michael Brenowitz and Anna Marie Pyle, *J Mol Biol.* (2003) **334,** 639-652. PMID: 14636593.

61. "RNA structure comparison, motif search and discovery using a reduced representation of RNA conformational space", Carlos M. Duarte, Leven M. Wadley and Anna Marie Pyle, *Nucleic Acids Res.* (2003) **31,** 4755-4761. PMID: 12907716.

60. "Domains 2 and 3 interact to form critical elements of the group II intron active-site", Olga Fedorova and Anna Marie Pyle, *J Mol Biol.* (2003) **330,** 197-209. PMID: 12823961.

59. "Lanthanide ions as probes for metal ions in the structure and catalytic mechanism of ribozymes", Roland Sigel and Anna Marie Pyle, *Met Ions Biol Syst.* (2003) **40,** 477-512. PMID: 12723159.

58. "A group II intron inserted into a bacterial heat-shock operon shows autocatalytic activity and unusual thermostability", Catherine Adamidi, Olga Fedorova, and Anna Marie Pyle, *Biochemistry* (2003) **42,** 3409-3418. PMID: 12653544.

57. "The pathway for DNA recognition and RNA integration by a group II intron retrotransposon", Yasunori Aizawa, Qing Xiang, Alan M. Lambowitz and Anna Marie Pyle, *Mol Cell* (2003) **11,** 795-805. PMID: 12667460.

56. "Group II introns: highly specific endonucleases with modular structures and diverse catalytic functions", Olga Fedorova, Linhui Julie Su and Anna Marie Pyle, *Methods* (2002) **28,** 323-335. PMID: 12431436.

55. "Metal ions in the structure and function of RNA". Anna Marie Pyle, *J Biol Inorg Chem.* (2002) **7,** 679-690. PMID: 12203005.

54. "The Hepatitis C Viral NS3 Protein is a Processive DNA Helicase with Cofactor Enhanced RNA Unwinding", Philip S. Pang, Eckhard Jankowsky, Paul Planet and Anna Marie Pyle, *EMBO J.* (2002) **21,** 1168-1176. PMID: 11867545.

53. "*Mda-5*, an interferon-inducible atypical putative RNA helicase with dsRNA-dependent ATPase activity and melanoma growth suppressive properties", Dong-Chul Kang, Rahul V. Gopalkrishnan, Qingping Wu, Eckhard Jankowsky, Anna Marie Pyle and Paul B. Fisher, *Proc. Natl. Acad. Sci. USA* (2002) **99,** 637-642. PMID: 11805321.

52. "Productive folding to the native state by a group II intron ribozyme", Jennifer Swisher, Lin-Hui Julie Su, Michael Brenowitz, Vernon Anderson, and Anna Marie Pyle, *J. Mol Biol* (2002) **315,** 297-310. PMID: 11786013.

51. "Kinetic dissection of the multistep process in L1.ltrB intron mobility", Aizawa, Xiang and Anna Marie Pyle, *Nucleic Acids Res. Suppl.* (2001) 249-250.

50. "Control of branch-site choice by a group II intron", Vi T. Chu, Catherine Adamidi, Qiaolian Liu, Philip S. Perlman, and Anna Marie Pyle, *EMBO J* (2001) **20,** 6866-6876. PMID: 11726522.

49. "Visualizing the solvent inaccessible core of a group II intron ribozyme", Jennifer Swisher, Carlos Duarte, Linhui Julie Su, and Anna Marie Pyle, *EMBO J.* (2001) **20,** 2051-2061. PMID: 11296237.

48. "Guiding ribozyme cleavage through motif recognition: the mechanism of cleavage site selection by a group II intron ribozyme", Linhui Julie Su, Peter Z. Qin, William J. Michels and Anna Marie Pyle, *J. Mo. Biol.* (2001) **306,** 655-668. PMID: 11243778.

47. "Active disruption of an RNA-protein interaction by a DExH/D RNA Helicase", Eckhard Jankowsky, Christian H. Gross, Stewart Shuman and Anna Marie Pyle, *Science* (2001) **291,** 121-125. PMID: 11141562.

46. "Metal ion binding sites in a group II intron core", Roland K.O. Sigel, Anand Vaidya and Anna Marie Pyle, *Nat Struct Biol.* (2000) **7,** 1111-1116. PMID: 11101891.

45. "A tertiary interaction that links active-site domains to the 5'-splice site of a group II intron", Marc Boudvillain, Alexandre de Lencastre and Anna Marie Pyle, *Nature* (2000) **406,** 315-317. PMID: 10917534.

44. "Using DNAzymes to Cut, Process and Map RNA Molecules for Structural Studies or Modification", Anna Marie Pyle, Vi T. Chu, Eckhard Jankowsky and Marc Boudvillain, *Methods in Enz.* (2000) **317,** 140-146. PMID: 10829278.

43. "New tricks from an itinerant intron", Anna Marie Pyle, *Nat Struct Biol.* (2000) **7,** 352-354. PMID: 10802726.

42. "The DExH/D protein NPH-II is a processive and directional motor for unwinding RNA", Eckhard Jankowsky, Christian H. Gross, Stewart Shuman and Anna Marie Pyle, *Nature* (2000) **403,** 447-451. PMID: 10667799.

41. "Calculating the electrostatic properties of RNA provides new insights into molecular interactions and function", Kevin Chin, Kim A. Sharp, Barry Honig and Anna Marie Pyle, *Nat Struct Biol.* (1999) **6,** 1055-1061. PMID: 10542099.

40. "Antagonistic substrate binding by a group II intron ribozyme", Peter Z. Qin and Anna Marie Pyle, *J Mol Biol.* (1999) **291,** 15-27. PMID: 10438603.

39. "Site specific labeling of RNA with fluorophores and other structural probes", Peter Z. Qin and Anna Marie Pyle, *Methods* (1999) **18,** 60-70. PMID: 10208817.

38. "Stepping through an RNA structure: a novel approach to conformational analysis", Chuck Duarte and Anna Marie Pyle, *J Mol Biol.* (1998) **284,** 1465-1478. PMID: 9878364.

37. "Analysis of putative RNase sensitivity and protease insensitivity of demethylation activity in extracts from rat myoblasts", Jennifer A. Swisher, Eyal Rand, Howard Cedar and Anna Marie Pyle, *Nucleic Acids Res.* (1998) **26**, 5573-5580.

36. "A map of the binding site for catalytic domain 5 in the core of a group II intron ribozyme", Boyana B. Konforti, Qiaolian Liu and Anna Marie Pyle, *EMBO J.* (1998) **17,** 7105-7117. PMID: 9843514.

35. "Defining functional groups, core structural features and inter-domain tertiary contacts essential for group II intron self-splicing: a NAIM analysis", Marc Boudvillain and Anna Marie Pyle, *EMBO J.* (1998) **17,** 7091-7104. PMID: 9843513.

34. "More than one way to splice an RNA: Branching without a bulge and splicing without branching in group II introns", Vi T. Chu, Qiaolian Liu, Mircea Podar, Philip S. Perlman and Anna Marie Pyle, *RNA* (1998) **4,** 1186-1202. PMID: 9769094.

33. "The architectural organization and mechanistic function of group II intron structural elements", Peter Zhifeng Qin and Anna Marie Pyle, *Curr Opin Struct Biol.* (1998) **8,** 301-308. PMID: 9666325

32. "The DEAH-box protein Prp22 is an ATPase that mediates ATP-dependent mRNA release from the spliceosome and unwinds RNA duplexes", John D.O. Wagner, Eckhard Jankowsky, Mahshid Company, Anna Marie Pyle and John N. Abelson, *EMBO J.* (1998) **17,** 2926-2937. PMID: 9582286.

31. "The sequence specificity of a group II intron ribozyme: multiple mechanisms for promoting unusually high discrimination against mismatched targets", Qing Xiang, Peter Z. Qin, William J. Michels, Keri Freeland and Anna Marie Pyle, *Biochemistry* (1998) **37,** 3839-3849. PMID: 9521704.

30. "Group II intron splicing in-vivo through first step hydrolysis", Mircea Podar, Vi T. Chu, Anna Marie Pyle and Philip S. Perlman, *Nature* (1998) **391,** 915-918. PMID: 9495347.

29. "Ribozyme catalysis from the major groove of group II intron domain 5", Boyana B. Konforti, Dana L. Abramovitz, Carlos M. Duarte, Alex Karpeisky, Leonid Beigelman and Anna Marie Pyle, *Mol Cell* (1998) **1,** 433-442. PMID: 9660927.

28. "Stopped-flow fluorescence spectroscopy reveals that domain 1 of a group II intron is an independent folding unit", Peter Z. Qin and Anna Marie Pyle, *Biochemistry* (1997) **36,** 4718-4730. PMID: 9125492.

27. "Branch-site selection in a group II intron mediated by active recognition of the adenine amino group and exclusion of non-adenine functionalities", Qiaolian Liu, Justin B. Green, Arbi Khodadadi, Leonid Beigelman, Peter Haeberli and Anna Marie Pyle, *J. Mol Biol.* (1997) **267,** 163-171. PMID: 9096215.

26. "Remarkable morphological variability of a common RNA folding motif: the GNRA tetraloop-receptor interaction", Dana L. Abramovitz and Anna Marie Pyle, *J. Mol Biol.* (1997) **266**, 493-506. PMID: 9067606.

25. "Mobile genetic elements. Inside an intron invasion", Anna Marie Pyle, *Nature* (1996) **381,** 280-281. PMID: 8692263.

24. "Catalytic role of 2'-hydroxyl groups within a group II intron active site", Dana L. Abramovitz, Richard A. Friedman and Anna Marie Pyle, *Science* (1996) **271,** 1410-1413. PMID: 8596912.

23. "Two competing pathways for self-splicing by group II introns; a quantitative analysis of in-vitro reaction rates and products", Danette Daniels, William J. Michels Jr. and Anna Marie Pyle, *J Mol Biol.* (1996) **256,** 31-49. PMID: 8609612.

22. "The role of metal ions in ribozymes", Anna Marie Pyle, *Metal Ions in Biological Systems* (1996), Eds. Helmut and Astrid Sigel, **32**, 479-520. PMID: 8640529.

21. "Catalytic reaction mechanisms and structural features of group II intron ribozymes", Anna Marie Pyle, *Nucleic Acids and Molecular Biology* (1995), 10th Anniversary Volume.

20. "Group II intron ribozymes that cleave DNA and RNA linkages with similar efficiency, and lack contacts to substrate 2'-hydroxyl groups", Edmund A. Griffin, Zhifeng Qin, William J. Michels Jr., and Anna Marie Pyle, *Chemistry and Biology* (1995) **2,** 761-770. PMID: 9383483.

19. "RNA folding", Anna Marie Pyle and Justin B. Green, *Current Opinion in Structural Biology*, (1995) **5,** 303-310. PMID: 7583628.

18. "Branch-point attack in group II introns is a highly reversible transesterification, providing a potential proof-reading mechanism for 5'-splice site selection", Kevin Chin and Anna Marie Pyle, *RNA* (1995) **1,** 391-406. PMID: 7493317.

17. "Conversion of a group II intron into a new multiple-turnover ribozyme that selectively cleaves oligonucleotides: Elucidation of reaction mechanism and structure/function relationships", William J. Michels Jr. and Anna Marie Pyle, *Biochemistry* (1995) **34,** 2965-2977. PMID: 7893710.

16. "Replacement of the conserved G-U with a G-C pair at the cleavage site of the *Tetrahymena* ribozyme decreases binding, reactivity and fidelity", Anna Marie Pyle, Sean Moran, Scott A. Strobel, Theresa Chapman, Douglas H. Turner and Thomas R. Cech, *Biochemistry* (1994) **33,** 13856-13863. PMID: 7947794.

15. "Building a Kinetic Framework for Group II Intron Ribozyme Activity: Quantitation of Inter-Domain Binding and Reaction Rate", Anna Marie Pyle and Justin B. Green, *Biochemistry* (1994) **33,** 2716-2725. PMID: 8117737.

14. "Ribozymes: A Distinct Class of Metalloenzymes", Anna Marie Pyle, *Science* (1993) **261,** 709-714. PMID: 7688142.

13. "RNA catalysis by a Group I ribozyme: Developing a model for transition state stabilization", Thomas R. Cech, Daniel Herschlag, Joseph A. Piccirilli and Anna Marie Pyle, *J. Biol. Chem.* (1992) **267,** 17479-17482. PMID: 1381347.

12. "RNA substrate binding site in the catalytic core of the *Tetrahymena* ribozyme", Anna Marie Pyle, Felicia L. Murphy and Thomas R. Cech, *Nature* (1992) **358,** 123-128. PMID: 1377367.

11. "DNA photocleavage by phenanthrenequinone diimine complexes of Rhodium (III): Shape-selective recognition and reactivity", Ayesha Sitlani, Eric C. Long, Anna Marie Pyle and Jacqueline K. Barton, *J. Am. Chem. Soc.* (1992) **114,** 2303-2312.

10. "Ribozyme recognition of RNA by tertiary interactions with specific ribose 2'-OH groups", Anna Marie Pyle and Thomas R. Cech, *Nature* (1991) **350,** 628-630. PMID: 1708111.

9. "Direct measurement of oligonucleotide substrate binding to wild-type and mutant ribozymes from *Tetrahymena*", Anna Marie Pyle, James A. McSwiggen and Thomas R. Cech, *Proc. Natl. Acad. Sci. USA* (1990) **87,** 8187-8191. PMID: 2236030.

8. "Probing microstructures in double-helical DNA with chiral metal complexes: Recognition of changes in base-pair propeller twisting in solution", Anna Marie Pyle, Takashi Morii, and Jacqueline K. Barton, *J. Am. Chem. Soc.* (1990) **112,** 9432-9434.

7. "Synthesis and characterization of physical, electronic, and photochemical aspects of 9,10-phenanthrenequinone diimine complexes of Ruthenium (II) and Rhodium (III)", Anna Marie Pyle, Michael Y. Chiang and Jacqueline K. Barton, *Inorg. Chem.* (1990) ***29***, 4487-4495.

6. "Probing nucleic acids with transition metal complexes", Anna Marie Pyle and Jacqueline K. Barton, *Progress in Inorganic Chemistry: Bioinorganic Chemistry* (1990) **38**, 413-475.

5. "Shape-selective targeting of DNA by (phenanthrenequinone diimine) rhodium (III) photocleaving agents", Anna Marie Pyle, Eric C. Long, and Jacqueline K. Barton, *J. Am. Chem. Soc.* (1989) **111,** 4520-4522.

4. "Mixed-ligand complexes of Ruthenium (II): Factors governing binding to DNA", Anna Marie Pyle, Jill P. Rehmann, R. Meshoyrer, C. Vijay Kumar, N.J. Turro, and Jacqueline K. Barton, *J. Am. Chem. Soc.* (1989) **111,** 3051-3058.

3. "High-resolution footprinting of EcoR1 and distamycin with $Rh(phi)_2(bpy)^{3+}$, a new photofootprinting reagent", Kiyoshi Uchida, Anna Marie Pyle, Takashi Morii, and Jacqueline K. Barton, *Nucl. Acids Res.* (1989) **17,** 10259-10279. PMID: 2602152.

2. "Synthesis and spectroscopic characterization of the purple tris(phenanthrenequinone diimine)ruthenium (II) ion", Anna Marie Pyle and Jacqueline K. Barton, *Inorg. Chem.* (1987) **26,** 3820-3823.

1. "H/D exchange in methane and other saturated hydrocarbons catalyzed by a supported zirconium complex", Anna Marie Pyle and Klaus-Joachim Jens, *J. Molec. Catalysis* (1986) **38**, 337-339.