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Curriculum Vitae (abbreviated)
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Professional Experience

Department of Chemistry, University of North Carolina – Chapel Hill	1996-
Postdoctoral Fellow, with Thomas R. Cech; University of Colorado – Boulder	1992-96
Ph.D., Biophysical Chemistry, advisor Donald M. Crothers; Yale University	1987-92
Fulbright Scholar in Chemistry; Universität Göttingen, Germany	1986-87
B.A., Chemistry; The College of Wooster, Wooster, OH	1982-86

The vision of my research laboratory is to use chemical principles to create high-content molecular microscopes for understanding the central role of RNA in biology, with a focus on addressing real-world problems and understanding human disease. To this end, we have developed, validated, and broadly applied information-rich RNA structure analysis technologies. SHAPE technologies, developed in my laboratory, are now in use worldwide.

We apply the technologies invented in our laboratory to address compelling, and otherwise intractable, problems in biology. Current projects focus on (i) RNA folding and protein assembly reactions central to the replication of human viruses, (ii) function of biomedically important ribonucleoprotein complexes inside living cells, and (iii) discovery of small molecule ligands, potential drugs, targeted against medically important RNAs.

Honors

NIH EUREKA Award (2011-15); North Carolina Health & Life Sciences Promise for Tomorrow Award (2009); Visiting Scholar, National Institutes of Health – NIEHS (2002-03); NSF Career Award (2000-05); Searle Scholar, Chicago Community Trust (1998-2001); Research Innovation Award, Research Corporation (1997); Fellow of the Jane Coffin Childs Memorial Fund for Medical Research (1992-95); Richard Wolfgang Prize for the Most Distinguished Dissertation in Chemistry, Yale University (1992); Fulbright Scholar, Göttingen, Germany (1986-87); B.A. with Honors, Departmental Honors in Chemistry, The College of Wooster (1986); Phi Beta Kappa (1985).

Active Support

Our lab is supported by grants from the NIH focused on understanding: *Retroviral Genomic RNA Dimer Structure and Function* (R01 GM064803) and *Structure of the HIV-1 Genome* (R01 AI068462). In NSF supported work, we are creating technology for *RNA Structure and Dynamics In Vivo* (MCB-0919666 and MCB-1121024). Via private foundation and NIH EUREKA support, we are developing *RNA-Directed Therapeutics*.

University Affiliations

Biological and Biomedical Sciences Program (Executive Committee & Graduate Studies Liaison for Chemistry); Chemical Biology Training Program (Co-Director); Program in Molecular Biology and Biotechnology (Director, RNA Biology); Medical Scientist M.D.-Ph.D. Training Program; Program in Molecular and Cellular Biophysics; UNC Center for AIDS Research; Virology Training Program; Lineberger Comprehensive Cancer Center (Molecular Therapeutics).

Teaching

I mentor students in the *Undergraduate Transcriptome Project*, an NSF-supported project, unique to my laboratory, designed to help undergraduates explore their potential for independent creativity, to fuel their passion for science, and to be a model for engaging undergraduates in a research university. I also contribute to numerous programs designed to enrich the undergraduate experience at UNC, including First Year Undergraduate Fellows, Honors Carolina, Morehead Planetarium, Women in Science, and Science in the Media.

Formal teaching emphasizes critical thinking and intellectual vision, both in *graduate seminars* and in *large-format, first-year chemistry*. I currently teach graduate courses in Chemical Biology that focus on the contemporary literature. I have had the privilege of teaching hundreds of students first year chemistry and emphasize engagement and multi-step problem solving.

Publications (selected, recent)

79. F. Ding, C.A. Lavender, K.M. Weeks and N.V. Dokholyan, Three-dimensional RNA structure refinement by hydroxyl radical probing. *Nature Methods* **9**, in press (2012).
77. J.T. Low, S.A. Knoepfel, J.M. Watts, O. ter Brake, B. Berkhout and K.M. Weeks, SHAPE-directed discovery of highly potent shRNA inhibitors of HIV-1. *Mol. Ther.* **20**, in press (2012).
76. J.K. Grohman, S. Kottegoda, R.J. Gorelick, N.L. Allbritton and K.M. Weeks, Femtomole SHAPE reveals regulatory structures in the authentic XMRV RNA genome. *J. Am. Chem. Soc.* **133**, 20326–20334 (2011).
70. C. Gherghe, T. Lombo, C.W. Leonard, S.A.K. Datta, J.W. Bess, R.J. Gorelick, A. Rein and K.M. Weeks, Definition of a high-affinity Gag recognition structure mediating packaging of a retroviral RNA genome. *Proc. Natl. Acad. Sci. USA* **107**, 19248-19253 (2010).
68. K.-A. Steen, A. Malhotra and K.M. Weeks, Selective 2'-hydroxyl acylation analyzed by protection from exoribonuclease. *J. Am. Chem. Soc.* **132**, 9940-9943 (2010).
64. C.E. Hajdin, F. Ding, N.V. Dokholyan and K.M. Weeks, On the significance of an RNA tertiary structure prediction. *RNA* **16**, 1340-1349 (2010).
58. S.A. Mortimer and K.M. Weeks, C2'-endo nucleotides as molecular timers suggested by the folding of an RNA domain. *Proc. Natl. Acad. Sci. USA* **106**, 15622-15627 (2009).
57. J.M. Watts, K.K. Dang, R.J. Gorelick, C.W. Leonard, J.W. Bess, R. Swanstrom, C.L. Burch and K.M. Weeks, Architecture and secondary structure of an entire HIV-1 RNA genome. *Nature* **460**, 711-716 (2009).
54. C.M. Gherghe, C.W. Leonard, F. Ding, N.V. Dokholyan and K.M. Weeks, Native-like RNA tertiary structures using a sequence-encoded cleavage agent and refinement by discrete molecular dynamics. *J. Am. Chem. Soc.* **131**, 2541-2546 (2009).
53. K.E. Deigan, T.W. Li, D.H. Mathews and K.M. Weeks, Accurate SHAPE-directed RNA structure determination. *Proc. Natl. Acad. Sci. USA* **106**, 97-102 (2009).
52. S.A. Mortimer and K.M. Weeks, Time-resolved RNA SHAPE chemistry. *J. Am. Chem. Soc.* **130**, 16178-16180 (2008).
49. C.M. Gherghe, Z. Shajani, K.A. Wilkinson, G. Varani and K.M. Weeks, Strong correlation between SHAPE chemistry and the generalized NMR order parameter (S^2) in RNA. *J. Am. Chem. Soc.* **130**, 12244-12245 (2008).
46. K.A. Wilkinson, R.J. Gorelick, S.M. Vasa, N. Guex, A. Rein, D.H. Mathews, M.C. Giddings and K.M. Weeks, High-throughput SHAPE analysis reveals structures in HIV-1 genomic RNA strongly conserved across distinct biological states. *PLoS Biology* **6**, e96 (2008).

Reviews (selected)

74. K.M. Weeks and D.M. Mauger, Exploring RNA structural codes with SHAPE chemistry. *Acc. Chem. Res.* **44**, 1280-1291 (2011).
73. K.M. Weeks, RNA structure probing *dash seq.* *Proc. Natl. Acad. Sci. USA* **108**, 10933-10934 (2011).
66. J.T. Low and K.M. Weeks, SHAPE-directed RNA secondary structure prediction. *Methods* **52**, 150-158 (2010).
63. K.M. Weeks, Advances in RNA structure analysis by chemical probing. *Curr. Opin. Struct. Biol.* **20**, 295–304 (2010).
60. J.L. McGinnis, C.D.S. Duncan and K.M. Weeks, High-throughput analysis of RNA structure and ribonucleoprotein assembly. *Methods Enzymol.* **468**, 67-89 (2009).
39. K.A. Wilkinson, E.J. Merino and K.M. Weeks, Selective 2'-hydroxyl acylation analyzed by primer extension (SHAPE): quantitative RNA structure analysis at single nucleotide resolution. *Nature Protocols* **1**, 1610-1616 (2006).

Invited Seminars (selected, from a total of ~80)

Keynote Speaker, Integrative RNA Analysis and Disease, Long Beach, CA, 13-14 Jul 2012.
Plenary Speaker, Protein and RNA Structure Prediction, Xcaret, Mexico, 3-7 Dec 2011.
Cell Symposium on Regulatory RNAs, Chicago, IL, 10-12 Oct 2011.
Frontiers of Retrovirology, Amsterdam, The Netherlands, 3-5 Oct 2011.
Mosbacher Kolloquium, Mechanisms of RNA-Mediated Regulation, Baden, Germany, 7-9 Apr 2011.
Cambridge University (England), Laboratory of Molecular Biology, 6 April 2011.
Colloquium Speaker, Pennsylvania State University, Department of Chemistry, 3 Feb 2011.
International Symposium on Nucleic Acids Chemistry, Yokohama, Japan, 10-12 Nov 2010.
Plenary Speaker, RNA in Motion Symposium, Iowa State University, 9-12 Sept 2010.
EURASNET – Frontiers in Structural Biology of RNA & RNPs, Poznan, Poland, 16-18 Aug 2010.
Plenary Speaker, XVIII International HIV Drug Resistance Workshop, Fort Myers, FL, 9-13 Jun 2009.