

Laura Landweber

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Department of Biological Sciences
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FIELD OF SPECIALIZATION

Molecular evolution and RNA-mediated epigenetic inheritance.

EDUCATION

Princeton University, A.B. in Molecular Biology, *summa cum laude*, June, 1989.

Harvard University, M.A. in Biology, November, 1991.

Harvard University, Ph.D. in Biology from the Department of Cellular and Developmental Biology, June, 1993. Topic of doctoral dissertation: “RNA editing and the evolution of mitochondrial DNA in kinetoplastid protozoa.” (Graduate advisors: Walter Gilbert and Richard Lewontin)

POSITIONS HELD

Columbia University, Professor of Biochemistry & Molecular Biophysics and of Biological Sciences, July 2016–present.

Princeton University, Professor, July 2009–June 2016.

Princeton University, Visiting Senior Research Scholar, July 2016–present.

Columbia University, Visiting Professor, May 2015–June 2016.

Princeton University, Associate Professor with Tenure, July 2001–2009.

California Institute of Technology, Visiting Associate in Chemical Engineering, Sept. 2001–Jan. 2002.

Princeton University, Assistant Professor of Ecology and Evolutionary Biology (EEB), 1994–2001.

Princeton University, Associate Faculty, Department of Molecular Biology (Mol), 1994–2016.

Harvard University, Junior Fellow of the Society of Fellows, 1993–1994.

Massachusetts General Hospital, Assistant in Molecular Biology, 1993–1994 (sponsor: Jack Szostak).

Harvard University, Parker Graduate Fellow in Cellular and Developmental Biology, 1992–1993.

Harvard University, Teaching Fellow (year long tutorial) and Resident Tutor, Eliot House, 1991–1992.

HONORS & AWARDS

President, Society for Molecular Biology and Evolution, 2016 (SMBE Council 2016-2018).

Division R Lecturer, American Society of Microbiology, 2014.

Guggenheim Fellow, 2012.

The New York Academy of Sciences, 2008 Blavatnik Award for Young Scientists.

Elected Councilor, Society for Molecular Biology and Evolution, 2007-2009.

Elected Fellow of AAAS in Biological Sciences, 2005 “for probing the diversity of genetic systems in microbial eukaryotes, including scrambled genes, RNA editing, variant genetic codes, and comparative genomics in protists”.

Nominated for a Graduate Mentoring Award, 2005, 2006.

Faculty of 1000, 2002 – present.

Tulip Prize for DNA Computing, 2001.

NSF CAREER Award in Computational Biology, 1999.

Sigma Xi’s first Young Investigator Award in the life and social sciences, 1999.

Elected to Santa Fe Institute Science Board, 1999-2004.

Santa Fe Institute Fellow-at-Large, 1999-2000.

Burroughs Wellcome Fund New Investigator Award in Molecular Parasitology, 1994.

Harvard University, William F. Milton Fund Award, 1993.

Harvard University Society of Fellows, Junior Fellowship, 1992.
Life Sciences Research Foundation Postdoctoral Fellowship, 1992 (declined).
Harvard University Graduate School of Arts and Sciences Merit Fellowship, 1992
Howard Hughes Medical Institute predoctoral fellowship, 1990–1993.
Sigma Xi Book Award (best thesis research) and membership in Sigma Xi, Molecular Biology, 1989.
National Science Foundation predoctoral fellowship, 1989–1990.
Genetics Society of America undergraduate research fellowship, 1988.

TEACHING EXPERIENCE: UNDERGRADUATE AND GRADUATE COURSES CREATED AND TAUGHT AT PRINCETON

FRS 134, *Jurassic Park: Myth or Reality?* Freshman Seminar, Spring 1995.
EEB 320/MOL 330, *Molecular Evolution*, Spring 1995, 97, 98, 2000, 2002, 2005-08, 2010-11, 2014, 2016.
EEB 524, *Topics in Evolution: Molecular Evolution*, Spring 1995, 1997, 1998, 2014.
EEB 524, *Topics in Evolution: Molecular Biology and Evolution of RNA*, Fall 1995.
EEB 522, *Colloquium on the Biology of Populations* (with Simon Levin), 1995–96, 2010-11.
EEB 211, *Biology of Organisms* (with James Gould), Fall 1997.
FRS 120, *DNA Computing: The Origin of Biological Information Processing*, Freshman Seminar, 1999.
EEB Junior Tutorial: Introduction to Genomics, Fall 2002.
EEB 524b, *Topics in Evolution: Molecular Evolution and Genomics*, Spring 2003.
EEB/GEO/AST/CHM 255, *Life in the Universe* (with Onstott, Turner, Chyba), 2004–2015.
EEB Junior Tutorial: Epigenetics, Fall 2006, 2010.
EEB 309, *Evolutionary Biology*, Fall 2011, 2012.
EEB Junior Tutorial: Controversies in Evolution, Fall 2013.

GRADUATE STUDENTS ADVISED AND POSTDOCTORAL RESEARCH FELLOWS SPONSORED (9 now tenured)

7 Current graduate students: **Leslie Beh** (Princeton), **Derek Clay** (Princeton), **V. Talya Yerlici** (Princeton), **Richard Miller** (Princeton), **Yi Feng** (Columbia), **Michael Lu** (Columbia), **Samuel Resnick** (Columbia, MD/PhD).

8 Former Princeton graduate students: **Kelsi Lindblad** (Quantitative and Computational Biology, PhD, 2017), **Xiao Chen** (Mol, Ph.D. 2015, Bioinformatics Scientist, Illumina), **Wenwen Fang** (Mol, Ph.D. 2012, Damon Runyon fellow, MIT Whitehead Institute; recipient of 2013 *RNA Society Scaringe Award* and 2013 *ASCB Norton B. Gilula Award*), **Estienne Swart** (EEB, Ph.D. 2012, postdoc University of Bern), **Han Liang** (Chemistry, Ph.D. 2006; Associate Professor with tenure and Deputy Chair, M.D. Anderson Cancer Research Center), **Rob Knight** (EEB, Ph.D. 2001; Professor, University of San Diego; *Council of Graduate Schools Distinguished Dissertation Award in the Biological and Life Sciences*, *HHMI Early Career Scientist*), **T. Andrew Ronneberg** (Chemistry, Ph.D. 2001; current, Vice President, Helios), **Tamara Horton** (Mol, Ph.D. 2000, NDSEG fellow; postdoc Rockefeller University; current faculty, Minnesota State University).

3 Current postdoctoral research fellows: **Jaspreet Khurana** (Ph.D. U Mass Medical School), **Rafik Neme** (Ph.D. Max Planck Institute For Evolutionary Biology), **Sandrine Moreira** (Ph.D. Montreal).

20 Former postdoctoral research fellows: **John Bracht** (NIH Kirschstein fellow, Ph.D. UCSD, Asst Prof, American University), **Xing Wang** (Ph.D. NYU, Asst Prof, Dept of Chemistry and Chemical Biology, RPI), **Aaron Goldman** (NASA postdoctoral fellowship, Ph.D. University of Washington; Asst Prof, Oberlin), **Brian Higgins** (NIH Kirschstein fellow; Ph.D. Georgia; Asst Prof, Medical College Georgia), **Mariusz Nowacki** (Ph.D. Ecole Normale Supérieure; Associate Prof, University of Bern), **Yi Zhou** (Ph.D. NYU, Bioinformatics Analyst), **Thomas Doak** (Ph.D. Utah; Research Staff at Indiana University), **Wei-Jen Chang** (Ph.D. SUNY Buffalo; Associate Professor, Hamilton College), **Andre Cavalcanti** (Ph.D. Universidade Federal de Pernambuco, Brazil; Associate Professor, Pomona College), **Michael Livstone** (Ph.D. Columbia, Scientific Curator for the Yeast Genome Database), **Shiuhyang Kuo** (Ph.D. Florida, Research Investigator, University of Michigan), **Zhongliang Tang** (Ph.D. Columbia chemical engineering, staff scientist at Biocept), **Danny van Noort** (Ph.D. applied physics, Linköpings University, Sweden; Research Professor, Universidad de los Andes), **Naomi Stover** (Ph.D. U.C. Irvine, Associate Professor, Bradley University), **Stephen Freeland** (HFSP

Fellowship, Ph.D. Cambridge University, Associate Professor and Director of Interdisciplinary Studies, UMBC), **Christina Burch** (Ph.D. U.C. San Diego, Associate Professor, University of North Carolina), **David Ardell** (NSF Fellowship in Computational Biology, Ph.D. Stanford; Asst Prof, University of California, Merced) **Dirk Faulhammer** (DFG fellowship, Ph.D. Munich, currently at GE Healthcare, Berlin), **Tai-Chi Kuo** (Ph.D. University of Texas, Austin; Professor at Industrial Technique Research Institute, Taiwan), and **Laura Katz** (Ph.D. Cornell, NSF/Sloan fellowship; Professor, Smith College).

Advised 67 Senior Theses in the Depts. of EEB, Molecular Biology, Computer Science, Chemistry, Chemical Engineering, Electrical Engineering and Geology. Seven have received thesis prizes: **Andrew Goodman** (EEB'99, Assistant Professor, Yale) *Cannon Prize*; **Anthony Cukras** (Chemistry and Computer Science'98, Instructor, Harvard Medical School) *Harold Willis Dodds Award for Achievement*; **Vikram Vijayan** (Electrical Engineering'07, postdoc, Rockefeller University), *best student talk at the 13th International Conference on DNA Based Computers* and the *Charles Ira Young Class of 1883 Memorial Tablet and Medal* (the highest distinction in research in electrical engineering); **Caroline Fichtenberg** (Mol'95, Director, Center for Public Health Policy, APHA), **Thor Wagner** (Mol'96, Assistant Professor, Seattle Children's Hospital), **Paul Bryson** (Mol'03, postdoc, USC), and **Elizabeth Hutton** (Mol'14, graduate student, Cold Spring Harbor Laboratory) *Senior Thesis Prizes in Molecular Biology*.

46% of undergraduate research in my lab has been published, some students up to 3 papers.

Second reader on ~100 undergraduate senior theses (approximately 5/year).

Committee member for Kenric Hoegler (2016, MolBio/Chemistry), Hannah Seidel (PhD, 2011), Georgii Bazykin (PhD, 2007), Philippe Tortell (PhD, 2001), Cara Magnabosco (current, Geology), and others in Chemistry, MolBio, and Geology.

PUBLICATIONS

BOOKS

- Landweber, L. F.** and Winfree, E., eds. (2002) *Evolution as Computation*. Springer-Verlag.
- Landweber, L. F.** and Dobson, A., eds. (1999) *Genetics and the Extinction of Species*. Princeton University Press.
- Landweber, L. F.** and Baum, E. B., eds. (1998) *DNA Based Computers II*. DIMACS Series in Discrete Mathematics and Theoretical Computer Science, vol. 44, American Mathematical Society.

ARTICLES (* denotes undergraduate author)

150. Lindblad, K. A., Bracht, J. R., Williams, A. E. and **L. F. Landweber** (2017) Thousands of RNA-cached copies of whole chromosomes are present in the ciliate *Oxytricha* during development. *RNA*. doi: 10.1261/rna.058511.116
149. Burns, J., Kukushkin, D., Chen, X., **Landweber, L. F.**, Saito, M., Jonoska, N. (2016) Recurring patterns among scrambled genes in the encrypted genome of the ciliate *Oxytricha trifallax*. *J Theor Biol*. 410:171-180. doi: 10.1016/j.jtbi.2016.08.038.
148. Goldman, A. D. and **L. F. Landweber** (2016) What Is a Genome? *PLoS Genet*. 12(7):e1006181. doi: 10.1371/journal.pgen.1006181. eCollection 2016
147. Bracht, J. R., Wang, X., *Shetty, K., Chen, X., Uttarotai, G. J., Callihan, E. C., *McCloud, S. S., Clay, D. M., Wang, J., Nowacki, M. and **L. F. Landweber** (2016). Chromosome fusions triggered by noncoding RNA. *RNA Biology*. doi: 10.1080/15476286.2016.1195940.
146. Chen, X. and **L. F. Landweber** (2016) Phylogenomic analysis reveals genome-wide purifying selection on TBE transposons in the ciliate *Oxytricha*. *Mobile DNA*. 7:2. doi: 10.1186/s13100-016-0057-9.
145. Goldman, A. D., *Beatty, J. T., and **L. F. Landweber** (2016) The TIM Barrel Architecture Facilitated the Early Evolution of Protein-Mediated Metabolism. *J. Mol. Evol*. 82(1):17-26.
144. Burns, J., Kukushkin, D., Lindblad, K., Chen, X., Jonoska, N., and **L. F. Landweber** (2016) <mds_ies_db>: a database of ciliate genome rearrangements. *Nucleic Acids Res.*, 44(D1):D703-9, doi 10.1093/nar/gkv1190.
143. Schaap, P., Barrantes, I., Minx, P., Sasaki, N., Anderson, R. W., Bénard, M., Biggar, K. K., Buchler, N. E., Bundschuh, R., Chen, X., Fronick, C., Fulton, L., Golderer, G., Jahn, N., Knoop, V., **Landweber, L. F.**, *et al.*

- (2015) The *Physarum polycephalum* Genome Reveals Extensive Use of Prokaryotic Two-component and Metazoan-type Tyrosine Kinase Signaling. Genome Biol. Evol. 8(1):109-25.
142. Chen, X., Jung, S., Beh, L. Y., Eddy, S. R., and **L. F. Landweber** (2015) Combinatorial DNA Rearrangement Facilitates the Origin of New Genes in Ciliates. Genome Biol Evol. 7(10):2859-70.
141. Beh, L. Y., Müller, M. M., Muir, T. W., Kaplan, N., and **L. F. Landweber** (2015) DNA-guided establishment of canonical nucleosome patterns within coding regions of a eukaryotic genome. Genome Research, 25:1727-1738.
140. Tyler-Smith, C., Yang, H., **Landweber, L. F.**, Dunham, I., Knoppers, B. M., Donnelly, P., Mardis, E. R., Snyder, M., McVean, G. (2015) Where Next for Genetics and Genomics? PLoS Biol. Jul 30;13(7):e1002216. doi: 10.1371/journal.pbio.1002216.
139. Chen, X., Bracht, J. R., Goldman, A. D., Dolzhenko, E., Clay, D. M., Swart, E. C., Perlman, D. H., Sebra, R. P., Doak, T. G., Stuart, A., Amemiya, C. T., and **L. F. Landweber** (2014) The architecture of a scrambled genome reveals massive levels of genomic rearrangement during development. Cell, 158:1187-1198.
138. Yerlici, V. T. and **L. F. Landweber** (2014) "Programmed genome rearrangements in the ciliate *Oxytricha*" in Mobile DNA III. N. Craig, ed. ASM Press; available online: Microbiol Spectrum 2(6): MDNA3-0025-2014. doi:10.1128/microbiolspec.MDNA3-0025-2014.
137. Khurana, J. S., Wang, X., Chen, X., Perlman, D. H., and **L. F. Landweber** (2014) Transcription-independent functions of an RNA Polymerase II subunit, Rpb2, during genome rearrangement in the ciliate, *Oxytricha trifallax*. Genetics, 197(3):839-49.
136. Goldman, A. D., *Stein, E. M., Bracht, J. R. and **L. F. Landweber** (2014) Programmed Genome Processing in Ciliates. In Discrete and Topological Models in Molecular Biology. N. Jonoska and M. Saito (eds.), Springer-Verlag, Berlin, 273-287.
135. Koonin, E. V., **Landweber, L. F.**, and D. J. Lipman, (2013) Biology Direct: celebrating 7 years of open, published peer review. Biol Direct. 8:11. <http://www.biologydirect.com/content/8/1/11>
134. **Landweber, L. F.**, Horton, T. L., and J. Gott (2013) Nucleic Acid Biodiversity: Rewriting DNA and RNA in Diverse Organisms. In Encyclopedia of Biodiversity (2nd edition). S. A. Levin, ed. Academic Press, Vol. 5, 568-580.
133. Liang, H. and **Landweber, L. F.** (2013) Dual-Coding Regions in Alternatively Spliced Human Genes. In: Encyclopedia of Life Sciences (eLS). John Wiley & Sons, Ltd: Chichester. <http://www.els.net> DOI: 10.1002/9780470015902.a0020780.pub2.
132. Vogt, A., Goldman, A. D., Mochizuki, K., and **L. F. Landweber** (2013) Transposon Domestication versus Mutualism in Ciliate Genome Rearrangements. PLoS Genetics Aug;9(8):e1003659.
131. Bracht, J. R., Fang, W., Goldman, A. D., Dolzhenko, E., *Stein, E. M., and **L. F. Landweber** (2013) Genomes on the edge: Programmed genome instability in ciliates. Cell, 152:406-16.
130. Fang, W. and **L. F. Landweber** (2013) RNA-mediated genome rearrangement: Hypotheses and evidence. BioEssays 35:84-7. doi: 10.1002/bies.201200140. (cover article)
129. Swart, E. C., Bracht, J. R., Magrini, V., Minx, P., Chen, X., Zhou, Y., Khurana, J. S., Goldman, A. D., Nowacki, M., Schotanus, K., Jung, S., Fulton, R. S., Ly, A., McGrath, S., Haub, K., Buckles, J. L., Storton, D., Matese, J., Parsons, L., Chang, W.-J., Bowen, M. S., Stover, N. A., Jones, T. A., Eddy, S. R., Herrick, G. A., Doak, T. G., Wilson, R. K., Mardis, E. R., and **L. F. Landweber** (2013) The *Oxytricha trifallax* Macronuclear Genome: A Complex Eukaryotic Genome with 16,000 Tiny Chromosomes. PLoS Biology, 11(1): e1001473. (cover article)
128. Goldman, A. D., *Bernhard, T. M., Dolzhenko, E., and **L. F. Landweber** (2013) LUCApedia: a database for the study of ancient life. Nucleic Acids Res. 41(D1):D1079-82, doi: 10.1093/nar/gks1217.
127. Goldman, A. D. and **L. F. Landweber** (2012) *Oxytricha* as a modern analog of ancient genome evolution. Trends Genetics 28:382-8. (cover article)
126. Fang, W., Wei, Y., Kang, Y., and **L. F. Landweber** (2012) Detection of a common chimeric transcript between human chromosomes 7 and 16. Biology Direct. 7:49, <http://www.biology-direct.com/content/7/1/49>.
125. Fang, W., Wang, X., Bracht, J. R., Nowacki, M., and **L. F. Landweber** (2012) Piwi-Interacting RNAs Protect DNA Against Loss During *Oxytricha* Genome Rearrangement. Cell, 151:1243-55.
124. Bracht, J. R., Perlman, D. H., and **L. F. Landweber** (2012) Cytosine methylation and hydroxymethylation

- mark DNA for elimination in *Oxytricha trifallax*. Genome Biology, 13, R99, <http://genomebiology.com/2012/13/10/R99>.
123. *Zoller, S. D., Hammersmith, R. L., Swart, E. C., Higgins, B. P., Doak, T. G., Herrick, G., and **L. F. Landweber** (2012) Characterization and taxonomic validity of the ciliate *Oxytricha trifallax* (Class Spirotrichea) based on multiple conserved gene sequences: limitations in identifying genera solely by morphology. Protist 163:643-57.
 122. Swart, E. C., Nowacki, M., *Shum, J., *Stiles, H., Higgins, B. P., Doak, T. G., Schotanus, K., Magrini, V. J., Minx, P., Mardis, E. R., and **L. F. Landweber** (2012) The *Oxytricha trifallax* mitochondrial genome. Genome Biology and Evolution. 4:136-54.
 121. Nowacki, M., *Shetty, K., and **L. F. Landweber** (2011) RNA-Mediated Epigenetic Programming of Genome Rearrangements. Annual Review of Genomics and Human Genetics. 12:367-89.
 120. Zhou, Y., *Wubneh, H., *Schwarz, C., and **Landweber, L. F.** (2011) A Chimeric Chromosome in the Ciliate *Oxytricha* Resulting from Duplication. J. Mol. Evol. 73: 70-73.
 119. Jung, S., Swart, E. C., Minx, P. J., Magrini, V., Mardis, E. R., **Landweber, L. F.**, Eddy, S. R. (2011) Exploiting *Oxytricha trifallax* nanochromosomes to screen for non-coding RNA genes. Nucleic Acids Res. 39:7529-47.
 118. Nowacki, M., Haye, J. E., Fang, W., *Vijayan, V. and **L. F. Landweber** (2010) RNA-mediated epigenetic regulation of DNA copy number. Proc Natl Acad Sci USA. 107:22140-4.
 117. Angeleska, A., Jonoska, N., M. Saito, and **L. F. Landweber** (2009) Strategies for RNA-guided DNA recombination, In: Algorithmic Bioprocesses. Condon, A., Harel, D., Kok, J.N., Salomaa, A., Winfree, E. (Eds.), Springer-Verlag, Berlin, 83-98.
 116. Nowacki, M. and **L. F. Landweber** (2009) Epigenetic Inheritance in Ciliates. Current Opinion in Microbiology 12: 638-643.
 115. *Gawrys, M. D., Hartman, I., **Landweber, L. F.** and D. W. Wood (2009) Use of engineered *Escherichia coli* cells to detect estrogenicity in everyday consumer products. J. Chemical Technology and Biotechnology 84: 1834-1840.
 114. Nowacki, M., Higgins, B. P., *Maquilan, G., Swart, E., Doak, T. G. and **L. F. Landweber** (2009) A functional role for transposases in a large eukaryotic genome. Science 324: 935-8.
 113. Liang, H. and **Landweber, L. F.** (2008) Dual-Coding Regions in Alternatively Spliced Human Genes. In: Encyclopedia of Life Sciences. John Wiley & Sons, Ltd: Chichester, <http://www.els.net/> [DOI: 10.1002/9780470015902.a0020780].
 112. Ricard, G., de Graaf, R.M., Dutilh, B.E., Duarte, I., van Alen, T.A., van Hoek, A.H., Boxma, B., van der Staay, G.W., Moon-van der Staay, S.Y., Chang, W.-J., **Landweber, L.F.**, Hackstein, J.H., and Huynen, M. A. (2008) Macronuclear genome structure of the ciliate *Nyctotherus ovalis*: single-gene chromosomes and tiny introns. BMC Genomics 9:587.
 111. Möllenbeck, M., Zhou, Y., Cavalcanti, A. R. O., Jönsson, F., Higgins, B. P., Chang, W.-J., Juranek, S., Doak, T. G., Rozenberg, G., Lipps, H. J. and **L. F. Landweber** (2008) The pathway to detangle a scrambled gene. PLoS ONE 3(6):e2330.
 110. Nowacki, M., *Vijayan, V., Zhou, Y., Schotanus, K., Doak, T. G. and **L. F. Landweber** (2008) RNA-mediated epigenetic programming of a genome-rearrangement pathway. Nature 451, 153-158.
 109. **Landweber, L. F.** (2008) Making sense of scrambled genomes. Science 319:901-902.
 108. **Landweber, L. F.** (2007) Why genomes in pieces? Science 318:405-407.
 107. Angeleska, A., Jonoska, N., Saito, M. and **L. F. Landweber** (2007) RNA-guided DNA assembly. J. Theor. Biol. 248:706-20.
 106. Chang, W.-J., *Addis, V. M., *Li, A. J., Axelsson, E., Ardell, D. H. and **L. F. Landweber** (2007) Intron Evolution and Information processing in the DNA polymerase α gene in spirotrichous ciliates: a hypothesis for interconversion between DNA and RNA deletion. Biol. Direct 2:6.
 105. Zhou, Y. and **L. F. Landweber** (2007) **BLASTO**: a tool for searching orthologous groups. Nucleic Acids Res. 35:W678-82.
 104. Liang, H. and **L. F. Landweber** (2007) Hypothesis: RNA Editing of MicroRNA Target Sites in Humans? RNA 13:463-7.

103. Cavalcanti, A. R. O. and **L. F. Landweber** (2006) Insights into a Biological Computer: Detangling Scrambled Genes in Ciliates. In J. Chen, N. Jonaska, G. Rozenberg, eds. Nanotechnology: Science and Computation. Springer-Verlag, Berlin, 349-360.
102. Koonin, E. V., **L. F. Landweber**, D. J. Lipman, R. Dignon (2006) Reviving a culture of scientific debate. Nature doi:10.1038/nature05005, www.nature.com/nature/peerreview/debate/nature05005.html
101. Koonin, E. V., **L. F. Landweber**, D. J. Lipman (2006) A community experiment with fully open and published peer review. Biol Direct 1:1.
100. Liang, H., Zhou, W. and **L. F. Landweber** (2006) **SWAKK**: a web server for detecting positive selection in proteins using a sliding window substitution rate analysis. Nucleic Acids Res. 34:W382-4.
99. Möllenbeck, M., Cavalcanti, A. R. O., Jönsson, F., Lipps, H. J. and **L. F. Landweber** (2006) Interconversion of germline-limited and somatic DNA in a scrambled gene. J. Mol. Evol. 63(1):69-73.
98. Livstone, M. S., Weiss, R. and **L. F. Landweber** (2006) Automated Design and Programming of a Microfluidic DNA Computer. Natural Computing 5:1-13.
97. Wong, L.-C. and **L. F. Landweber** (2006) Evolution of Programmed DNA Rearrangements in a Scrambled Gene. Mol. Biol. Evol. 23:756-763.
96. *McFarland, C.P., Chang, W.-J., Kuo, S. and **L. F. Landweber** (2006) Conserved linkage of two genes on the same macronuclear chromosome in spirotrichous ciliates. Chromosoma 115:129-138.
95. Cavalcanti, A.R.O., Stover, N. A. and **L. F. Landweber** (2006) On the paucity of duplicated genes in *Caenorhabditis elegans* operons. J. Mol. Evol. 62:765-771.
94. Chang, W.-J., Kuo, S. and **L. F. Landweber** (2006) A new scrambled gene in the ciliate *Uroleptus*. Gene 368:72-77.
93. Liang, H. and **L. F. Landweber** (2006) A Genome-wide Study of Dual Coding Regions in Human Alternatively Spliced Genes. Genome Research 16:190-196.
92. Kuo, S., Chang, W.-J. and **L. F. Landweber** (2006) Complex Germline Architecture: Two Genes Intertwined on Two Loci. Mol. Biol. Evol. 23:4-6.
91. Vlassov, A. V., Johnston, B. H., **Landweber, L. F.** , and S. A. Kazakov (2005) RNA catalysis in frozen solutions. Dokl Biochem Biophys. May-Jun;402:207-9.
90. van Noort, D. and **L. F. Landweber** (2005) Towards a re-programmable DNA computer. Natural Computing 4:163–175.
89. Liang, H., **Landweber, L. F.** and J. R. Fresco (2005) Are stop codons recognized by base triplets in the large ribosomal RNA subunit? RNA 11(10):1478-84.
88. Chang, W.-J., *Bryson, P. D., Liang, H., Shin, M.-K. and **L. F. Landweber** (2005) The evolutionary origin of a complex scrambled gene. Proc Natl Acad Sci USA. 102(42):15149-54.
87. Vlassov, A. V., Kazakov, S. A. Johnston, B. H. and **L. F. Landweber** (2005) The RNA World on Ice: A New Scenario for the Emergence of RNA Information. J. Mol Evol. 61(2):264-73.
86. Liang, H. and **L. F. Landweber** (2005) Molecular mimicry: quantitative methods to study structural similarity between protein and RNA. RNA 11(8): 1167-72.
85. Stover, N. A., Cavalcanti, A. R. O., *Li, A. J., Richardson, B. C. and **L. F. Landweber** (2005) Reciprocal fusions of two genes in the formaldehyde detoxification pathway in ciliates and diatoms. Mol Biol Evol. 22(7): 1539-42.
84. Liang, H., Cavalcanti, A. R. O., and **L. F. Landweber** (2005) Conservation of tandem stop codons in yeasts. Genome Biology 6(4):R31-R31.8.
83. Liang, H., *Wong, J., Bao, Q., Cavalcanti, A.R.O. and **L. F. Landweber** (2005) Decoding the decoding region: analysis of eukaryotic release factor stop codon-binding residues, J. Mol. Evol. 60: 337-44.
82. Cavalcanti, A.R.O., *Clarke, T. H. and **L. F. Landweber** (2005) MDS_IES_DB: a database of macronuclear and micronuclear genes in spirotrichous ciliates. Nucleic Acids Res. 33 Database Issue:D396-8.
81. Kari, L. and **L. F. Landweber** (2004) Biocomputation in ciliates. In Cellular Computing, M. Amos, Ed., Oxford University Press, 202-216.
80. Cavalcanti, A.R.O. and **L. F. Landweber** (2004) Genetic code. Current Biology 14: R147.
79. Knight, R. D., Freeland, S. J., and **L. F. Landweber** (2004) Adaptive Evolution of the Genetic Code. In The Genetic Code and the Origin of Life. Ribas de Pouplana, L., ed., Landes Bioscience.

78. van Noort, D., Tang, Z. and **L. F. Landweber** (2004) Fully controllable microfluidics for molecular computers. J. Association Laboratory Automation (JALA) 9(5): 285-290.
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76. Cavalcanti, A.R.O., Stover, N.A., *Orecchia, L., Doak, T.G. and **L. F. Landweber** (2004) Coding properties of *Oxytricha trifallax* (*Sterkiella histriomuscorum*) macronuclear chromosomes: analysis of a pilot genome project. Chromosoma, 113:69–76.
75. Chang, W.-J., Stover, N. A., *Addis, V. M., and **L. F. Landweber** (2004) A Micronuclear Locus Containing Three Protein-coding Genes Remains Linked During Macronuclear Development in the Spirotrichous Ciliate *Holosticha*. Protist, 155(2):245-255.
74. Livstone, M. S. and **Landweber, L. F.** (2004) Mathematical Considerations in the Design of Microreactor-Based DNA Computers. Lecture Notes in Computer Science 2943:180-189.
73. van Noort, D. and **Landweber, L. F.** (2004) Towards a re-configurable DNA computer. Lecture Notes in Computer Science 2943:190-197.
72. Vlassov, A. V., Johnston, B. H., **Landweber, L. F.**, and S. A. Kazakov (2004) Ligation activity of fragmented ribozymes in frozen solution: implications for the RNA world. Nucleic Acids Research 32(9):2966-74.
71. Cavalcanti, A.R.O., **L. F. Landweber** (2004) **Gene Unscrambler** for detangling scrambled genes in ciliates, Bioinformatics 20(5):800-2.
70. Cavalcanti, A.R.O. and **L. F. Landweber** (2003) Genetic code: what nature missed. Current Biology 13(22):R884-5.
69. Livstone, M., van Noort, D., and **L. F. Landweber** (2003) Molecular computing revisited: a Moore's law? Trends in Biotechnology. 21: 98-101.
68. Ardell, D. H., Lozupone, C. A. and **L. F. Landweber** (2003) Polymorphism, Recombination and Alternative Unscrambling in the DNA Polymerase α Gene of the Ciliate *Stylonychia lemnae*. Genetics 165:1761-77.
67. Doak, T. G., Cavalcanti, A. R. O., Stover, N.A., Dunn, D. M., Weiss, R., Herrick, G. and **L. F. Landweber** (2003) Sequencing the *Oxytricha trifallax* macronuclear genome: a pilot project. Trends Genetics 19:603-7.
66. Knight, R. D., **Landweber, L. F.**, and M. Yarus (2002) Tests of a Stereochemical Code. In Translation Mechanisms, Lapointe, J. and Brakier-Gingras, L., eds., Landes Bioscience.
65. Horton, T. L. and **L. F. Landweber** (2002) Rewriting the information in DNA: RNA editing in kinetoplasts and myxomycetes Current Opinion in Microbiology 5: 620–626.
64. **Landweber, L. F.** (2002) Custom Codons come in Threes, Fours, and Fives. Chemistry and Biology. 9(2):143.
63. **Landweber, L. F.** and L. Kari (2002) Universal Molecular Computation in Ciliates. In **Landweber, L. F.** and Winfree, E., eds. Evolution as Computation. Springer-Verlag, Berlin.
62. *Ruben, A. J., Freeland, S. J., and **L. F. Landweber** (2002) PUNCH: An Evolutionary Algorithm for Optimizing Bit Set Selection. Lecture Notes in Computer Science 2340:150-160.
61. *Ruben, A. J. and **L. F. Landweber** (2001) The Past, Present, and Future of DNA Computing. In Biotechnology 2000. B. Alizadeh, ed. Universal Medical Press, San Francisco.
60. Knight, R. D., Freeland, S. J., and **L. F. Landweber** (2001) Rewiring the Keyboard: Evolvability of the Genetic Code. Nature Reviews Genetics 2: 49-58.
59. Knight, R. D., **Landweber, L. F.**, and M. Yarus (2001) How Mitochondria Redefine the Code. J. Mol. Evol. 53(4-5):299-313.
58. Knight, R. D., Freeland, S. J., and **L. F. Landweber** (2001) A Simple Model Based On Mutation and Selection Explains Codon and Amino Acid Usage Trends Within and Across Genomes. Genome Biology 2(4):RESEARCH0010 (genomebiology.com/2001/2/4/research/0010/).
57. Ronneberg, T. A., Freeland, S. J., and **L. F. Landweber** (2001) **Genview** and **Gencode**: A Pair of Programs to Test Theories of Genetic Code Evolution. Bioinformatics 17(3):280-1.
56. Faulhammer, D., Lipton, R. J. and **L. F. Landweber** (2001) Fidelity of enzymatic ligation for DNA computing. J. Comp. Biol. 7(6):839-48.

55. Lozupone, C. A., Knight, R. D., and **L. F. Landweber** (2001) The Molecular Basis for Nuclear Genetic Code Change in Ciliates. Current Biology, 11: 65-74.
54. **Landweber, L. F.** (2000) Beyond Silicon Computing: DNA Computers. Testimony to the U.S. House of Representatives Committee on Science, Subcommittee on Basic Research, September 12.
53. Kari, L. and **L. F. Landweber** (2000) Computational Power of Gene Rearrangement, In DNA Based Computers V, E. Winfree, D. Gifford eds. DIMACS Series in Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, vol 54: 201-216.
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51. Beech, P. L., **Landweber, L. F.** and P. R. Gilson. (2000) Protist News: Meeting Report: XIIIth Meeting of the International Society for Evolutionary Protistology, České Budejovice, Czech Republic, July 31–August 4, 2000 Protist 151: 299-305.
50. Faulhammer, D., Lipton, R. J. and **L. F. Landweber** (2000) When the knight falls: On constructing an RNA computer. In DNA Based Computers V, E. Winfree, D. Gifford, eds. DIMACS Series in Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, 54: 1-7.
49. Horton, T. L. and **L. F. Landweber** (2000) Nucleic Acid Biodiversity. In Encyclopedia of Biodiversity. S. A. Levin, ed. Academic Press 4: 415-426.
48. *Ruben, A. J. and **L. F. Landweber** (2000) The Past, Present, and Future of Molecular Computing. Nature Reviews Molecular Cell Biology, inaugural October issue 1: 69-72.
47. Freeland, S. J., Knight, R. D., and **L. F. Landweber** (2000) Measuring adaptation in the genetic code. Trends in Biochemical Sciences 25(2): 44-5.
46. Knight, R. D., and **L. F. Landweber** (2000) The Early Evolution of the Genetic Code. Cell 101: 569-572.
45. Horton, T. L. and **L. F. Landweber** (2000) Mitochondrial RNAs of Myxomycetes terminate with non-encoded 3' poly(U) tails. Nucleic Acids Research 28(23): 4750-4754.
44. Horton, T. L. and **L. F. Landweber** (2000) Evolution of Four Types of RNA Editing in Myxomycetes. RNA 6: 1339-1346.
43. Hagedorn, T. R. and **L. F. Landweber** (2000) Phylogenetic Invariants and Geometry. Journal of Theoretical Biology 205: 365-376.
42. Freeland, S. J., Knight, R. D., **Landweber, L. F.**, and L. D. Hurst (2000) Early Fixation of an Optimal Genetic Code. Molecular Biology and Evolution. 17(4): 511-518.
41. Knight, R. D. and **L. F. Landweber** (2000) Guilt by Association: The Arginine Case Revisited. RNA 6:499-510.
40. Ronneberg, T. A., **Landweber, L. F.** and S. J. Freeland (2000) Testing a Biosynthetic Theory of the Genetic Code: Fact or Artifact? Proc. Natl. Acad. Sci. USA 97(25): 13690-13695.
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35. Kari, L. and **L. F. Landweber** (1999) L'ordinateur biologique, pour demain? Le Calcul par ADN (*Computing with DNA*) Les Cahiers de Science & Vie, Octobre, 53: 88-93.
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31. **Landweber, L. F.** (1999) Something Old for Something New: The Future of Ancient DNA in Conservation Biology. In Genetics and the Extinction of Species. **L. F. Landweber** and A. Dobson, eds. Princeton University Press, 163-186.
30. Forbes, N. A. and **L. F. Landweber** (1999) Computer Science and the Evolution of Genetic Information. Computing in Science and Engineering 1(5):12-15.
29. Kari, L. and **L. F. Landweber** (1999) Computing with DNA. Methods in Molecular Biology 132:413-430.
28. **Landweber, L. F.** (1999) Experimental RNA Evolution. Trends Ecol. Evol. 14: 353-358.
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25. **Landweber, L. F.** (1999) Testing Ancient RNA-Protein Interactions. Proc. Natl. Acad. Sci. USA 96: 11067-11068.
24. Faulhammer, D., Lipton, R. J. and **L. F. Landweber** (1999) Counting DNA: Estimating the complexity of a test tube of DNA. In DNA Based Computers IV, L. Kari, ed. *Biosystems* 52:193-6.
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22. **Landweber, L. F.** and L. Kari (1999) The Evolution of Cellular Computing: Nature's Solution to a Computational Problem, In DNA Based Computers IV, L. Kari, ed. *Biosystems* 52:3-13
21. **Landweber, L. F.**, Lipton, R. J. and M. O. Rabin (1999) DNA²DNA Computations: A Potential "Killer App"? In DNA Based Computers III, H. Rubin and D.H. Wood, eds. DIMACS Series in Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, vol 48, 161-172.
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19. **Landweber, L. F.** and I. D. Pokrovskaya (1999) Emergence of a Dual Catalytic RNA with Metal Specific Cleavage and Ligase Activities: The Spandrels of RNA Evolution. Proc. Natl. Acad. Sci. USA 96: 173-178.
18. **Landweber, L. F.** and L. A. Katz (1998) Evolution: Lost Worlds. A meeting brief. HMS Beagle (BioMedNet) Issue 26 (Mar. 6).
17. **Landweber, L. F.**, Simon, P. J. and *Wagner, T. A. (1998) Ribozyme Design and Early Evolution. BioScience 48: 94-103.
16. **Landweber, L. F.** and L. A. Katz (1998) Evolution: Lost Worlds. Trends Ecol. Evol. 13: 93-94.
15. **Landweber, L. F.** (1998) RNA Based Computing. In DNA Based Computers II, **L. F. Landweber** and E. B. Baum, eds. DIMACS Series in Discrete Mathematics and Theoretical Computer Science, American Mathematical Society, 181-189.
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13. **Landweber, L. F.** (1998) The Evolution of DNA Computing: Nature's Solution to a Path Problem. *IEEE Proceedings of Symposia on Intelligence and Systems '98*, May 21-23, 1998. IEEE Computer Society Press, 133-139.
12. Knight, R. D. and **L. F. Landweber** (1998) Rhyme or Reason: RNA-Arginine Interactions and the Genetic Code. Chemistry and Biology. 5: R215-220.
11. **Landweber, L. F.** (1997) RNA Based Computing. DIMACS Technical Report 97-83.
10. **Landweber, L. F.** (1997) This Tree of Life: A meeting brief. HMS Beagle (BioMedNet) Issue 1 (Feb. 1).
9. **Landweber, L. F.** and R. J. Lipton (1997) DNA²DNA Computations: A potential 'killer app'? In *24th International Colloquium on Automata, Languages and Programming (ICALP)*, Lecture Notes in Computer Science, pages 672-683, Springer-Verlag.
8. *Orr, A. T., *Rabets, J. C., Horton, T. L., and **L. F. Landweber** (1997) RNA Editing Missing in Mitochondria. RNA 3: 335-336.
7. **Landweber, L. F.** and M. Kreitman (1995) Producing Single-Stranded DNA in Polymerase Chain Reaction for Direct Genomic Sequencing. In Recombinant DNA Methodology II, Ray Wu, ed., pp.579-588.
6. **Landweber, L. F.** and W. Gilbert (1994) Phylogenetic analysis of RNA editing: A primitive genetic

- phenomenon. Proc. Natl. Acad. Sci. USA 91: 918-921.
5. **Landweber, L. F.**, *Fiks, A. G., and W. Gilbert (1993) The Boundaries of Partially Edited Cytochrome c Oxidase III Transcripts are Not Conserved in Kinetoplastids: Implications for the Guide RNA Model of Editing. Proc. Natl. Acad. Sci. USA 90: 9242-9246.
 4. **Landweber, L. F.** and W. Gilbert (1993) RNA editing as a source of genetic variation. Nature 363:179-182.
 3. **Landweber, L. F.** and M. Kreitman (1993) Producing Single-Stranded DNA in Polymerase Chain Reaction for Direct Genomic Sequencing. Methods in Enzymology 218: 17-26.
 2. **Landweber, L. F.** (1992) The evolution of RNA editing in kinetoplastid protozoa. BioSystems 28:41-45.
 1. Kreitman, M. and ***Landweber, L. F.** (1989) A strategy for producing single-stranded DNA in the polymerase chain reaction: a direct method for genomic sequencing. Gene Analysis Techniques 6:84-88.

GRANTS RECEIVED FOR CURRENT RESEARCH

- NIH R01 GM59708 (including renewals) “Understanding Complex Gene Scrambling and Editing Systems in Protists,” August 1999 – June 2017. (MIRA pending, post council review).
- NIH R01 GM111933, “RNA Biology in *Oxytricha*: a Complex Unicellular Model,” September 2015 – June 2019.
- NIH R01 GM109459, “RNA-guided Genome Rearrangement: Experiments Coupled with Discrete Models” September 2013 – June 2018 (with N. Jonoska, USF).
- HFSP, “Molecular mechanisms and epigenetic control of beneficial transposons: lessons from ciliates” (co-PI with Orsolya Barabas, EMBL) August 2014 – July 2018.
- Joint NSF/NIGMS “RNA-guided DNA recombination through assembly graphs,” September 2009 – August 2013 (co-PI with N. Jonoska, USF).
- NSF ARRA: Epigenetic Mechanisms for the Inheritance of Acquired Mutations. 2009–2012.
- NSF Emerging Models and Technology, “Molecular Computation in Ciliates,” 2006–2010.
- NSF Information Technology and Research (ITR) “Molecular Computation in Ciliates,” 2001–2006.
- NSF ITR “Molecular Computation with Automated Microfluidic Sensors”, 2001–2005.
- DARPA “Molecular Computation with Automated Microfluidic Sensors,” 2001–2003.
- NASA “Origins of RNA catalysis in extreme environments” 2001–2003 (with Brian Johnston and Sergei Kazakov, Somagenics, Inc.).
- NSF: FASEB Conference on Ciliate Molecular Biology, July 28–August 2, 2001.
- NSF “Origins of RNA catalysis in extreme environments” 2000–2003 (with Brian Johnston and Sergei Kazakov, Somagenics, Inc.).
- Templeton Foundation “The Origins and Implications of Order in the Genetic Code” 2000–2002 (with Stephen Freeland).
- NSF CAREER Award in Computational Biology, “Pioneering Nucleic Acid Based Computing: New Approaches and Experiments, 1999–2003.
- Somagenics, Inc. Palo Alto, CA, NIH subcontract for joint RNA research, 1999–2000.
- Alfred P. Sloan Foundation grant for two Symposia on “Nucleic Acid Selection” and “Evolution as Computation” 1998–1999.
- NSF/DARPA “Prototyping Biomolecular Computations,” 1997–2000 (with Richard Lipton, Computer Science).
- NSF “*In vitro* evolution of RNA modifying ribozymes from random sequences,” 1997–2001.
- DIMACS “Special Focus on DNA Computing,” 1997–1999, conference, research and visitor funds (with Richard Lipton, Computer Science).
- NSF Small Grant For Exploratory Research (SGER), 1995–1997.
- Burroughs Wellcome Fund New Investigator Award, 1994–1998.

PATENTS

“Microfluidic and Nanofluidic Electronic Devices for Detecting Changes in Capacitance of Fluids and Methods of Using,” L. L. Sohn, O. A. Saleh, J. B. Knight, D. A. Notterman, and **L. F. Landweber** — US Letters Patent Publication US 2007/0238112 A1. International Patent Publication WO01/18286.

DEPARTMENTAL SERVICE

Chair, RNA and Chromosome Biology faculty search, Columbia University Dept. Biochemistry and Molecular Biophysics, 2016 – present.

Chair, Evolutionary Genomics EEB faculty search committee, Princeton University, 2013–2014.

Undergraduate Departmental Representative, Princeton, 2011–2014 (advising juniors/seniors).

Residential College Academic Advisor, Mathey College, 2013–2015 (advising freshmen/sophomores).

EEB Senior Thesis Writing Groups, Princeton Faculty Advisor, 2013–2014.

Co-organizer and founder, EEB faculty research informal seminars, 2014 (with S. Levin) and 2004–2005.

Joint EEB–Molecular Biology Faculty Search Committee, 2012–2013.

EEB Seminar Series, Colloquium on the Biology of Populations, 2010–2011 and 1995–1996.

EEB Faculty Search Committees, 2010–2012.

EEB Undergraduate Committee, 2007–2015.

EEB Graduate Committee, 1994–1996, 2006–2008.

Organizer, joint EEB–Molecular Biology seminars, 2004–2014.

Organizer and chair, Evolution at Princeton Symposium, December 13, 2004.

Institutional Biosafety Committee (URB), EEB representative, 2004–2007.

EEB Associated Faculty Committee, 2004–2006.

EEB Curriculum Committee, 2004–2005.

EEB Member, Search Committee for Director, Lewis-Sigler Institute for Integrative Genomics, 2001–2002.

Organizer, Princeton University 250th Anniversary Symposium (with Andy Dobson): "Genes, Species and the Threat of Extinction: DNA and Genetics in the Conservation of Endangered Species," 1996.

UNIVERSITY COMMITTEES/RESPONSIBILITIES (PRINCETON)

Associate Faculty, Princeton University Department of Molecular Biology, 1994–1996.

Chair, Princeton Center for Theoretical Science program on Origins of Life, 2012–2013.

Chair, Princeton Origin of Life Discussion Group, 2012–2014.

Co-Chair, RNA Club (with Alexei Korennykh), 2011–2012.

Executive Committee, Certificate in Planets and Life, 2010–2016.

Judicial Committee of the University, 2009–2011.

Faculty Trustee of the Princeton University Store, 2005–2006.

Member, Search Committee for Genomics Faculty, Dept. Molecular Biology, 2002–2003.

Elected Member, Princeton University Committee on the Course of Study, 1998–2001.

Member, President’s Awards Committee for Distinguished Teaching, 1998–1999.

President-Elect/Vice-President, Princeton Chapter of Sigma Xi, 1997–1999.

Co-Chair, DIMACS Special Focus on DNA Computing (with Richard Lipton), 1997–1999.

Elected Member, Executive Committee of the Princeton Chapter of Sigma Xi, 1996–1999.

Organizer, Sigma Xi Lecture Series on “DNA-Based Materials,” 1996–1997.

Elected Member, Executive Committee of the Council for Princeton University Community, 1996–1997.

Elected Member, Faculty Advisory Committee on Policy, 1996–1997.

Faculty Advisor, “RNA Today”, Department of Molecular Biology Graduate Student Sponsored International Symposium in honor of Princeton’s 250th Anniversary, May 9–10, 1996.

Elected Member, Council for Princeton University Community, 1995–1998.

Faculty Fellow, Mathey College, 2013–present (now Community/Alumni Fellow).

Faculty Fellow, Rockefeller College, 2009–2013.

Faculty Fellow, Forbes College, 1994–2009.

EXTERNAL SERVICE AND ORGANIZATIONS

Blavatnik National Awards jury member, 2014 – present.
Chair, SMBE Fitch prize committee, 2014.
Joint NIGMS/NSF panel on Research at the Interface of the Biological and Mathematical Sciences, 2013.
Associate Editor, *Genome Biology and Evolution*, 2012 – present.
Co-Organizer (with Aaron Goldman), NASA Astrobiology Institute and SMBE Satellite Workshop on the Origins of Life, Princeton Center for Theoretical Science, January 20–24, 2013.
Organizing committee, DIMACS Conference on Effects of Genome Structure and Sequence on the Generation of Variation and Evolution, August 9–11, 2011.
NSF Epigenetics and Chromatin panel, 2009.
Editorial Board, *Eukaryotic Cell*, 2008 – present.
Committee of Visitors, NSF Division of Computing and Communication Foundations (CCF), 2009.
Co-Organizer (with Erik Winfree, Ron Weiss, and Mona Singh), NSF EMT Workshop on Bio-Inspired Computing and the Biology and Computer Science Interface, Princeton, July 2008.
Elected Councilor of the Society for Molecular Biology and Evolution (SMBE), 2007–2009.
NIH National Center for Research Resources, Special Emphasis Panel, 2007.
NIH study section on Genetic Variation and Evolution (GVE), 2006–2007.
Co-Editor-in-Chief, *Biology Direct*, 2005–2016 (journal launched in 2006). <http://biology-direct.com>
Co-Chair, NHGRI Working Group on Comparative Genome Evolution, to select new organisms for genome sequencing at NHGRI Genome Centers, 2003–2007.
Steering Committee and Scientific Advisory Board, *Tetrahymena* Genome Project, 2003–2006.
Program committee, Ninth International Meeting on DNA Based Computers, 2003.
NHGRI, Genome Resources and Sequencing Priorities Panel, to select new organisms for genome sequencing and BAC library construction at NHGRI Genome Centers, 2001–2003.
Organizer, “Prospects for Protist Genomics”, The Institute for Genomic Research (TIGR), Dec. 2001.
Elected Co-Chair, 2001 FASEB conference on Ciliate Molecular Biology.
Advisory Committee, NSF Directorate for Computer & Information Science & Engineering (CISE) 2001–2003.
Santa Fe Institute Science Board and nominating committee, 2000–2004.
NIH Panel on Integrated Genomic Technologies, 1999.
NASA Working Group on Exobiology, 1998–2001.
NSF Panel for Postdoctoral Research Fellowships in Molecular Evolution, 1996–1998.
Advisory Board, Springer-Verlag Series on Natural Computing, 1999–2009.
Advisory Board, *Genome Biology*, 1999–2011.
Associate Editor, *Journal of Molecular Evolution*, 2001–2012.
Acting Associate Editor, *Journal of Molecular Evolution*, 1999–2000.
Editor, *H.M.S. Beagle* and BioMedNet, 1996–1998 (online publication).
Associate Editor, *Genes to Cells*, 1995–1999.
International Symposium Organizer, “Evolution of Dynamic Gene Rearrangements” Society for Molecular Biology and Evolution (SMBE). Brisbane, Australia, July 11-14, 1999.
Chair, DIMACS Workshop on “Evolution as Computation”, Princeton, January 11-12, 1999.
Chair, DIMACS Workshop on “Nucleic Acid Selection”, Princeton University, March 15-17, 1998.
International Symposium Organizer, “The Evolution of Unusual Molecular Processes in Protists,” in joint association with the 1994 meetings of the International Society for Evolutionary Protistology and the Canadian Institute for Advanced Research, Halifax, Canada.
Short Course Faculty, Workshop on Molecular Evolution, Marine Biological Laboratory, Woods Hole, MA summers 1991–1995, 1998.
Elected Membership Director, Intl. Society for Evolutionary Protistology (ISEP), 1998-2000.
Panelist, NPR Radio Times, WHYY Philadelphia. Topic: “Possible Life on Mars.” August 12, 1996.

Member, AAAS (Fellow), Society for Molecular Biology and Evolution (SMBE, past councilor), Genetics Society of America (GSA), International Society for the Study of the Origin of Life (ISSOL), The RNA Society, and The New York Academy of Sciences (Blavatnik Fellow).

REPRESENTATIVE PLENARY AND INTERNATIONAL LECTURES (*PARTIAL LIST OF OVER 200 TALKS SINCE 1991*)

Stanford Genetics Retreat, keynote talk, Monterey, CA, September, 2016.
University of Michigan Genetics Retreat, keynote talk, May, 2016.
The Allied Genetics Conference, Orlando, FL, Session chair, July 2016.
Society for Molecular Biology and Evolution, Gold Coast, Australia, July 2016.
EMBO Workshop on piRNAs and PIWI proteins, Montpellier, France, April 2016.
Biochemistry and Molecular Biology 2015 annual meeting, Kobe, Japan, December, 2015.
EMBL Heidelberg, *graduate student invited talk*, October, 2015.
Wellcome Trust Sanger Institute, Cambridge, U.K., October, 2015.
Lorne Genome Conference, Melbourne, Australia, February, 2015.
UCSF, Dec. 2014; May 2009 and Dec. 1999.
Cell Symposium on Regulatory RNAs, Berkeley, CA, October 2014.
Harvard Medical School, Departments of Genetics and Systems Biology, Oct. 2014.
Broad Institute of Harvard and MIT, September, 2014 and March 2009.
International Society for the Study of Evolution (ISSOL), Nara, Japan, July 2014.
Gordon Research Conference on Genomic Instability, Hong Kong, China, July 2014.
Society for Molecular Biology and Evolution, plenary lecture, Puerto Rico, June 2014.
University of Montreal, June 2014 and March 1999.
Annual Meeting of the RNA Society, Quebec, June, 2014.
"Division R Lecturer" ASM, Boston, May 2014.
ASCB Symposium speaker, New Orleans, Dec. 2013.
Cold Spring Harbor Laboratory, meeting on Mobile Genetic Elements, Oct. 2013.
Harvard University Origins Forum, Oct. 2013.
NYU 12th Annual Genomics Symposium, June 2013 and department seminar, Sept. 2013.
1st Gordon Research Conference on Biological Mechanisms of Evolution, June 2013.
UMass Medical School, March 2013.
Tokyo Tech, Earth-Life Science Institute inaugural meeting, Japan, March 2013.
National Autonomous University of Mexico, (UNAM) Mexico City, Mexico, November 2012.
MRC Laboratory of Molecular Biology, Cambridge, England, June 2012.
Society for Molecular Biology and Evolution, Dublin, Ireland, June 2012.
Origins Institute Public Lecture, McMaster University, Canada, February 2012.
Orthodox Academy of Crete, Greece, FASEB Conference on Ciliate Molecular Biology, July 2011.
Fred Hutchinson Cancer Research Center, *Bioplasticity Student Symposium*, October 2010.
University of Colorado, Boulder, October 2010.
University of Washington, *Graduate Student Invited Colloquium*, November 2009.
University of Illinois, *Chancellor's Colloquium on Evolution*, October 2009.
Gordon Research Conference on Microbial Population Biology, New Hampshire, July 2009.
U.S. House of Representatives, Research and Development Caucus, Capitol Hill briefing on NSF, "Investing in the Future," June, 2009.
68th Frontiers in Chemistry Distinguished Lecture, Case Western, April 2009.
Duke University, April, 2009, March, 2004, and April, 2002.
Johns Hopkins School of Medicine, September 2008.
Plenary speaker, 14th Intl. Conference on DNA Computers, Prague, Czech Republic, June 2008.
Society for Molecular Biology and Evolution, Barcelona, Spain, June 2008.

Annual Distinguished Women in Science Lecture, Barnard College, April 2008.
National Evolutionary Synthesis Center, Darwin Day symposium, Duke University, February 2008.
The Salk Institute, San Diego, November 2007.
Workshop on Genomics, Evolution and Biodiversity, Athens, Greece, April 2007.
Institute for Advanced Study, Princeton, February, 2007 and 1999.
NSF Workshop on Theoretical Biology, Arlington, VA, September 2006.
International Paramecium Genomics Meeting, Paris, France, May 2006.
Plenary talk, NHGRI Large-Scale Sequencing Workshop, Bethesda, June 2005.
University of Chicago, March, 2005.
Harvard University, October 2013, March 2005, February 2001, and March 1999.
NYU Graduate Student Invited Colloquium, November 2004 and Sept 1998.
ISSOL (Intl. Soc. Study of Origin of Life) Oaxaca, Mexico, July 2002.
Bioinformatics 2002, Bergen, Norway, April, 2002.
Caltech, February 2001 and January 2002.
Santa Fe Institute, faculty for Complex Systems Summer School – series of 2 talks, June 2001.
Institute for Theoretical Physics, Santa Barbara – lecture series on Biological Information, 2001.
UC Berkeley, October 2000 and March 2001.
University of Texas, Southwestern, Dallas, *Postdoc invited talk*, January 2001.
U.S. House of Representatives Committee on Science, Subcommittee on Basic Research,
Congressional Hearing, Beyond Silicon Computing: DNA Computers. September, 2000.
Microsoft Research, Seattle, “Molecular Computation,” July 2000.
Cold Spring Harbor, Public Lecture: “DNA games: From espionage to computing,” June 2000.
The Tech Museum of Innovation, San Francisco, Public Lecture, May, 2000.
German Society of Protozoology, Göttingen, main lecture (only foreign speaker) March 2000.
Sigma Xi Annual Meeting, Young Investigator Award Lecture, Minneapolis, November 1999.
The Templeton Foundation Symposium on Complexity, Information Theory, and Design, “Nature’s
oddsities and the genetic code: Can design govern in a thing so small?” Santa Fe, October 1999.
Society for Molecular Biology and Evolution, Brisbane, Australia, keynote speaker and symposium
chair, July 1999.
Brazilian Society of Biochemistry and Molecular Biology, Coxambu, Brazil, May 1999.
Stanford University, March 1999 and October 1998.
Princeton Plasma Physics Laboratory, Science on Saturday, Feb. 1999.
National Academy of Sciences, Session Chair, Chinese-American Frontiers of Science, Irvine, CA, 1998.
Woods Hole, Molecular Evolution Short Course Faculty, Marine Biological Laboratory, Summers
1991 – 1995, 1998 inclusive.
University of Leiden, Netherlands, lecture series on Nucleic Acid Based Computing, July 1998.
NASA Ames, “Molecular Evolution of DNA Computing” and “Rhyme or Reason in RNA Evolution”
1998.
Yale University, October, 1995.