Curriculum Vitae

Walter N. Moss

Assistant Professor at Iowa State University
Roy J. Carver Department of Biochemistry, Biophysics, and Molecular Biology

E-mail: wmoss@iastate.edu
Website: http://www.mosslab.org/
Publons: https://publons.com/researcher/1200726/walter-moss

EDUCATION

Yale University
NIH K99/R00 Postdoctoral Fellow 2015 –2016
American Cancer Society Postdoctoral Fellow 2014 – 2015
Howard Hughes Medical Institute Postdoctoral Associate 2012 – 2014
Mentor: Prof. Joan A. Steitz
Specialization: Bioinformatics, Biochemistry, and Molecular Biology

University of Rochester
Doctor of Philosophy, March 2012 (Master of Science, June 2007)
Advisor: Prof. Douglas H. Turner
Specialization: Bioinformatics and Biochemistry

Stony Brook University
Bachelor of Science (*magna cum laude*), June 2004
Major: Chemistry (Biological Chemistry focus)
Specialization: Computational Chemistry

RESEARCH

Assistant Professor at Iowa State University 2015 –
- Developed a world-class research program aimed at developing methods for the analysis of RNA structure and function
- Currently applying these tools to functionally annotate the genomes of humans and our pathogens

Postdoctoral Fellow at Yale University/HHMI 2012 – 2015
- Worked in the lab of Prof. Joan A. Steitz to discover functional and noncoding viral RNAs

Graduate Research at the University of Rochester 2005 – 2011
- Worked in the lab of Prof. Douglas H. Turner to improve methods for funding and predicting functional RNA structure

Laboratory Manager at the NY Botanical Garden (NYBG) 2004 – 2005
- Ran the molecular biology lab of the New York Plant Genomics Consortium and performed research aimed at understanding the molecular basis of the evolution of seeds

Undergraduate Research at Stony Brook University 2003 – 2004
- Computational analysis of carbon-rich halogens

TEACHING

Assistant Professor at Iowa State University 2015 –

- Mentored two postdoctoral scholars, five graduate students and six undergraduate students in my research lab
- Mentored 11 graduate students through program of study committee work
- Developed a module for BBMB 461/561/561L aimed at training undergraduate and graduate students in the use of computational methods for molecular biophysics
- Co-taught BBMB 405 (Biochemistry II)

Undergraduate Mentor at Yale University 2014 – 2015

- Mentored student in the HHMI Medical Fellow program
- Mentored 1st year graduate student (Dept. of Molecular Biophysics and Biochemistry) in the Steitz Lab
- Mentored undergraduate student in HHMI diversity program

Undergraduate Mentor at University of Rochester 2010 – 2012

- Mentor for student enrolled in the McNair program for underrepresented minority groups and secured funding for student by assisting in the preparation of supplemental NIH grant (#3R01GM022939-33A1S1) to support diversity

Teaching Assistant at the University of Rochester 2005 – 2008

- Taught six sections (30 students each) of organic chemistry lab.
- Cited for excellence based on student evaluations.

GRANTS AND FELLOWSHIPS (active funding in blue)

Lilly Research Award Program (Eli Lilly)	2020 –
NIH R01 (R01GM133810)	2019 –
COVID-19 SEED funding ISU VPR	2020
NIH K99/R00 (R00GM112877)	2015 – 2020
American Cancer Society Postdoctoral Fellowship	2014 – 2015
Experiment.com “crowdsourced” funding	2014
Weissberger Memorial Fellowship	2008 – 2010
DeRight Fellowship	2006 – 2008
Sherman-Clark Fellowship	2005 – 2007
NSF Graduate Fellowship (Honorable Mention)	2005
URECA Grant	2003

AWARDS AND HONORS

Top reviewers in Cross-Field (Web of Science)	2018
Top reviewers for Iowa State University (Web of Science)	2017
Einsteinium Foundation Award	2014
RNA Society Travel Award	2012
Sigma Xi award for undergraduate research	2004
American Institute of Chemists Award	2004
Undergraduate Recognition Award for Excellence	2004
Inducted into Phi Beta Kappa Honors Society	2004

- SUNY Stony Brook Honors College 2000 – 2004
- Inducted into Golden Key Honors Society 1998
- Eagle Scout Award 1998

HONORS FOR STUDENTS

- NIH F31 Ruth L. Kirschstein Predoctoral Award, Warren Rouse 2021
- BBMB Teaching Award, Jake Peterson 2021
- Graduate College Research Excellence Award, Ryan Andrews 2021
- Brown Graduate Fellowship, Ryan Andrews 2020
- Dean's High Impact Undergraduate Research Award, Andrea Tigges 2020
- BBMB Teaching Award, Collin O'Leary 2020
- Carver Trust Graduate Student Award, Ryan Andrews 2019
- Carver Fellowship Award 2017

SOCIETY MEMBERSHIPS

- American Chemical Society
- RNA Society
- Microbiological Society

PROFESSIONAL ACTIVITIES

Review Panels

- Kuwait Foundation for the Advancement of Science 2021
- Kuwait Foundation for the Advancement of Science 2020
- Israeli Science Foundation 2018

Iowa State Committees

- Website/Communications Advisory Committee 2021-
- Graduate Student Selection Committee 2021-
- Postdoctoral Development Committee 2020-
- Seminar Committee 2016-

Meeting Organization

- Session Chair: "Discovery of non-coding and structured RNAs" 2nd International Work-Conference on Bioinformatics and Biomedical Engineering, Granada, Spain (2014)

PUBLICATIONS (*Corresponding author, underlined co-first); H-Index: 19 (Web of Science)

1. Andrews RJ, Baber L, **Moss WN***. Mapping the RNA structural landscape of viral genomes. *Methods*. 2020 Nov 1;183:57-67. doi: 10.1016/j.ymeth.2019.11.001.

2. Haniff, H.S., Tong, Y., Liu, X., Chen, J. L., Suresh, B.M., Andrews, R.J., Peterson, J.M., O'Leary, C.A., Benhamou, R.I., **Moss, WN**, & Disney, M.D. (2020). "Targeting the SARS-CoV-2 RNA Genome with Small Molecule Binders and Ribonuclease Targeting Chimera

(RIBOTAC) Degraders." *ACS Central Science*, acscentsci.0c00984. https://doi.org/10.1021/acscentsci.0c00984.

3. Andrews RJ, O'Leary CA, **Moss WN***. "A survey of RNA secondary structural propensity encoded within human herpesvirus genomes: global comparisons and local motifs." *PeerJ*. 2020;8:e9882. doi: 10.7717/peerj.9882. eCollection 2020.

4. Ursu A, Childs-Disney JL, Andrews RJ, O'Leary CA, Meyer SM, Angelbello AJ, **Moss WN**, Disney MD. "Design of small molecules targeting RNA structure from sequence." *Chem Soc Rev*. 2020 Oct 19;49(20):7252-7270. doi: 10.1039/d0cs00455c.

5. Andrews RJ, Peterson JM, Haniff HS, Chen J, Williams C, Grefe M, Disney MD, **Moss WN***. "An in silico map of the SARS-CoV-2 RNA Structurome." *bioRxiv*. 2020 Apr 18;. doi: 10.1101/2020.04.17.045161.

6. Pavlovic Djuranovic S, Erath J, Andrews RJ, Bayguinov PO, Chung JJ, Chalker DL, Fitzpatrick JA, **Moss WN**, Szczesny P, Djuranovic S. "Plasmodium falciparum translational machinery condones polyadenosine repeats." *Elife*. 2020 May 29;9:e57799. doi: 10.7554/eLife.57799.

7. Moss LI, Tompkins VS, **Moss WN***. "Differential expression analysis comparing EBV uninfected to infected human cell lines identifies induced non-micro small non-coding RNAs." *Noncoding RNA Res*. 2020 Mar;5(1):32-36. doi: 10.1016/j.ncrna.2020.02.002.

8. Benhamou RI, Angelbello AJ, Andrews RJ, Wang ET, **Moss WN**, Disney MD. "Structure-Specific Cleavage of an RNA Repeat Expansion with a Dimeric Small Molecule Is Advantageous over Sequence-Specific Recognition by an Oligonucleotide." *ACS Chem Biol*. 2020 Feb 21;15(2):485-493. doi: 10.1021/acschembio.9b00958.

9. Zhang P, Park HJ, Zhang J, Junn E, Andrews RJ, Velagapudi SP, Abegg D, Vishnu K, Costales MG, Childs-Disney JL, Adibekian A, **Moss WN**, Mouradian MM, Disney MD. "Translation of the intrinsically disordered protein α-synuclein is inhibited by a small molecule targeting its structured mRNA." *Proc Natl Acad Sci U S A*. 2020 Jan 21;117(3):1457-1467. doi: 10.1073/pnas.1905057117.

10. Andrews RJ, Baber L, **Moss WN***. "Mapping the RNA structural landscape of viral genomes." *Methods*. 2019 Nov 8;. doi: 10.1016/j.ymeth.2019.11.001.

11. Andrews RJ, **Moss WN***. "Computational approaches for the discovery of splicing regulatory RNA structures." *Biochim Biophys Acta Gene Regul Mech*. 2019 Nov - Dec;1862(11-12):194380. doi: 10.1016/j.bbagrm.2019.04.007.

12. Chen JL, **Moss WN**, Spencer A, Zhang P, Childs-Disney JL, Disney MD. "The RNA encoding the microtubule-associated protein tau has extensive structure that affects its biology." *PLoS One*. 2019;14(7):e0219210. doi: 10.1371/journal.pone.0219210.

13. O'Leary CA, Andrews RJ, Tompkins VS, Chen JL, Childs-Disney JL, Disney MD, **Moss WN***. "RNA structural analysis of the MYC mRNA reveals conserved motifs that affect gene expression." *PLoS One*. 2019;14(6):e0213758. doi: 10.1371/journal.pone.0213758.

14. Angelbello AJ, Rzuczek SG, Mckee KK, Chen JL, Olafson H, Cameron MD, **Moss WN***, Wang ET, Disney MD. "Precise small-molecule cleavage of an r(CUG) repeat expansion in a myotonic dystrophy mouse model." *Proc Natl Acad Sci U S A*. 2019 Apr 16;116(16):7799-7804. doi: 10.1073/pnas.1901484116.

15. Ungerleider NA, Jain V, Wang Y, Maness NJ, Blair RV, Alvarez X, Midkiff C, Kolson D, Bai S, Roberts C, **Moss WN**, Wang X, Serfecz J, Seddon M, Lehman T, Ma T, Dong Y, Renne R, Tibbetts SA, Flemington EK. "Comparative Analysis of Gammaherpesvirus Circular RNA Repertoires: Conserved and Unique Viral Circular RNAs." *J Virol*. 2019 Mar 15;93(6). doi: 10.1128/JVI.01952-18.

16. Kumarasinghe N., **Moss WN*** "Analysis of a structured intronic region of the LMP2 pre-mRNA from EBV reveals associations with human regulatory proteins and nuclear actin." *BMC Res. Notes* 2019 Jan.; 12:33.

17. Andrews R.J., Roche J., **Moss WN*** "ScanFold: an approach for genome-wide discovery of local RNA structural elements—applications to Zika virus and HIV." *PeerJ* 2018 Dec.; 6:e6136.

18. **Moss WN*** "The ensemble diversity of non-coding RNA structure is lower than random sequence." *Noncoding RNA Res.* 2018 May 24;3(3):100-107.

19. Ungerleider N, Concha M, Lin Z, Roberts C, Wang X, Cao S, Baddoo M, **Moss WN**, Yu Y, Seddon M, Lehman T, Tibbetts S, Renne R, Dong Y, Flemington EK. The Epstein Barr virus circRNAome. *PLoS Pathog.* 2018 Aug 6;14(8):e1007206.

20. **Moss WN*** "RNA2DMut: a web tool for the design and analysis of RNA structure mutations." *RNA*. 2018 Mar;24(3):273-286.

21. Tompkins VS, Valverde DP, **Moss WN*** "Human regulatory proteins associate with non-coding RNAs from the EBV IR1 region." *BMC Res Notes*. 2018 Feb 20;11(1):139.

22. Andrews R.J., Baber L., **Moss WN*** "RNAStructuromeDB: A genome-wide database for RNA structural inference." *Sci Rep*. 2017 Dec 8;7(1):17269. doi: 10.1038/s41598-017-17510-y.

23. Soszynska-Jozwiak M., Michalak P., **Moss WN**, Kierzek R, Kesy J, Kierzek E. "Influenza virus segment 5 (+)RNA - secondary structure and new targets for antiviral strategies." *Sci Rep*. 2017 Nov 8;7(1):15041. doi: 10.1038/s41598-017-15317-5.

24. Ruszkowska A., Lenartowicz E., **Moss WN**, Kierzek R., Kierzek E. "Secondary structure model of the naked segment 7 influenza A virus genomic RNA." *Biochem J*. 2016 Dec 1;473(23):4327-4348.

25. Pawlica P., **Moss WN**, and Steitz J.A. "Host miRNA degradation by Herpesvirus saimiri small nuclear RNA requires an unstructured interacting region" *RNA* 2016; 22(8):1181-9.

26. Lenartowicz E., Kesy J., Ruszkowska A., Soszynska-Jozwiak M., Michalak P., **Moss WN**, Turner D.H., Kierzek R., and Kierzek E. "Self-Folding of Naked Segment 8 Genomic RNA of Influenza A Virus" *PLoS ONE* 2016; 11(2):e0148281.

27. Fang R., **Moss WN**, Rutenberg-Schoenberg M. and Simon M.D. "Probing Xist RNA Structure in Cells Using Targeted Structure-Seq" *PLoS Genetics* 2015; 11(12): e1005668.

28. Soszynska-Jozwiak M., Michalak P., **Moss WN**, Kierzek R., and Kierzek E. "A conserved secondary structural element in the coding region of the influenza A virus nucleoprotein (NP) mRNA is important for the regulation of viral proliferation" *PLoS ONE* 2015 10(10):e0141132.

29. **Moss WN**, and Steitz J.A. "In silico discovery and modeling of non-coding RNA structure in viruses" *Methods*. 2015; pii: S1046-2023(15)30003-7.

30. Cao S, **Moss WN**, O'Grady T, Concha M, Strong MJ, Wang X, Yu Y, Baddoo M, Zhang K, Fewell C, Lin Z., Dong Y., and Flemington E.K. "New Noncoding Lytic Transcripts Derived from the Epstein-Barr Virus Latency Origin of Replication, oriP, Are Hyperedited, Bind the Paraspeckle Protein, NONO/p54nrb, and Support Viral Lytic Transcription" *J Virol.* 2015 89(14):7120-32.

31. Lee N., **Moss WN**, Yario T., and Steitz J.A. "An Epstein–Barr virus non-coding RNA uses base pairing to recruit the PAX5 transcription factor to its DNA target" *Cell* 2015; 160(4):607–618.

32. Cao S., Strong M.J., Wang X., **Moss WN**, Concha M., Lin Z., O'Grady T., Baddoo M., Fewell C., Renne R., and Flemington E.K. "High-Throughput RNA sequencing based virome analysis of 50 lymphoma cell lines from the Cancer Cell Line Encyclopedia project." *J Virol.* 2014; pii: JVI.02570-14.

33. Jiang T., Kennedy S., **Moss WN**, Kierzek E., and Turner D.H. "Secondary Structure of a Conserved Domain in an Intron of Influenza A M1 mRNA" *Biochemistry* 2014; 53 (32): 5236-5248.

34. **Moss WN** "Analyses of non-coding RNAs generated from the Epstein–Barr virus W repeat region" *Proceedings IWBBIO* 2014; 238-252.

35. **Moss WN**, Lee N, Pimienta G, Steitz J.A. "RNA families in Epstein–Barr virus" *RNA Biology* 2014; 11:1-8.

36. Dela-Moss L.I., **Moss WN**, and Turner D.H. "Identification of conserved RNA secondary structures at influenza B and C splice sites reveals similarities and differences between influenza A, B, and C" *BMC Research Notes* 2014; 7:22.

37. **Moss, WN**, and Steitz, J.A. "Genome-wide analyses of Epstein–Barr virus reveal conserved RNA structures and a novel stable intronic sequence RNA" *BMC Genomics* 2013; 14:543.

38. **Moss, WN** "Computational prediction of RNA secondary structure" *Methods in Enzymology* 2013; 530:3-65.

39. Priore, S.F., Baman, J., **Moss, WN**, Dela-Moss, L.I., Kierzek, E., Kierzek, R., and Turner, D.H. "Secondary Structure of a Conserved Domain in the Intron of Influenza A NS1 mRNA" *PLoS ONE* 2013; 8(9): e70615.

40. Priore, S.F., **Moss, WN**, and Turner, D.H. "Influenza B virus has global ordered RNA structure in (+) and (-) strands but relatively less stable predicted RNA folding free energy than allowed by the encoded protein sequence" *BMC Research Notes* 2013; 6:330.

41. **Moss, WN**, Dela-Moss, L.I., Priore, S.F., and Turner, D.H. "The influenza A segment 7 mRNA 3' splice site pseudoknot/hairpin family" *RNA Biology* 2012; 9:1-6.

42. **Moss, WN**, Dela-Moss, L.I., Kierzek, E., Kierzek, R., Priore, S.F., and Turner, D.H. "The 3' splice site of influenza A segment 7 mRNA can exist in two conformations: a pseudoknot and a hairpin" *PLoS ONE* 2012; 7(6): e38323.

43. Priore, S.F., **Moss, WN**, and Turner, D.H. "Influenza A virus coding regions exhibit host-specific global ordered RNA structure" *PLoS ONE* 2012; 7(4): e35989.

44. **Moss, WN**, Priore, S.F., and Turner, D.H. "Identification of potential conserved RNA secondary structure throughout influenza A coding regions" *RNA* 2011; 17:991-1011.

45. **Moss, WN**, Eickbush, D.G., Lopez, M.J., Eickbush, T.H., and D.H. Turner, D.H. "The R2 retrotransposon RNA families" *RNA Biology* 2011; 8:714-718.

46. Mathews, D.H., **Moss, WN**, and Turner, D.H. "Folding and finding RNA secondary structure" RNA Worlds, 4th Edition (ed., Atkins, J.F, Gesteland, R.F., and Cech, T.R.) 2010 Cold Spring Harbor Press, Cold Spring Harbor; cited as: *Cold Spring Harb. Perspect. Biol.* DOI:10.1101/cshperspect.a003665.

47. Kierzek, E., Christensen, S.M., Eickbush, T.H., Kierzek, R., Turner, D.H., and **Moss, WN** "Secondary structures for 5′ regions of R2 retrotransposon RNAs reveal a novel conserved pseudoknot and regions that evolve under different constraints" *Journal of Molecular Biology* 2009; 390:428-442.

48. Kierzek, E., Kierzek, R., **Moss, WN**, Christensen, S.M., Eickbush, T.H., and Turner, D.H. "Isoenergetic penta- and hexanucleotide microarray probing and chemical mapping provide a secondary structure model for an RNA element orchestrating R2 retrotransposon protein function" *Nucleic Acids Research* 2008; 36:1770-82.

49. Brenner, E.D., Katari, M.S., Stevenson, D.W., Rudd, S.A., Douglas, A.W., **Moss, WN**, Twigg, R.W., Runko, S.J., Stellari, G.M., McCombie, W.R. and Coruzzi, G.M. "EST analysis in Ginkgo biloba: an assessment of conserved developmental regulators and gymnosperm specific genes" *BMC Genomics* 2005; 6:143.

50. **Moss, WN**, and Goroff, N.S. "Theoretical analysis of the 13C NMR of iodoalkynes upon complexation with Lewis bases" *Journal of Organic Chemistry* 2005; 70:802-808.

TALKS AND POSTERS

- "Finding and folding functional RNA in SARS-CoV-2" Invited talk given to the COVID-19 International Research Team (2020)
- "Finding and folding functional RNA in SARS-CoV-2" Invited talk given to the Baker Center for Bioinformatics and Biological Statistics at Iowa State University (2020)
- "Finding and Folding Functional RNA Structures" Invited talk given at the University of Northern Iowa (2020)
- "Exploring the RNA Structuromes of Humans and Their Pathogens" Invited talk given at the annual meeting of the American Chemical Society (2019)
- "Exploring the RNA Structuromes of Humans and Their Pathogens" Invited talk given at the Scripps Research Institute (2019)
- "Regulatory and non-coding RNAs in Epstein–Barr virus", Poster presented at CSHL Meeting on Regulatory and Noncoding RNAs (2018)
- "Analyses of non-coding RNAs generated from the Epstein–Barr virus W repeat region." Talk given at the 2nd International Work-Conference on Bioinformatics and Biomedical Engineering, Granada, Spain (2014)
- "Discovery of RNA Secondary Structure in Influenza Virus."
  Poster presented at the 17th Annual Meeting of the RNA Society Ann Arbor, MI (2012)

- "Identification of Conserved Structural Regions in Influenza A Coding Regions." Poster given at University of Albany Conference on RNA Science and its Applications, Albany, NY (2011)
- Participation in the RNA Ontology Consortium Structure Mapping Workgroup, Montreal, Canada (2007)

PEER REVIEW ACTIVITIES (Reviewed **63** articles since 2016)

Journal	# Rev.	Journal	# Rev.
Scientific Reports	5	Genome Biology	1
Non-Coding RNA	4	PLOS Pathogens	1
Nature Communications	3	RNA	1
Plos One	3	Biochimica et Biophysica Acta BBA	1
BMC Bioinformatics	2	Frontiers in Microbiology	1
Biophysical Journal	2	OncoTargets and Therapy	1
Nucleic Acids Research	2	Gene	1
Cells	2	Biology	1
Current Bioinformatics	2	Cancers	1
iScience	2	Computational and Structural Biotechnology Journal	1
International Journal of Molecular Sciences	2	Future Microbiology	1
PeerJ	2	Genes	1
RNA Biology	2	Israel Journal of Plant Sciences	1
Scientific Data	2	Journal of Cancer Research and Clinical Oncology	1
Journal of Ayurveda and Integrative Medicine	2	Journal of Visualized Experiments	1
Nature Methods	1	Microbes and Infection	1
eLife	1	Molecular Neurobiology	1
Journal of the American Chemical Society	1	Pharmaceuticals	1
Journal of Molecular Biology	1	Seminars in Cell and Developmental Biology	1
Journal of Virology	1	Trends in Biochemical Sciences	1
Vaccines	1	**Total:**	**63**