

## W. FORD DOOLITTLE

April 10, 2017

Born Urbana, Illinois, 21 February, 1942

U.S. and Canadian citizen

Married, two children

### EDUCATION

B.A. in Biochemical Sciences (*magna cum laude*), Harvard College, 1963 (honors thesis with A.M. Pappenheimer, Jr.)

Ph.D. in Biological Sciences, Stanford University, 1969 (with C. Yanofsky)

USPH Postdoctoral trainee in Microbiology, University of Illinois, 1968-1969 (with S. Spiegelman)

Postdoctoral Fellow and Research Associate, National Jewish Hospital and Research Center, Denver, 1969-1971 (with N.R. Pace)

BFA (Photography), Nova Scotia College of Art and Design, 2013

### SCHOLARSHIPS, FELLOWSHIPS, HONORS AND AWARDS

National Merit Scholarship, Harvard College, 1959-1963

National Science Foundation Predoctoral Fellowship, Stanford University, 1963-1968 (declined)

US National Cancer Institute Postdoctoral Fellowship, National Jewish Hospital and Research Center, 1969-1970

Medical Research Council Scholarship, Dalhousie University, 1971-1976 (*five-year full salary award*)

Atlantic Provinces Inter-University Council on the Sciences, Young Scientist of the Year Award, 1978

Ayerst Award, Canadian Biochemical Society, 1981

Max Forman Senior Faculty Award, Dalhousie University, 1982

Guggenheim Fellowship, Stanford, 1985-86 (*partial sabbatical salary*)

Fellow, American Association for the Advancement of Science, 1985-present

Fellow, Canadian Institute for Advanced Research, 1986-2007 (*five-year full salary award, renewed in 1991 and 1996; Richard Ivey Fellow from 2000*)

Fellow, Royal Society of Canada, 1991-present

Award of Excellence, Genetics Society of Canada, 1991

Henry Friesen Award, The Canadian Society for Clinical Investigation and The Royal College of Physicians and Surgeons of Canada, 1996

Fellow, American Academy of Microbiology, 1999-present

Honorary Doctorate of Science Degree, University of Ottawa, 2000

Roche Diagnostics Prize for Biomolecular and Cellular Research, The Canadian Society of Biochemistry and Molecular and Cellular Biology, 2001

Canada Research Chair in Comparative Microbial Genomics, 2001-2008 (*seven-year full salary award plus research allowance*)

Elected Member, U.S. National Academy of Sciences, 2002-present

Institute Fellow, Canadian Institute for Advanced Research, 2008-present

Elected Member, Norwegian Academy of Science and Letters, 2009-present

NSERC Gerhard Herzberg Canada Gold Medal for Science and Engineering, 2013 (presented 2014) (*Canada's top award for scientists. includes one million-dollar, five-year research grant, 2014-2019.*)

Max Beberman Distinguished Alumni Award, University High School, Urbana, Illinois, 2015

## **POSITIONS/TITLES**

Assistant Professor (and MRC Scholar), Department of Biochemistry, Dalhousie University, 1971-1976  
Associate Professor, Department of Biochemistry, Dalhousie University, 1976-1982  
Sabbatical Professor, Harvard University, 1977-1978 (with W. Gilbert)  
Professor, Department of Biochemistry and Molecular Biology, Dalhousie University, 1982-present  
Sabbatical Professor, Stanford University, 1985-1986 (with C. Yanofsky)  
Director, Canadian Institute for Advanced Research Program in Evolutionary Biology, 1986-2007  
Canada Research Chair (Tier 1) in Comparative Microbial Genomics, 2001-2008  
Senior Research Scholar, Dibner Institute for the History of Science and Technology, MIT, 2004-2005  
Professor Emeritus, Department of Biochemistry and Molecular Biology, Dalhousie University (with continuing salaried post-retirement appointment as Professor, 2007-2019)

## **GRANT PANEL AND NATIONAL/INTERNATIONAL COMMITTEE MEMBERSHIPS (since 1991)**

Consultant, Center for Prokaryotic Genome Analysis, 1987-1991  
Inter-Council Human Genome Advisory Committee, 1990-1991  
Medical Research Council, Biochemistry/Molecular Biology "B" Grants Committee, 1992-1995  
Medical Research Council, Canadian Genome Analysis and Technology Program, Management Committee, 1992-1997  
Sloan Foundation, Peer Review Committee for Young Investigators Awards, 1994-1998  
Council, Society for Molecular Biology and Evolution, 1995-1998  
Flavelle Medal Selection Committee, The Royal Society of Canada, 1998  
Gairdner Foundation Awards Committee, 2001  
College of Reviewers, Canada Research Chairs Program, 2001  
Faculty of 1000, Microbial Genetics and Genomics, 2001  
Scientific Advisory Board, Ecopia Biosciences Inc., 2001-2002  
Scientific Advisory Board, Genome Prairie, 2001-2005  
American Academy of Microbiology International Initiatives Committee, 2001-2004  
CIHR Genomics Grants Committee, 2002-2004, 2005, 2008  
US National Research Council Metagenomics Committee, 2005-2007  
Committee on Election to Fellowship, American Academy of Microbiology, 2007-2009  
Scientific Advisory Group, Ontario Genomics Institute, 2009  
Advisory Board, Canadian Institute for Advanced Research - Integrated Microbial Biodiversity Program, 2008-present  
Expert Panel on the State and Trends of Biodiversity Science in Canada, Council of Canadian Academies, 2009-2011  
Chair, Scientific Advisory Board, Hydrocarbon Metagenomics Project, Genome Alberta, 2009-2013  
US National Academy of Sciences, committee to award Walcott and Miller Prize in Paleobiology, 2012-present

## **EDITORIAL RESPONSIBILITIES (since 1991)**

Editorial Board, *Journal of Molecular Evolution*, 1984-1992  
Editorial Board, *Journal of Genetics*, 1985-1991  
Editorial Board, *Molecular Biology and Evolution*, 1987-1995  
Editorial Board, *Environmental Microbiology*, 2000-2013  
Advisory Editorial Board, *Trends in Microbiology*, 2000-2015  
Editorial Board, *Archaea*, 2001-2009

Editorial Board, *Biology Direct*, 2009-present  
Editorial Board, *Proceedings of the US National Academy of Sciences*, 2002-present  
Board of Reviewing Editors, *Science*, 2006-2009  
Editorial Board, *Genome Biology and Evolution*, 2009-present  
Editorial Board, *Biology and Philosophy*, 2016-present

### **OTHER SOCIETY MEMBERSHIPS (see also HONORS AND AWARDS)**

American Association for the Advancement of Science  
American Society for Microbiology  
Society for Molecular Biology and Evolution (honorary)  
International Society for the History, Philosophy and Social Studies of Biology  
Philosophy of Science Association

### **CURRENT LOCAL COMMITTEE MEMBERSHIPS**

Advisory Committee, Centre for Comparative Genomics and Evolutionary Bioinformatics (CGEB),  
Dalhousie University, 2008-present  
Executive Committee, Dalhousie-Kings Node of Situating Science Cluster (SSHRC), 2008-2015  
Dalhousie Art Gallery Advisory Committee, 2004-present

### **TRAINING OF QUALIFIED PERSONNEL**

#### **Current Postdoctoral Fellow**

S. Andrew Inkpen (Ph.D. UBC)

#### **Former Postdoctoral Fellows**

Phyllis R. Dobson (Ph.D. Dalhousie)  
Richard A. Singer (Ph.D. Harvard)  
Annalee Cohen (Ph.D. Dalhousie)  
Michael Torres (Ph.D. Texas A&M)  
Reginald H. Lau (Ph.D. Alberta)  
Jason D. Hofman (Ph.D. Tennessee)  
R. Keith Conover (Ph.D. UCLA)  
William F. Walker (Ph.D. Illinois)  
Marlene Snyder (Ph.D. Colorado)  
Charles D. Daniels (Ph.D. Michigan)  
Susan M. Logan (Ph.D. Victoria)  
James R. Brown (Ph.D. Simon Fraser)  
Arlin Stoltzfus (Ph.D. Iowa)  
Nataraj Vettakorumakankav (Ph.D. Calgary)  
Sandra Baldauf (Ph.D. Michigan)  
Hans-Peter Klenk (Ph.D. Munich)  
John Logsdon (Ph.D. Indiana)  
Dave Faguy (Ph.D. Queen's)  
Jan Andersson (Ph.D. Uppsala - co-supervised with A. Roger)  
Alastair Simpson (Ph.D. Sydney - co-supervised with A. Roger)  
Christophe Douady (Ph.D. Belfast)  
Christian Blouin (Ph.D. Dalhousie - co-supervised with A. Roger)  
Yuji Inagaki (Ph.D. Nagoya - co-supervised with A. Roger)  
Uri Gophna (Ph.D. Tel Aviv)  
Maureen O'Malley (Ph.D. Sussex)

Eric Bapteste (Ph.D. Paris)  
Thane Papke (Ph.D. Montana State)  
Camilla Nesbø (Ph.D. Oslo)  
Olga Zhaxybayeva (Ph.D. Connecticut)  
Carlos Mariscal (Ph.D. Duke)  
Austin Booth (Ph.D. Harvard)

**Former Graduate Students**

Ronald M. MacKay (Ph.D.)  
Susan E. Douglas (Ph.D.)  
Carmen Sapienza (Ph.D.)  
Wen-Lian Xu (Ph.D.)  
Robert L. Charlebois (Ph.D.)  
Leonard C. Schalkwyk (Ph.D.)  
Wan L. Lam (Ph.D.)  
Cheryl Dollard (M.Sc.)  
Andrew Roger (Ph.D.)  
David Edgell (Ph.D.)  
Patrick Keeling (Ph.D.)  
Naomi Fast (Ph.D.)  
John Archibald (Ph.D.)  
Joel Dacks (Ph.D.)  
Yan Boucher (Ph.D.)  
David Walsh (Ph.D.)  
Ellen Boudreau (Ph.D.)  
Jeremy Koenig (Ph.D.)  
Adrian Sharma (Ph.D.)  
Tyler Brunet (MSc in Bioinformatics), co-supervised with C. Blouin

**Former Undergraduate / Honours Students**

Jessica Boyd  
Susan Williamson  
James MacWilliam  
Andrew McKee  
Karen McAllister  
Jeremy Murray  
Olof Sandblom  
Amanda Doherty  
Banoo Malik  
Claire Richardson  
Mike Dorey  
Elizabeth Ryall  
Joel Surette  
Geoffrey Morris  
David McLeod  
Christine Sharpe  
Tyler Brunet

**Former Sabbatical Visitors:**

Mike Dyall-Smith (Melbourne)  
Francisco Rodriguez-Valera (Alicante)  
Junetsu Ito (Arizona)

## RESEARCH FUNDING

**Continuously funded since 1971. Listed below are grants since 1991.**

*(Direct costs, Canadian dollars except where noted)*

Strategic Research Initiatives Fund – Dalhousie University, Office of VP (Research):  
2014-2016; \$200,000/annum; P.I. (with 10 co-applicants)

NSERC Herzberg Gold Medal in Science and Engineering: Discovery grant; 2014-2019,  
\$200,000/annum

Canadian Institutes of Health Research - Emerging Team Grant: Canadian Microbiome Initiative:  
*Modeling and mapping microbial diversity and function with marker genes, genomes and metagenomes* (co-PI with R. Beiko, J. Bielawski & M. Ereshefsky), 2010-2013,  
\$223,000/annum. No-cost extension to March 31, 2015.

Tula Foundation: CGEB Molecular Biology Postdoctoral Fellowship (plus research allowance)  
07/2008-12/2010, \$64,000/annum.

Canadian Institutes of Health Research (Genomics): Integron metagenomics, 2006-2009,  
\$141,917/annum.

Genome Atlantic (Award-in-Aid): Prokaryotic Genome Project, 04/2006-03/2007, \$85,469

Canadian Institutes of Health Research (Genetics) and formerly Medical Research Council of  
Canada: Evolution of genome structure and function. Continuously funded from 1971 through  
2007; last renewal 2002-2007, \$253,000/annum.

Crohn's & Colitis Foundation of Canada: The archaeal microbiota in inflammatory bowel disease  
(IBD). 2-yr award: \$55,000 (2004-2005); \$45,000 (2005-2006).

Genome Canada (Genome Atlantic): A comparative understanding of prokaryotic genome evolution  
and diversity. Ca. \$6 million (direct costs) over four years (2002-2006). Approximately \$2  
million available for use by this lab.

Canada Research Chair (CIHR): Comparative Microbial Genomics, 2001-2008, \$200,000/annum  
(including salary)

Canada Foundation for Innovation (to accompany Canada Research Chair): 2001-2002,  
\$97,767

Canadian Institutes of Health Research: Bioinformatic evaluation of theories in genomics,  
2000-2003, \$61,986/annum. Combined into *Evolution of genome structure and function* in  
2002.

Canadian Institutes of Health Research – Equipment Grant: 2000-2001, \$28,284

Dalhousie University Medical Research Foundation – Equipment Grant: 2000-2001, \$13,642

Canada Foundation for Innovation - Ongoing New Opportunities: A new laboratory for comparative  
genomics (co-PI with A. Roger & M. Gray), 1999, \$200,000

Canadian Genome Analysis and Technology Program: Sequence of the genome of *Sulfolobus*  
*solfataricus* (co-PI with M. Ragan & R. Charlebois), 1993-1997, \$227,500/annum.

Office of Naval Research (US): Archaeobacterial genetics, 1991-1995, US \$65,000/annum.

## PUBLICATIONS

*Note: as of 1 September, 2016, Google Scholar indicates 27,260 citations, and an h-index of 83 (43 since 2011).*

### Twenty most important or influential publications

*My output over 45 years has been a mix of contributions to evolutionary theory (largely concerning genome evolution) and experimental or computational work in prokaryotic genetics, genomics and metagenomics. We have also used phylogenetics and phylogenomics to investigate questions in eukaryotic cell biology and evolution. I believe that an understanding of why genomes are as they are is foundational for even the most practical goal-oriented biological or biomedical science, and that evolutionary theory gives the best answers to “Why?” I have selected twelve theoretical and eight experimental/computational studies to represent this work, with one-sentence explanations of why I think each was important.*

Doolittle WF and Pace NR (1971)

Transcriptional organization of the ribosomal RNA cistrons in *Escherichia coli*. *Proc Natl Acad Sci USA* **68**: 1786-1790.

*Using transcriptional runoff and oligonucleotide cataloguing, showed 16S, 23S and 5S rRNA genes to be transcribed as a unit.*

Bonen L and Doolittle WF (1975)

On the prokaryotic nature of red algal chloroplasts. *Proc Natl Acad Sci USA* **72**: 2310-2314.

*Molecular proof, using oligonucleotide cataloging, of the endosymbiont hypothesis for the origin of plastids.*

Doolittle WF (1978)

Genes in pieces, were they ever together? *Nature* **272**:581-582.

*The first articulation of the “introns early” hypothesis, a stimulus for much experimental and computational work over the next decade.*

Doolittle WF and Sapienza C (1980)

Selfish genes, the phenotype paradigm and genome evolution. *Nature* **284**:601-603. *With accompanying article by LE Orgel and FHC Crick, set stage for (still ongoing) debate over the “function” of transposable elements that make up the majority of many genomes.*

Doolittle WF (1981)

Is nature really motherly? (A critique of J.E. Lovelock's *Gaia: A New Look at Life on Earth*).

*CoEvolution Quarterly* **29**:58-63. *Perhaps the most frequently cited explanation, for the general public, of why Darwinists find James Lovelock's very appealing and popular Gaia hypothesis untenable.*

Gray MW and Doolittle WF (1982)

Has the endosymbiont hypothesis been proven? *Microbiol Rev* **46**: 1-42.

*A review article widely regarded as the definitive statement on the status, after a decade, of efforts to prove Lynn Margulis' “serial endosymbiont hypothesis”.*

Lam WL and Doolittle WF (1989)

Shuttle vectors for the archaebacterium *Halobacterium volcanii*. *Proc Natl Acad Sci USA* **86**: 5478-5482. *The first reliable genetic system for any archaeal species, the basis of much subsequent work.*

Stoltzfus A, Spencer DF, Zuker M, Logsdon JM Jr and Doolittle WF (1994)  
Testing the exon theory of genes: the evidence from protein structure. *Science* **265**: 202-207.  
*Strong statistical evidence against claimed proofs for “introns early” based on protein structure-gene structure correlations.*

Roger AJ, Clark CG and Doolittle WF (1996)  
A possible mitochondrial gene in the early-branching amitochondriate protist *Trichomonas vaginalis*. *Proc Natl Acad Sci USA* **93**: 14618-14622.  
*Early support for the now widely accepted conclusion that the last common ancestor of all extant eukaryotes had mitochondria (not thought to be so in the early 1990s).*

Doolittle WF (1998)  
You are what you eat: a gene transfer ratchet could account for bacterial genes in eukaryotic nuclear genomes. *Trends Genet* **14**: 307-311.  
*A still popular explanation for why gene transfer from organelles and (in phagotrophs) food bacteria is unidirectional and inevitable.*

Doolittle WF (1999)  
Phylogenetic classification and the universal tree. *Science* **284**: 2124-2128.  
*Perhaps the most frequently cited paper (1691 citations to date) on the implications of lateral gene transfer for prokaryotic phylogeny and the meaning of any Tree of Life.*

Archibald JM, Logsdon JM, Jr. and Doolittle WF (1999)  
Recurrent paralogy in the evolution of archaeal chaperonins. *Current Biology* **9**: 1053-1056.  
*A model (and data bearing on) neutral processes for the evolution of molecular complexity (Constructive Neutral Evolution, or CNE).*

Baldauf SL, Roger AJ, Wenk-Siefert I and Doolittle WF (2000)  
A kingdom-level phylogeny of eukaryotes based on combined protein data. *Science* **290**: 972-977.  
*An early and widely cited use of concatenated gene sequences in deep eukaryote phylogeny.*

Gogarten JP, Doolittle WF and Lawrence JE (2002)  
Prokaryotic evolution in the light of gene transfer. *Mol Biol Evol* **19**: 2226-2238.  
*A definitive collective statement on the role of lateral gene transfer in genome evolution.*

Papke RT, Koenig JE, Rodriguez-Valera F and Doolittle WF (2004)  
Frequent recombination in a saltern population of *Halorubrum*. *Science* **306**: 1928-1929.  
*The first evidence for recombination in archaea in Nature.*

Doolittle WF and Baptiste E (2007)  
Pattern pluralism and the Tree of Life hypothesis. *Proc Natl Acad Sci USA* **104**: 2043-2049.  
*A reinterpretation of the Tree of Life as it is affected by lateral gene transfer, now generally accepted.*

Doolittle WF and Zhaxybazyeva O (2009)  
On the origin of prokaryotic species. *Genome Research* **19**: 744-756.  
*A rational and pluralistic approach to the bacterial “species problem”.*

Doolittle WF (2013)  
Is junk DNA bunk? A critique of ENCODE. *Proc Natl Acad Sci USA* **110**: 5294-5300.  
*Situating claims for genomic “function” within comparative genomics and definitions based on the theory of natural selection.*

Booth A and Doolittle WF (2015)  
Eukaryogenesis, how special really? *Proc Natl Acad Sci USA* **112**: 10278-10285.  
*An attempt to remove biases from interpretations of the prokaryote: eukaryote transition.*

Doolittle WF (2016)  
Making the most of clade selection. *Philosophy of Science* (in press).  
*An argument for selection for persistence as a way of accommodating clade selection within a neoDarwinian framework, using, in part, an analogy to periodic selection in microbial chemostats.*

### **Complete List of Publications**

1. Miller, P.A., Pappenheimer, A.M., Jr. and Doolittle, W.F. (1966)  
Phage-host relationships in certain strains of *Corynebacterium diphtheriae*. *Virology* 29: 410-425.
2. Doolittle, W.F. and Yanofsky, C. (1968)  
Mutants of *Escherichia coli* with an altered tryptophanyl-transfer ribonucleic acid synthetase. *J. Bacteriol.* 95:1283-1294.
3. Doolittle, W.F. and Pace, N.R. (1970)  
Synthesis of 5S ribosomal RNA in *Escherichia coli* after rifampicin treatment. *Nature* 228: 125-129.
4. Doolittle, W.F. and Pace, N.R. (1971)  
Transcriptional organization of the ribosomal RNA cistrons in *Escherichia coli*. *Proc. Natl. Acad. Sci. U.S.A.* 68:1786-1790.
5. Doolittle, W.F. (1972)  
Ribosomal ribonucleic acid synthesis and maturation in the blue-green alga *Anacystis nidulans*. *J. Bacteriol.* 111:316-324.
6. Doolittle, W.F. (1973)  
Postmaturational cleavage of 23S ribosomal ribonucleic acid and its metabolic control in the blue-green alga *Anacystis nidulans*. *J. Bacteriol.* 113:1256-1263.
7. Dobson, P.R., Doolittle, W.F. and Sogin, M.L. (1974)  
Precursor of 5S ribosomal ribonucleic acid in the blue-green alga *Anacystis nidulans*. *J. Bacteriol.* 117:660-666.
8. Singer, R.A. and Doolittle, W.F. (1974)  
Novel ribonucleic acid species accumulated in the dark in the blue-green alga *Anacystis nidulans*. *J. Bacteriol.* 118:351-357.
9. Doolittle, W.F. and Singer, R.A. (1974)  
Mutational analysis of dark endogenous metabolism in the blue-green bacterium *Anacystis nidulans*. *J. Bacteriol.* 119:677-683.
10. Doolittle, W.F., Woese, C.R., Sogin, M.L., Bonen, L. and Stahl, D. (1975)  
Sequence studies on 16S ribosomal RNA from a blue-green alga. *J. Mol. Evol.* 4:307-315.
11. Singer, R.A. and Doolittle, W.F. (1975)  
Control of gene expression in blue-green algae. *Nature* 253:650-651.

12. Bonen, L. and Doolittle, W.F. (1975)  
On the prokaryotic nature of red algal chloroplasts. Proc. Natl. Acad. Sci. U.S.A. 72:2310-2314.
13. Singer, R.A. and Doolittle, W.F. (1975)  
Leucine biosynthesis in the blue-green bacterium *Anacystis nidulans*. J. Bacteriol. 124:810-814.
14. Bonen, L., Allen, G.V., Dobson, P.R. and Doolittle, W.F. (1976)  
Nonribosomal nature of novel, stable ribonucleic acid species accumulated by blue-green bacteria. J. Bacteriol. 126:1020-1023.
15. Bonen, L. and Doolittle, W.F. (1976)  
Partial sequences of 16S rRNA and the phylogeny of blue-green algae and chloroplasts. Nature 261:669-673.
16. Cunningham, R.S., Bonen, L., Doolittle, W.F. and Gray, M.W. (1976)  
Unique species of 5S, 18S and 26S ribosomal RNA in wheat mitochondria. FEBS Lett. 69:116-122.
17. Cunningham, R.S., Gray, M.W., Doolittle, W.F. and Bonen, L. (1977)  
The prokaryotic nature of wheat embryo mitochondrial 18S ribosomal RNA. Colloques internationaux C.N.R.S. (Acides nucleiques et synthese des proteines chez les vegetaux) 261:243-248.
18. Bonen, L., Cunningham, R.S., Gray, M.W. and Doolittle, W.F. (1977)  
Wheat embryo mitochondrial 18S ribosomal RNA: Evidence for its prokaryotic nature. Nucleic Acids Res. 4:663-671.
19. Lau, R.H., McKenzie, M.M. and Doolittle, W.F. (1977)  
Phycocyanin synthesis and degradation in the blue-green bacterium *Anacystis nidulans*. J. Bacteriol. 132:771-778.
20. Bonen, L. and Doolittle, W.F. (1978)  
Ribosomal RNA homologies and the evolution of the filamentous blue-green bacteria. J. Mol. Evol. 10:283-292.
21. Doolittle, W.F. (1978)  
Genes in pieces, were they ever together? Nature 272:581-582.
22. Lau, R.H. and Doolittle, W.F. (1979)  
Covalently closed circular DNAs in closely related unicellular cyanobacteria. J. Bacteriol. 137:648-652.
23. Bonen, L., Doolittle, W.F. and Fox, G.E. (1979)  
Cyanobacterial evolution: results of 16S ribosomal ribonucleic acid sequence analyses. Can. J. Biochem. (C.H. Best memorial issue) 57:879-888.
24. MacKay, R.M., Zablen, L.B., Woese, C.R. and Doolittle, W.F. (1979)  
Homologies in processing and sequence between the 23S ribosomal ribonucleic acids of *Paracoccus dentrificans* and *Rhodopseudomonas spheroides*. Arch. Microbiol. 123:165-172.

25. Hofman, J.D., Lau, R.H. and Doolittle, W.F. (1979)  
The number, physical organization and transcription of ribosomal RNA cistrons in an archaeobacterium: *Halobacterium halobium*. *Nucleic Acids Res.* 7:1321-1333.
26. Doolittle, W.F. and Sapienza, C. (1980)  
Selfish genes, the phenotype paradigm and genome evolution. *Nature* 284:601-603.
27. Lau, R.H., Sapienza, C. and Doolittle, W.F. (1980)  
Cyanobacterial plasmids: their widespread occurrence, and the existence of regions of homology between plasmids in the same and different species.  
*Mol. Gen. Genet.* 178: 203-211.
28. Doolittle, W.F. (1980)  
Revolutionary concepts in evolutionary cell biology. *Trends Biochem. Sci.* 5:146-149.
29. MacKay, R.M., Spencer, D.F., Doolittle, W.F. and Gray, M.W. (1980)  
Nucleotide sequences of wheat embryo cytosol 5S and 5.8S rRNAs.  
*Eur. J. Biochem.* 112:561-576.
30. MacKay, R.M., Gray, M.W. and Doolittle, W.F. (1980)  
Nucleotide sequence of *Crithidia fasciculata* 5S rRNA. *Nucleic Acids Res.* 8:4911-4917.
31. Lau, R.H. and Doolittle, W.F. (1980)  
Aqu I; a more readily purified isoschizomer of *Ava* I. *FEBS Lett.* 121:200-202.
32. Dover, G.A. and Doolittle, W.F. (1980)  
Modes of genome evolution. *Nature* 288:646-647.
33. Doolittle, W.F. and Bonen, L. (1981)  
Molecular sequence data indicating an endosymbiotic origin for plastids. *Ann. N.Y. Acad. Sci.* 361:248-259.
34. Sapienza, C. and Doolittle, W.F. (1981)  
Genes are things you have whether you want them or not. *Cold Spring Harbor Symp. Quant. Biol.* 45:177-182.
35. Doolittle, W.F. (1981)  
Is nature really motherly? (A critique of J.E. Lovelock's Gaia: A New Look at Life on Earth).  
*CoEvolution Quarterly* 29:58-63.
36. Doolittle, W.F. (1981)  
5S ribosomal RNA genes and the *Alu* I family: evolutionary and functional significance of a region of strong homology. *FEBS Lett.* 126:147-149.
37. MacKay, R.M. and Doolittle, W.F. (1981)  
Nucleotide sequences of *Acanthamoeba castellanii* 5S and 5.8S ribosomal ribonucleic acids: phylogenetic and comparative structural analyses. *Nucleic Acids Res.* 9:3321-3334.
38. Doolittle, W.F. (1981)  
The endosymbiont hypothesis (a review of Lynn Margulis' Symbiosis in Cell Evolution).  
*Science* 213:640-641.

39. MacKay, R.M., Spencer, D.F., Schnare, M.N., Doolittle, W.F. and Gray, M.W. (1982)  
Comparative analysis and functional implications of 5S and 5.8S ribosomal RNA structure. *Can. J. Biochem.* 60:480-489.
40. Gray, M.W. and Doolittle, W.F. (1982)  
Has the endosymbiont hypothesis been proven? *Microbiol. Rev.* 46:1-42.
41. Doolittle, W.F. (1982)  
Evolutionary molecular biology: where it is going? *Can. J. Biochem.* (text of Ayerst Award Lecture) 60:83-90.
42. Sapienza, C. and Doolittle, W.F. (1982)  
Unusual physical organization of the halobacterial genome. *Nature* 295:384-389.
43. Sapienza, C. and Doolittle, W.F. (1982)  
Repeated sequences in the genomes of halobacteria. *Zbl. Bakt. Hyg. I, Abt. Orig. C3*: 120-127.
44. MacKay, R.M., Bonen, L., Stackebrandt, E. and Doolittle, W.F. (1982)  
The 5S ribosomal RNAs of *Paracoccus denitrificans* and *Prochloron*. *Nucleic Acids Res.* 10:2963-2970.
45. Sapienza, C., Rose, M. and Doolittle, W.F. (1982)  
High frequency genomic rearrangements involving halobacterial repeat sequences. *Nature* 299:182-185.
46. Walker, W.F. and Doolittle, W.F. (1982)  
Redividing the basidiomycetes on the basis of 5S rRNA sequences. *Nature* 299:723-724.
47. Walker, W.F. and Doolittle, W.F. (1982)  
Nucleotide sequences of 5S ribosomal RNA from four oomycete and chytrid water molds. *Nucleic Acids Res.* 10:5715-5721.
48. MacKay, R.M. and Doolittle, W.F. (1982)  
Two thraustochytrid 5S ribosomal RNAs. *Nucleic Acids Res.* 10:8307-8310.
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284. Keeling, P.J., McCutcheon J.P. and Doolittle W.F. (2015)  
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291. Eme, L. and Doolittle, W.F. (2015)  
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292. Doolittle W.F. and Brunet, T.D.P. (2016)  
What is the Tree of Life? *PLoS Genetics*: 12: e1005912.
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295. Eme, L. and Doolittle, W.F. (2016)

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296. Doolittle W.F. and Booth, A. (2017)  
It's the song, not the singer: an exploration of holobiosis and evolutionary theory. *Biology & Philosophy* 32: 5-24.
297. Doolittle W.F. (2017)  
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299. Mariscal, C. and Doolittle, W.F. (2017)  
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300. Inkpen, S.A., Doolittle, W.F. and Campbell, R. (2017)  
Making sense of molecular homology. *Philosophy of Science*, *submitted*.

#### **Book Chapters:**

- Doolittle, W.F., Lam, W.L. and Schalkwyk, L.C. (1991)  
Evolution and basic features of gene and genome structure. *Symp. Soc. Gen. Microbiol.* 47: 1-16.
- Dyall-Smith, M., Holmes, M., Kamekurn, M. and Doolittle, W.F. (1992)  
Halobacterial vector development and the opportunities for gene expression and analysis. *Proceedings, Vth International Congress on Retinal Proteins*, pp. 89-92.
- Doolittle, W.F. (1992)  
The prokaryote-eukaryote transition: changing perspectives. In *Frontiers of Life*, J. Tran Thanh Van, K. Tran Thanh Van, J.C., Mounolou, J. Schneider and C. McKay (eds.), pp. 175-193, Edition Frontieres, Gif-sur-Yvette, France.
- Doolittle, W.F. (1993)  
Epilogue. In *The Biochemistry of Archaea (Archaeobacteria)*, M. Kates, D.J. Kushner, A.T. Matheson (eds.), pp. 565-571. Elsevier Science Publishers, Cambridge, U.K.
- Cline, S., Lam, W.L. and Doolittle, W.F. (1993)  
Transformation of *Halobacterium halobium*. In *Protocols for Archaea Research*, E.M. Fleischmann, A.R. Place, F.T. Robb and H.J. Schreier (eds.), Cold Spring Harbour Laboratory Press, pp. 3.1.1- 3.1.5.
- Cline, S., Lam, W.L. and Doolittle, W.F. (1993)  
Transformation of *Haloferax volcanii*. In *Protocols for Archaea Research*, E.M. Fleischmann, A.R. Place, F.T. Robb and H.J. Schreier (eds.), Cold Spring Harbour Laboratory Press, pp. 3.2.1- 3.2.6.
- Doolittle, W.F. (1994)  
Evolutionary creativity and complex adaptations: A molecular biologist's perspective. In *Creative Evolution*, J.H. Campbell and J.W. Schopf (eds.), Jones and Bartlett Publishers, Inc., pp. 47-73.

- Sensen, C.W., Charlebois, R.L., Singh, R.K., Klenk, H.P., Ragan, M.A. and Doolittle, W.F. (1996)  
Sequencing the genome of *Sulfolobus solfataricus* P2. In *Bacterial Genomes: Physical Structure and Analysis*, de Bruijn, Lupski and Weinstock (eds.), Chapman and Hall, New York, London.
- Doolittle, W.F. (1996)  
Some aspects of the biology of cells and their possible evolutionary significance. Symp. Soc. Gen. Micro. 64: 1-21.
- Doolittle, W.F. (1999)  
Microbial evolution: the new synthesis. In *Microbial Biosystems: New Frontiers* (Proceedings of the 8th International Symposium on Microbial Ecology), C.R. Bell, M. Brylinsky and P. Johnson-Green (Eds.), Atlantic Canada Society for Microbial Ecology, Halifax, Canada.
- Doolittle, W.F. (2000)  
Forward to *Comparative Genomics: Empirical and Analytical Approaches to Gene Order Dynamics, Map Alignment and the Evolution of Gene Families*, D. Sankoff and J.H. Nadeau (Eds.), pp. vii-viii, Kluwer Academic Publishers B.V.
- Doolittle, W.F. (2000)  
Another branch of the family. A review of *The Variety of Life: A Survey and Celebration of All the Creatures That Have Ever Lived*, by Colin Tudge. The New York Times (June 18 edition, Sunday Book Review Section).
- Doolittle, W.F. (2004)  
Bacteria and archaea. In *Assembling the Tree of Life*, J. Cracraft & M. Donoghue, Eds., from Tree of Life Symposium, American Museum of Natural History, Oxford University Press, New York.
- Doolittle, W.F. (2004)  
If the Tree of Life fell, would we recognize the sound? In J. Sapp (Ed.), *Microbial Phylogeny and Evolution*, pp. 119-133, Oxford University Press, USA.
- Doolittle, W.F. (2005)  
The origin and early evolution of life. In *Evolutionary Science and Society: Educating a New Generation*, J. Cracraft & R.W. Bybee (Eds.), pp. 35-42, Biological Sciences Curriculum Study, American Institute of Biological Sciences, Washington.
- Walsh, D.A., Boudreau, M.E., Bapteste, E., and Doolittle, W.F. (2007)  
The root of the tree: lateral gene transfer and the nature of the domains. In *Archaea: Evolution, Physiology and Molecular Biology*, R. Garrett & H.-P. Klenk (Eds.), pp. 29-37, Blackwell Publishing.
- Doolittle, W.F., Nesbø, C.L., Bapteste, E. & Zhaxybayeva, O. (2008)  
Lateral gene transfer. In *Evolutionary Genomics and Proteomics*, M. Pagel & A. Pomiankowski (Eds.), pp. 45-79, Sinauer.
- Lovejoy, T.E. et al. (13 co-authors) (2010) *Canadian Taxonomy: Exploring Biodiversity, Creating Opportunity*. Canadian Council of Academies Press, Government of Canada.

Doolittle, W.F. (2012) Craig Venter's new life: the realization of some thought experiments in biological ontology. In *Thought Experiments in Science, Philosophy and the Arts*, M. Frappier, L. Meynell & J.R. Brown (Eds.), pp. 160-176, Routledge.

Doolittle, W.F. (2012) Postphylogenetics. In *Microbes and Evolution: The World That Darwin Never Saw*, R. Kolter & S. Maloy (Eds.), pp. 269-274, ASM Press, Washington.

Doolittle, W.F and Zhaxybayeva, O. (2013) What is a prokaryote? Introductory chapter for 4<sup>th</sup> edition of *The Prokaryotes*, a 9-volume reference book and fully hyperlinked Online Encyclopedia, edited by Eugene Rosenberg, Edward F. DeLong, Fabiano Thompson, Stephen Lory and Erko Stackebrand, pp. 21-37, Springer Verlag, Berlin.

### **INVITED CONFERENCE PRESENTATIONS AND SEMINARS (1995-present):**

*From 1971-1994 not all records retained. With an average of 5-10 per year, total number of presentations during those years was ~180.*

Gene Action '95, Asilomar Conference Center, Pacific Grove, California, 1995

Genetics in Biology and Medicine, Toronto, Ontario, 1995

CIAR Bioinformatics Meeting, Montreal, Quebec, 1995

CIAR Earth Systems and Evolution, Annual Meeting, Halifax, Nova Scotia 1995

University of British Columbia, Biochemistry Department seminar, Vancouver, BC, 1995

Oregon State University, Graduate Student seminar, Corvallis, Oregon, 1995

DuPont Central Research and Development, Newark, Delaware, 1995

Gordon Conference on Origin of Life, Ventura, California, 1996

Gordon Conference on Frontiers of Molecular Evolution, Ventura, California, 1996

134th Meeting of the Society of General Microbiology, Warwick, UK, 1996

CIAR Student Meeting, Halifax, Nova Scotia, 1996

Workshop on Molecular Evolution, Woods Hole, Massachusetts, 1996

CIAR RNA Meeting, Sidney, British Columbia, 1996

Thermophiles - Molecular Evolution and the Origin of Life, Athens, Georgia, 1996

Pontifical Academy of Sciences - The Origin and Early Evolution of Life, The Vatican, Italy, 1996

West Coast Bacterial Physiologists Annual Asilomar Conference, California, 1996

The American Society for Microbiology, Miami Beach, Florida, May 1997

The Pfizer, Inc.-Olga G. Nalbandov/Beckman Institute Symposium on "Bioinformatics, Structure and Function", Urbana, Illinois, May 29-June 1, 1997

Workshop on Molecular Evolution, Woods Hole, Massachusetts, August 1997

CIAR Evolutionary Biology Annual Meeting, Chaffey's Locks, Ontario, August 1997

Evolution: A Molecular Point of View, Woods Hole, Massachusetts, October 1997

65th Conjoint Meeting on Infectious Diseases, CACMID, St. John's, Newfoundland, October 1997

Fairfield Osborn Lecture, The Rockefeller University, New York, November 1997

The Toronto Hospital, Surgical Directorate Rounds, Toronto, Ontario, November 1997

CIAR Programs Meeting, Toronto, Ontario, November 1997

St. Francis Xavier University, Antigonish, Nova Scotia, March 1998

NASA Astrobiology Program (Life: From Local Origins to Global Persistence), Durham, NH, June, 1998

CIAR Annual Meeting, Evolutionary Biology Program, Mont-Rolland, Quebec, July 1998

Opening Plenary Lecture, Eighth International Symposium on Microbial Ecology, Halifax, Nova Scotia, August 1998

Molecular Evolution Workshop, Marine Biological Laboratory, Woods Hole, MA, August 1998  
Keystone Symposia, Archaea: Bridging the Gap Between Bacteria and Eukarya, Taos, New Mexico, January 1999  
Bridging Two Worlds: From the Archaean to the Proterozoic, UCLA Center for Study of Evolution and the Origin of Life, Los Angeles, California, February, 1999  
Gordon Conference on Origins of Life, Ventura, California, February 1999  
ASM Colloquium, Microbial genome sequencing: Current status and future needs, New Orleans, March 1999  
CIAR All-Programs Congress, Banff, Alberta, May 1999  
European Developmental Biology Congress (EDBC-99), Oslo, Norway, June 1999  
American Society for Microbiology, Microbiology Biodiversity Conference, Chicago, Illinois, August 1999  
CIAR Annual Meeting of the Evolutionary Biology Program, Banff, Alberta, October 1999  
University of Connecticut, Molecular and Cell Biology, Storrs, CT, November 1999  
University of Toronto, Biochemistry Department, November 1999  
University of PEI, Charlottetown, January 2000  
Microbial Genomes IV, Chantilly, Virginia, February 2000  
AAAS Annual Meeting 2000, Washington, DC, February 2000  
MRC Legacy Symposium, Ottawa, March 2000  
University of Arizona, Ecology and Evolutionary Biology, Tucson, May 2000  
Montana State University, Thermal Biology Institute, Bozeman, May 2000  
American Society for Microbiology (ASM) Annual Meeting, Los Angeles, CA, May 2000  
New England BioLabs, Beverly, MA, May 2000  
State University of New York at Albany, Center for Molecular Genetics, June 2000  
NSF Microbe Workshop, Woods Hole, MA, August 2000  
EMBO Workshop on Origins of Cells and Organelles, Hoor, Sweden, September 2000  
CIAR Annual Meeting of the Evolutionary Biology Program, Digby, N.S., October 2000  
Ottawa Hospital Research Institute, Centre for Molecular Medicine, Ottawa, November 2000  
Dalhousie University Symposia on Technology and Change, Halifax, November 2000  
University of Pennsylvania, Department of Biology, Philadelphia, PA, December 2000  
University of Montreal, Department de Biochimie, Quebec, February 2001  
Keystone Symposium, Microbe Interactions with their Environments. Taos, NM, March 2001  
Yale University, Molecular Biophysics and Biochemistry, April 2001  
University of Western Ontario, May 2001  
American Society for Microbiology (ASM) Annual Meeting, Orlando, May 2001  
Canadian Society of Biochemistry, Molecular & Cellular Biology, 44<sup>th</sup> Annual Meeting, Alliston, Ontario, June 2001  
U.S. Department of Energy Workshop, Baltimore, Maryland, June 2001  
Gordon Conference on Archaea, Andover, New Hampshire, August 2001  
CIAR Annual Meeting of the Evolutionary Biology Program, Val-David, Quebec, October 2001  
Ecopia BioSciences Inc., Saint-Laurent, Quebec, October 2001  
Stanford University, Department of Biological Sciences, January 2002  
Gordon Research Conference on Molecular Evolution, Ventura, CA, January 2002  
AAAS Annual Meeting, Boston, MA, February 2002  
CIAR Research Council Meeting, Toronto, April 2002  
Astrobiology Science Conference, NASA Ames Research Center, Moffett Field, CA, April 2002  
Genome Canada National Genomics Conference, Montreal, May 2002  
ASM General Meeting, Salt Lake City, May 2002  
Tree of Life Symposium, New York, May-June 2002  
CIAR All-Programs Meeting, Victoria, BC, June 2002  
EMBL Distinguished Visitor Series, Heidelberg, Germany, June 2002

Royal Society of London, UK, June 2002  
ISMB'02 Meeting, Edmonton, Alberta, August 2002  
SIAC Genome Canada Workshop, Toronto, August 2002  
Ecopia (SAB) Meeting, Montreal, August 2002  
CIHR Institute of Genetics Workshop, Ottawa, September 2002  
CIAR Annual Meeting, Evolutionary Biology Program, Harrison Hot Springs, BC, September 2002  
AAM (ASM) Colloquium, Longboat Keys, Florida, October 2002  
Microbial Evolution Conference, UQAM, Montreal, October 2002  
Science College Public Lecture Series, Concordia University, Montreal, October 2002  
Dalhousie Faculty of Arts and Social Sciences, Crosscurrents Series, January 2003  
CIAR Program Director's Annual Meeting, Toronto, February 2003  
Princeton University, Department of Ecology and Evolutionary Biology, March 2003  
U.S. National Academy of Sciences Annual Meeting, April 2003  
Madison Medical School Symposium, Wisconsin, May 2003  
Keynote Address, Cold Spring Harbor, New York, May 2003  
Genetics Society of Canada Conference, King's College, Halifax, June 2003  
Bioinformatics Symposium, Stockholm, Sweden, June 2003  
Gordon Research Conference on Origin of Life, Bates College, Maine, July 2003  
CIAR Annual Meeting of the Evolutionary Biology Program, White Point, N.S., September 2003  
European Prokaryotic Genomics Conference, Gottingen, Germany, October 2003  
International Congress on Systems Biology, St. Louis, MO, November 2003  
Biology Department Series, MIT, Cambridge, MA, February 2004  
Cubist Pharmaceuticals, Lexington, MA, April 2004  
CIAR Program Director's Annual Meeting, Toronto, April 2004  
Harvey Lecture, The Rockefeller University, New York, April 2004  
CB van Niel Memorial Lecture, Hopkins Marine Station, Monterey, CA, April 2004  
American Society for Biochemistry and Molecular Biology, Boston, MA, June 2004  
Genomes and Evolution '2004, Pennsylvania State University, June 2004  
Wichita State University, Biological Sciences, Wichita, KS, September 2004  
University of Massachusetts, Organismic & Evolutionary Biology, Amherst, MA, October 2004  
University of Connecticut, Molecular & Cell Biology, Storrs, CT, November 2004  
AIBS/NABT Symposium, Chicago, IL, November 2004  
Universite de Sherbrooke, Department de biochimie, Quebec, April, 2005  
International Conference on Microbial Genomes, Halifax, NS, April 2005  
ASM 105<sup>th</sup> General Meeting, Atlanta, GA, June 2005  
Annual Meeting of the Canadian Society of Microbiologists, Halifax, NS, June 2005  
Microbial Diversity Course Symposium, MBL, Woods Hole, MA, June 2005  
Cold Spring Harbor Symposium (Gilbert retirement), Cold Spring Harbor, NY, July 2005  
CIAR Annual Meeting of the Evolutionary Biology Program, Parksville, BC, September 2005  
University of Nebraska, Biological Sciences, October 2005  
Dalhousie University, Anatomy and Neurobiology, November 2005  
National Academy of Sciences, A.M. Sackler Colloquia, Irvine, CA, December 2005  
CIAR Program Director's Meeting, Toronto, January 2006  
National Academy of Sciences, Metagenomics Meeting, Washington, DC, January 2006  
National Academy of Sciences, CMC Meeting, Irvine, CA, February 2006  
McMaster University, Department of Biology, Hamilton, Ontario, February 2006  
Keynote Address, University of Michigan, College of Literature, Science and Arts, March 2006  
CIAR Founders Network, University of Toronto, March 2006  
University of Michigan, Department of Ecology and Evolutionary Biology, March 2006  
Phylogenomics Conference, St. Adele, QC, March 2006

Society for General Microbiology Meeting, Warwick, UK, April 2006  
 Layman Endowment Lectures, Northern Illinois University, April 2006  
 National Academy of Sciences, Metagenomics Meeting, Washington, DC, May 2006  
 National Academy of Sciences, Metagenomics Meeting, Washington, DC, July 2006  
 American Academy of Microbiology Colloquium, Washington, DC, September 2006  
 International Metagenomics Conference, San Diego, CA, October 2006  
 National Academy of Sciences, Metagenomics Meeting, Irvine, CA, October 2006  
 Genome Canada International Conference, Quebec City, October, 2006  
 University of Pittsburgh, Biological Sciences, Pittsburgh, PA, October 2006  
 University of Pennsylvania, Microbiology, Philadelphia, PA, November 2006  
 Dalhousie University, Biology Department, Halifax, November 2006  
 University of Toronto, Cell and Systems Biology, Toronto, December 2006  
 University of King's College, Trust in Science Forum, Halifax, March 2007  
 Annual Meeting of the Society for Molecular Biology and Evolution, Halifax, June 2007  
 CIFAR Integrated Microbial Biodiversity, Program Meeting, Vancouver, October 2007  
 Symposium on Evolution, The Rockefeller University, NY, May 2008  
 CIFAR Integrated Microbial Biodiversity, Program Meeting, Quebec, May 2008  
 Dalhousie University, Medical Humanities Day Forum, Halifax, May 2008  
 Microbiome Workshop, Toronto, June 2008  
 Marine Biological Laboratory symposium course, Woods Hole, MA, June 2008  
 Atlantic OMICS Symposium, Moncton, NB, August 2008  
 Marker Lectureship, Pennsylvania State University, October 2008  
 Norman Giles Lecture, University of Georgia, Athens, Georgia, March 2009  
 University of Cincinnati, Molecular Genetics, Biochemistry & Microbiology, April 2009  
 74<sup>th</sup> Cold Spring Harbor Symposium on Quantitative Biology, NY, May-June 2009  
 Perspectives on the Tree of Life Workshop, Halifax, NS, July 2009  
 Dalhousie University, Department of Philosophy Seminar, Halifax, August 2009  
 RiboClub Annual Meeting, Sherbrooke, Quebec, September 2009  
 Current Issues in Darwinian Theory Workshop, Dalhousie University, Halifax, October 2009  
 Mount Allison University Seminar Series, Sackville, NB, October 2009  
 Invited lecture on Darwinian Revolution, University of King's College, March 2010  
 University of British Columbia, Department of Botany seminar, Vancouver, BC, April 2010  
 Distinguished Lecture Series speaker, University of Alberta, Edmonton, AB, April 2010  
 Dalhousie University, Public Lecture for Int'l Behavioural and Neural Genetics Society, May 2010  
 Thought Experiments Workshop, Dalhousie University, Halifax, June 2010  
 Annual Meeting of Canadian Society of Microbiologists, McMaster University, Hamilton,  
 June 2010  
 Microbial Diversity Course Lectures, Marine Biological Laboratory, Woods Hole, MA, July 2011  
 Centre for Structural and Functional Genomics, Symposium on Integrative Genomics: From  
 Microbes to Humans, Concordia University, Montreal, February 2012  
 Invited Lecture on Human Genome Project, University of King's College, Halifax, March 2012  
 Annual Meeting of Society for Molecular Biology and Evolution, Dublin, Ireland, June 2012  
 American Society for Cell Biology, San Francisco, December 2012  
 Isaac Walton Killam Hospital Grand Rounds, Halifax, January 2013  
 Universite de Laval (IBIS Conference), April 2013  
 Dartmouth College, New Hampshire, April 2013  
 University of Iowa (Darwin Days speaker), Iowa City, February 2014  
 McGill University (Bierman's Lecture, Department of Physiology), Montreal, May 2014  
 American Society of Microbiology, Plenary session convenor and speaker, Boston, May 2014  
 Calgary Summit of Philosophers of Science, University of Calgary, September 2014  
 Sackler Colloquia of the National Academy of Sciences, Irvine, CA (organizer), October 2014

Royal Canadian Institute / NSERC Foundation Lecture, Ryerson University, Toronto, November 2014

Genome Atlantic-Human Genetics and Genomics Seminar, Dalhousie University, February 2015

Keynote Lecture, International Society for the History Philosophy and Social Studies of Biology, Montreal, July 2015

Carleton University, George R. Carmody Lecture in Biology, Ottawa, September 2015

Joint Genome Institute, Exploring Diversity of Life Meeting, Pacifica, California, December 2015

Oral History of RNA World at Library of Congress, Washington DC, March 2016

Unseen Partners: Manipulating Microbial Communities that Support Life on Earth, University of Michigan, Ann Arbor, May 2016

Philosophy of Biology at Madison, Keynote Speaker, Madison, Wisconsin, May 2016

Philosophy of Science Association Biennial General Meeting, Atlanta, Georgia, November 2016

Invited participant in Roundtable Discussion on Canada's Fundamental Science Review, Toronto, October 2016

Biodiversity Seminar Series, and Microbial Evolution and Biogeochemistry Meeting, UBC, Vancouver, March 2017

Species in the Age of Discordance Conference, Salt Lake City, March 2017

BAGECO (Bacterial Genetics and Ecology), Introductory Plenary, Aberdeen, June 2017