

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. on phages of *Corynebacterium diphtheriae*)

Ph.D. in Biological Sciences, Stanford University, 1969 (with C. Yanofsky on regulation of the tryptophan operon in *Escherichia coli*)

USPH Postdoctoral trainee in Microbiology, University of Illinois, 1968-1969 (with S. Spiegelman on RNA/DNA hybridization)

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

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, 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 (*full salary 1986-2001*)

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, 2001-2007 (*full salary 2001-2007 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, *includes one million-dollar, five-year research grant, 2014-2019*)

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

Killam Prize in Natural Sciences, 2017 (\$100,000 prize)

Motoo Kimura Lifetime Contribution Award, Society for Molecular Biology and Evolution, 2017

Honorary Doctor of Civil Law, University of King's College, Halifax, 2018

McLaughlin Medal, Royal Society of Canada, Ottawa, November 2019

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, 2007-2023)
Cross-appointment in Department of Philosophy, Dalhousie University, 2020

GRANT PANEL AND NATIONAL/INTERNATIONAL COMMITTEE MEMBERSHIPS (since 2000)

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, 2008-2018
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, 2015-2018

EDITORIAL RESPONSIBILITIES (since 2000)

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*, 2009-2018
Editorial Board, *Biology and Philosophy*, 2016-present

CURRENT 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
Dalhousie Art Gallery Advisory Committee, 2004-present

TRAINING

Current Postdoctoral Fellows

Christopher Jones (Ph.D. Dalhousie). Supported by Moore Foundation grant to W.F. Doolittle, P.I.
Christopher Lean (Ph.D. Australia). Simultaneous PDF appointment in Biochem/MolBiol and
Philosophy, supported by Moore Foundation grant to W.F. Doolittle, P.I.
Celso Neto (Ph.D. Calgary, simultaneous PDF appointment in Biochem/MolBiol and Philosophy).
Supported by NFRF grant to W.F. Doolittle, P.I. and Letitia Meynell, Philosophy, co-P.I.

Former Postdoctoral Fellows (all supported by grants to WFD or to postdoctoral fellow, appointment in Biochem/MolBiol unless otherwise indicated)

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 Baptiste (Ph.D. Paris)
Thane Papke (Ph.D. Montana State)
Camilla Nesbø (Ph.D. Oslo)
Olga Zhaxybayeva (Ph.D. Connecticut)

Carlos Mariscal (Ph.D. Duke) simultaneous PDF appointment in Biochem/MolBiol and Philosophy
Austin Booth (Ph.D. Harvard) simultaneous PDF appointment in Biochem/MolBiol and Philosophy
S. Andrew Inkpen (Ph.D. UBC) simultaneous PDF appointment in Biochem/MolBiol and Philosophy
Jeremy Wideman (Ph.D. Alberta)
Aaron Novick (Ph.D. Pittsburgh) simultaneous PDF appointment in Biochem/MolBiol and Philosophy

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 (CIHR 1971- 2014). Listed below are awards since 2000.

- New Frontiers in Research Fund (CIHR/NSERC/SSHRC): “It’s the song, not the singer(s)”: microbiomes to Gaia”, 03/2020-03/2022 (auto extension to 03/2023), \$245,828 over two years.
Co-PI Letitia Maynell, co-applicant Joe Bielawski.
- Gordon and Betty Moore Foundation: Foundations of inter-species mutualisms, 09/2020-03/2023,
\$198,889 USD (\$280,125 CAD)
- NSERC Herzberg Gold Medal in Science and Engineering: Discovery grant; 2014-2019,
\$200,000/annum (auto extension to 31 March, 2020)
- Strategic Research Initiatives Fund – Dalhousie University, Office of VP (Research):
2014-2016; \$200,000/annum; P.I. (with 10 co-applicants).
- 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), 2010-2014,
\$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.

PUBLICATIONS

Note: as of 2 September, 2021, Google Scholar indicates 36,665 citations, and an h-index of 94 (Twenty-five most significant publications are shown in bold, with brief statements about their significance).

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. Using transcriptional runoff and oligonucleotide cataloguing, showed 16S, 23S and 5S rRNA genes to be transcribed as a unit.**
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. *Molecular proof, using oligonucleotide cataloging, of the endosymbiont hypothesis for the origin of plastids.*
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. *The first articulation of the "introns early" hypothesis, a stimulus for much experimental and computational work over the next decade and more.*
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 denitrificans* and *Rhodospseudomonas 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.
With accompanying article by Leslie Orgel and Francis Crick, set stage for (still ongoing) debate over the "function" of transposable elements that make up the majority of many genomes. 2007 citations to date.
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. *Perhaps the most frequently cited explanation, for the general public, of why Darwinists find James Lovelock's very appealing and popular Gaia hypothesis untenable.*
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. A review article widely regarded as the definitive statement on the status, after a decade, of efforts to prove Lynn Margulis' "serial endosymbiont hypothesis".
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.
49. Williamson, S.E. and Doolittle, W.F. (1983)
Genes for tRNA^{ile} and tRNA^{ala} in the spacer between the 16S and 23S rRNA genes of a blue-green alga: Strong homology to chloroplast tRNA genes and tRNA genes of the *E. coli* *rnnD* gene cluster. *Nucleic Acids Res.* 11:225-235.

50. Rose, M.R. and Doolittle, W.F. (1983)
Molecular biological mechanisms of speciation. *Science* 220:157-163.
51. Rose, M.R. and Doolittle, W.F. (1983)
Parasitic DNA - the origin of species and sex. *New Scientist* 98:787-789.
52. Xu, W.-L. and Doolittle, W.F. (1983)
Structure of the archaeobacterial transposable element ISH50. *Nucleic Acids Res.* 11:4195-4199.
53. Walker, W.F. and Doolittle, W.F. (1983)
5S rRNA sequences from four marine invertebrates and implications for base pairing models of metazoan sequences. *Nucleic Acids Res.* 11:5159-5164.
54. Walker, W.F. and Doolittle, W.F. (1983)
5S rRNA sequences from eight basidiomycetes and fungi imperfecti. *Nucleic Acids Res.* 11:7625-7630.
55. Walker, W.F. and Doolittle, W.F. (1983)
Systematics of basidiomycetes based on 5S rRNA sequences and other data (reply to Templeton). *Nature* 303:732.
56. Daniels, C.J., McKee, A.H.Z. and Doolittle, W.F. (1984)
Archaeobacterial heat shock proteins. *EMBO J.* 3:745-749.
57. Douglas, S.E. and Doolittle, W.F. (1984)
Nucleotide sequence of the 5S rRNA gene and flanking regions in the cyanobacterium *Anacystis nidulans*. *FEBS Lett.* 166:307-310.
58. Doolittle, W.F., Kirkwood, T.R.L. and Dempster, M.A.H. (1984)
Selfish DNAs with self-restraint. *Nature* 307:501-502.
59. Douglas, S.E. and Doolittle, W.F. (1984)
Complete nucleotide sequence of the 23S rRNA gene of the cyanobacterium *Anacystis nidulans*. *Nucleic Acids Res.* 12:3373-3386.
60. Daniels, C.J., Gupta, R. and Doolittle, W.F. (1985)
Transcription and excision of a large intron in the tRNA^{Trp} gene of an archaeobacterium, *Halobacterium volcanii*. *J. Biol. Chem.* 260:3132-3134.
61. Daniels, C.J., Hofman, J.D., MacWilliam, J.G., Doolittle, W.F., Luehrsen, K.R. and Fox, G.E. (1985)
Sequence of 5S ribosomal RNA gene regions and their products in the archaeobacterium *Halobacterium volcanii*. *Mol. Gen. Genet.* 198:270-274.
62. Lau, R.H., Visentin, L.P., Martin, S.M., Hofman, J.D. and Doolittle, W.F. (1985)
Site-specific restriction endonuclease from the filamentous cyanobacterium *Nostoc* species Mac PCC 8009. *FEBS Letts.* 179:129-132.
63. Doolittle, W.F. (1985)
RNA-mediated gene conversion? *Trends Genet.* 1: 64-65.

64. Doolittle, W.F. (1985)
Some broader evolutionary issues which emerge from molecular biological data. *PSA 84* (Philosophy of Science Assoc.) 2:129-144.
65. Doolittle, W.F. (1985)
Archaeobacteria coming of age. *Trends Genet.* 1:268-269.
66. Daniels, C.J., Douglas, S.E., McKee, A.H.Z. and Doolittle, W.F. (1986)
Genes for transfer RNAs in *Halobacterium volcanii*. *Systematic and Applied Micro.* 7:26-29.
67. **Darnell, J.E. and Doolittle, W.F. (1986)**
Speculations on the early course of evolution. *Proc. Natl. Acad. Sci. U.S.A.* 83:1271-1275. A comprehensive scenario linking the RNA world to modern gene structure.
68. Hofman, J.D., Schalkwyk, L.C. and Doolittle, W.F. (1986)
ISH51: a large, degenerate family of insertion sequence-like elements in the genome of the archaeobacterium, *Halobacterium halobium*. *Nucleic Acids Res.* 14:6983-7000.
69. Doolittle, W.F. (1986)
The evolutionary significance of the archaeobacteria. *Ann. N.Y. Acad. Sci.* 503:72-77.
70. Cline, S.W. and Doolittle, W.F. (1987)
Efficient transfection of the archaeobacterium *Halobacterium halobium*.
J. Bacteriol. 169:1341-1344.
71. Doolittle, W.F. (1987)
The origin and function of intervening sequences in DNA (a review). *American Naturalist* 130:915-928.
72. Doolittle, W.F. (1987)
Genome evolution in review. (Review of *The Evolution of DNA Sequences*). *Trends Genet.* 3:82-83.
73. Drouin, G., Hofman, J.D. and Doolittle, W.F. (1987)
Unusual rRNA gene organization in copepods of the genus *Calanus*. *J. Mol. Biol.* 196: 943-946.
74. Doolittle, W.F. (1987)
What introns have to tell us: hierarchy in genome evolution. *Cold Spring Harbor Symp. Quant. Biol.* 52:907-913.
75. Charlebois, R.L., Lam, W.L., Cline, S.W. and Doolittle, W.F. (1987)
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313. Doolittle, W.F. (2020) Why I am not a creationist: the devil in the details. *Physics in Canada* 76: 1.
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315. Doolittle, W.F. (2020) Is the Earth an Organism? *Aeon*. *Published 3 December*.
316. Brunet, T.D.P., Doolittle, W.F. and Bielawski, J.P. (2021) The role of purifying selection in the origin and maintenance of complex function. *Studies Hist. Phil. Biol. Biomed. Sci. C.* 87: 125-135.
317. Doolittle, W.F. (2021) All about levels: Transposable elements as selfish DNAs and drivers of evolution. *Biology and Philosophy*. *In press*.
318. Novick, A. and Doolittle, W.F. (2021) 'Species' without species. *Studies in History and Philosophy of Science* 87: 72-80.
319. Inkpen, S.A. and Doolittle, W.F. (2021) Adaptive regeneration across scales: Replicators and interactors from limbs to forests. *Philosophy, Theory and Practice in Biology* 13:1.
320. Inkpen, S.A. and Doolittle, W.F. (2021) *Do Microbial Communities Regenerate? Uniting Ecology and Evolutionary Biology*. 44,000 word book, under contract with U. of Chicago Press, *in press*.
321. Doolittle, W.F. and Neto, C.A. (2021) A chemostat model for evolution by persistence, clade selection and its explanatory autonomy (under revision).

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 4th 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 (2000-present):

From 1971-1999 not all records retained. With an average of 5-10 per year, total number of presentations during those years was 200-250.

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
EMB0 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, 44th 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 105th 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
74th 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 (Debate with Norman Pace)
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
Society for Molecular Biology and Evolution, Austin, Texas, July 2017
SoCIA (Social and Conceptual Issues in Astrobiology) Reno, Nevada, April 2018 (keynote)
Orkney International Science Festival, Scotland, September 2018 (public lecture)
University of Exeter, UK, September 2018
Boston Colloquium for Philosophy of Science. October 2018
Philosophy of Science Association Biennial Meeting, Seattle. November 2018
Biology and Philosophy Departments Joint Seminar, St. Francis Xavier, March 2019
Long-Term Trends in Evolution Workshop, University of Arizona, March 2019
Huck Institute Distinguished Lecturer, Penn State University, March 2019
International Society for the History, Philosophy and Social Studies of Biology, Oslo, July 2019
International Regeneration Mini-Conference, Indianapolis, Feb. 2020
ERC Conference on the Microbiota in Bordeaux, Bordeaux, France, May 2020 (online)
Sciences of the Origin (Templeton funded, Keynote speaker), June 2021 (online)
Gordon and Betty Moore Foundation SASI Workshop (featured speaker with Joan Roughgarden), June 2021 (online)

International Society for the History, Philosophy and Social Studies of Biology (Seminar organizer and speaker), July 2021 (online)