

Nancy A. Moran

Leslie Surginer Endowed Professor
Department of Integrative Biology
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Education

University of Texas	B. A., Highest Honors	1976	Plan II, General Studies
University of Michigan	M. S.	1978	Zoology
University of Michigan	Ph. D.	1982	Zoology

(Doctoral advisors: William D. Hamilton and Richard D. Alexander)

Research and Professional Experience

Lecturer in Ecology	1983	University of Michigan
Exchange Scholar, US National Academy of Sciences	1984	Institute. of Entomology, Czech Academy of Sciences
NSF Postdoctoral Fellow	1984-86	Northern Arizona University
Assistant Professor	1986-91	University of Arizona
Associate Professor	1991-96	University of Arizona
Professor	1996-2000	University of Arizona
Regents' Professor	2001-2010	University of Arizona
William H. Fleming Professor	2010- 2013	Yale University
Professor	2013- 2014	University of Texas at Austin
Leslie Surginer Endowed Professor	2014-	University of Texas at Austin

Honors and Awards

Molecular Ecology Prize for 2017
Motoo Kimura Award for lifetime contribution in Molecular Evolution, 2016
(Society for Molecular Biology and Evolution)
James Tiedje Award for lifetime contribution in Microbial Ecology, 2014
(International Society for Microbial Ecology)
Fellow of the Entomological Society of America, elected 2014
International Prize for Biology, 2010 (Japan Society for the Promotion of Science)
Member of the Connecticut Academy of Science and Engineering, elected 2012
University of Arizona Alumni Association Extraordinary Faculty Award, 2008
Fellow of the American Association for the Advancement of Science, elected 2007
Member of the American Academy of Arts and Sciences, elected 2006
Galileo Circle Faculty Fellow, College of Science, University of Arizona, elected 2006
Member of the National Academy of Sciences, elected 2004
Member of the American Academy of Microbiology, elected 2004
University of Arizona Regents' Professor, awarded 2001
John D. and Catherine T. MacArthur Fellow, awarded 1997
American Society of Naturalists President's Award 1988

Research Funding (NM is PI unless otherwise noted)

Current:

- NSF, DEB1551092, “Elucidating the coevolutionary dynamics in an obligate insect symbiosis”. (Oct 1 2016-Sept 30 2019, \$875,302)
- NIH, RO1-GM108477-01, "Host and symbiont determinants of colonization by a coevolved gut community". (Jan 1 2014-Dec 31 2018, approx. \$1,400,000)
- NSF, IOS1347116, "Host-mediated regulation of dual obligate intracellular symbionts". (Mar 15 2014-Mar 14 2018, \$440,000).
- DARPA BRICS “Control of bee behavior by stably engineered gut microbial communities”, \$2.480,000. (co-PIs, A. Ellington, J. Barrick, B. Davies, H. Alper). 2015-2017.

Completed, 1990-present:

- NSF, Population Biology BSR-8806068: "Evolution of a genetically variable complex life cycle in a heterogeneous environment" (1988-1991, \$144,453)
- Key participant in NSF Research Training Group, "Analysis of Biological Diversification" (1991-1996, approx. \$900,000)
- Key participant in NSF/DOE/USDA Training Grant, "Plant-Insect Interactions" (1991-1996, approx. \$1,200,000)
- NSF, DEB, Systematic Biology BSR-9119280: "Phylogenetics of aphids and their intracellular associates and implications for the evolutionary history of the endosymbiosis" (1992- 1993, \$100,000)
- NSF, DEB, Career Advancement Award DEB-9210386: "Molecular methods in the study of the evolution of sterile soldier morphs in aphids" (1992-1993 \$35,000)
- NSF, DEB, Population and Systematic Biology DEB-9306495: “Molecular phylogenetics of the Sternorrhyncha (Insecta: Homoptera) and their bacterial endosymbionts“ (1993-1995, \$215,000)
- NSF, DEB, Population Biology DEB-9527635: “Evolutionary dynamics of endosymbiont-borne adaptation in aphids“ (1996-1999, \$145,000)
- USDA, Entomology, “Effects of endosymbiont genetics on Russian wheat aphid/host plant interactions” (1996-1998, \$157,000)
- NSF, DEB, Population Biology, “Genomic evolution in the endosymbiotic bacteria of aphids” (1999- 2001, \$215,000)
- NSF, DEB, Biocomplexity, “Integrating genomic and ecological analysis of symbiotic bacteria that mediate insect herbivory” (1999- 2003, \$2,218,000)
- NSF, Doctoral Dissertation Improvement Grants (4 total, 1997-2007) awarded to support graduate student advisees
- NSF Research Experience for Undergraduates (several awards, 2001-2008)
- NSF-IGERT (training grant) in Evolutionary, Computational and Functional Genomics (2002-2007, ~\$2,700,000) (co-PI with Michael Nachman, PI)
- NSF, Biocomplexity in the Environment, Genome-Enabled: “Response of host and symbiont genomes to environmental stress and its ecological consequences” (2003-2007, \$1,856,147)

NSF, Biodiversity Surveys and Inventories, “Discovery and characterization of bacterial endosymbiont diversity in *Drosophila*” (2003-2009, \$510,000) (T. Markow, co-PI)

USDA, Program on Functional Genomics of Agriculturally Important Organisms. “Microarray analysis of agriculturally relevant gene expression in the peach-potato aphid, *Myzus persicae*” (2005-2008, \$900,000) (G. Jander was PI, NM was co-PI)

NSF, Microbial Genome Sequencing, “Highly reduced genomes of co-resident bacterial endosymbionts of xylem-feeding insects: ecological and evolutionary implications” (Oct 1 2006-Sept 30 2011, \$440,000)

NSF, Environmental Genomics, “Mutation in genomes of obligate symbionts and impacts on the ecological tolerances and distributions of hosts: *Buchnera* and pea aphids”. (Jan. 1 2008-Dec. 31 2011, \$790,027).

NSF, DEB1046153, 1415604, Dimensions of Biodiversity, “Dimensions: Genomics, functional roles, and diversity of the symbiotic gut microbiotae of honey bees and bumble bees”. (Jan 1. 2011- Sept 30 2016, \$2,006,416) (J. Evans is co-PI).

Fellowship funding to recent and current lab group members (2010-present):

Postdoctoral Fellowship from the Swiss National Science Foundation, awarded for 1 year to Philipp Engel, 2010-2011

Postdoctoral Fellowship from USDA-AFRI, awarded for 2 years to Allison Hansen, 2011-2013

Postdoctoral Fellowship from the European Molecular Biology Organization (EMBO), awarded for 2 years to Philipp Engel, 2011-2013

Ruth L. Kirschstein Postdoctoral Fellowship (NIH, NRSA) awarded for 3 years to Daniel Sloan, 2011-2013

Donnelley Environmental Postdoctoral Fellowship from Yale awarded for 2 years to Daniel Sloan (declined in order to accept the NIH Kirschstein fellowship)

Postdoctoral Fellowships from The Swiss National Science Foundation, awarded for 3 years to Hauke Koch, 2012-2015

Graduate Fellowship from Natural Sciences and Engineering Research Council (Canada), awarded for 3 years to Waldan Kwong, 2012-2015

Postdoctoral Fellowship from USDA-AFRI, awarded for 2 years to Gordon Bennett, 2013-2015

Postdoctoral fellowship, China Scholars Council, 1 year to Yueli Yun, 2013-2014

Predocotrinal fellowship, Brazil Science without Frontiers program, 4 years to Erick Silva da Motta, 2014- present

Postdoctoral Fellowship from USDA-AFRI, awarded for 2 years to Rebecca Chong, 2015-2017

Predocotrinal fellowship, National Science Foundation, 3 years to Serena Zhao, Aug 2015-

Postdoctoral Fellowship from USDA-AFRI, awarded for 2 years to Kasie Raymann, 2016-2018

Professional Service (2002-present)

Max Planck-Institute for Terrestrial Microbiology, Scientific Advisory Board, 2015-
National Sciences Foundation, review panel, 2017

National Academy of Sciences, Council Member, 2014-2017

Blavatnik Award in Life Sciences, Selection Committee, 2017-

Society for Molecular Biology and Evolution, Local Organizing Committee for 2017
annual meeting in Austin Texas

Joint Genome Institute, Prokaryotic Program Advisory Committee, 2010-present

National Academy of Sciences, Chair Class II Temporary Nominating Group, 2011-13

Institute for Genomic Biology, University of Illinois, review panel, April 2013

Honey Bee Health Conference, Oct 2012, Research Leader

National Science Foundation grant review panel, DEB Division, April 2012

National Research Council committee on “Thinking Evolutionarily”, developing
evolutionary approaches in teaching of biology, 2011

National Science Foundation grant review panel, IOS Division, October 2011

National Academy of Sciences, Nominating Committee, 2011

Joint Genome Institute, Community Sequencing Program Review Panels, 2010, 2012

Chair of Evolutionary Biology Section, National Academy of Sciences 2008-2011

NIH review panels, ad hoc member of panels, 2009, 2010, 2011

National Science Foundation, Division of Environmental Biology, Committee of
Visitors (long-term review committee), June 2009

Co-organizer and member of International Aphid Genome Sequencing Consortium,
2005-2010.

Authorship committee, “Science and Creationism-a report from the National Academy
of Sciences, 2nd edition”, 2005-2007

Steering Group, AAAS Section on Biological Sciences, 2003-2006

Oversight committee for the CyberInfrastructure in Phylogenetics Research project (an
NSF project to improve phylogenetic computing), 2003-2004

Biology working group for Deep Underground Science & Engineering Laboratory
(NSF project for studying deep underground processes), 2004-2006

International Aphid Genomics Consortium, founding member and co-author of White
Paper on sequencing an aphid genome, 2003-present

NSF review panel for Population Biology, 2003

Society for the Study of Evolution, President, 2002

Service, University of Texas (Aug. 2013-):

Plan II Advisory Council (Sept 2016-)

College of Natural Sciences 21st Century Research Committee

Integrative Biology Merit Review Committee (2016)

Institute for Molecular and Cellular Biology Advisory Committee (2014-2016)

Graduate admissions committee for Ecology, Evolution and Behavior (2015-2016)

Brackenridge Field Laboratories Master Planning, Steering Committee (2015)
 Deans Scholar Honors Program, Advisor for IB and Steering Committee (Aug 2013-)
 College of Natural Science Stengl-Wyer Endowment Committee ((Jan 2015-)
 Search Committee, Insect Curator position (2013-2014)
 Search Committee, faculty position in Ecology (2014)

Service, Yale University (Selected, 2010-2013):

Search Committees, Microbial Diversity Institute 2010-2011
 Scholar Awards Committee, 2010-2013
 Yale Science Advisory Committee 2010-2011
 Yale Center for Genome Analysis, Advisory Committee, 2011
 Yale Women Faculty Forum, Pilot Mentoring Program, 2011-2013
 Ecology and Evolutionary Biology, Graduate Advisory Committee 2010-2012
 Ecology and Evolutionary Biology Promotions Committee 2011
 Yale Environmental Film Festival, panel member, April 2011
 Participant in Yale Engineering and Science recruiting weekend, February 2011

Service, University of Arizona (Selected, 2003-2010):

Department Ecology and Evolutionary Biology Steering Committee (2002-2007)
 Faculty Search Committees (2002-2003, 2003-2004, 2005-2006, 2006-2007)
 College of Science Promotion and Tenure Committee, chair (2004-2007)
 Focused Excellence Team for the Life Sciences (2003-2004)
 Executive Committee, Postdoctoral Excellence in Research and Teaching, NIH
 training grant (2003-2006)
 Advisory panel, Institute for Biomedical Science and Biotechnology (2003-2010)
 Executive committee for IGERT training grant in Genomics (2002-2010)
 Center for Insect Science Executive Committee (1998-2010)
 Faculty User Group Committee for Laboratory of Molecular Systematics and
 Evolution/ Genetic Analysis and Technology Center (1993-2010)

Editorships and reviewing service, 2003-present:

Editorial Board, *mBio*, 2009-present
 Editorial Board, *Genome Biology and Evolution*, 2010-present
 Editor, Proceedings of the National Academy of Science USA, 2004-present
 Editorial Board, Public Library of Science-Biology, 2002-present
 Editorial Board, Proceedings of the National Academy of Science USA, 2004-2007
 Associate Editor, *PLoS-Genetics*, 2009-2012.
 Editorial Board, *Annual Review of Microbiology*, 2005-2011
 Editorial Board BMC Evolutionary Biology, 2002-present
 Editorial Board, *Molecular Phylogenetics and Evolution* 1999-present
 Editorial Board, *Annual Review of Genetics*, guest in 2008
 Outside reviewer for articles submitted to *Applied and Environmental Microbiology*,
Biology Letters, *Cell*, *Current Biology*, *Ecological Entomology*, *Ecology*,
Entomologia Experimentalis et Applicata, *Environmental Microbiology*, *Evolution*,

Genetics, Genome Biology, Genome Research, Insect Molecular Biology, Insectes Sociaux, ISME Journal, Journal of Bacteriology, Journal of Heredity, Journal of Molecular Evolution, Molecular Biology and Evolution, Molecular Microbiology, Nature, Nature Genetics, Nature Reviews Genetics, Oecologia, PLoS-Biology, PLoS-Genetics, Proceedings of the National Academy of Sciences USA, Proceedings of the Royal Society of London Series B, Science

Reviewer of grant proposals for the National Environment Research Council (Britain), US National Science Foundation, US Dept. of Agriculture, British Research Council, US-Israel Binational Foundation, Wellcome Trust

Invited Lectures (2002-present)

- 2002 Genetics seminar series, University of California (Davis, CA)
- 2002 Biocomplexity Symposium, University of Illinois (Champaign-Urbana, IL)
- 2002 Presidential Address, Society for the Study of Evolution (Urbana IL)
- 2002 Symposium on “Symbiosis and Pathogenesis”, (Würzburg, Germany)
- 2002 14th Annual Genome Sequencing and Analysis Conference (Boston MA)
- 2003 Sackler Colloquium, Chemical communication (Irvine, CA)
- 2003 Gordon Conference, Microbial Population Biology (Andover, NH)
- 2003 MIT-sponsored conference in Environmental Genomics (Cambridge, MA)
- 2003 Princeton University, Department of Ecology and Evolutionary Biology (Princeton, NJ)
- 2004 Gordon Conference in Molecular Evolution (Ventura, CA)
- 2004 Gordon Conference in Plant-Insect Interactions (Ventura, CA)
- 2004 Jacques Monod Conference on Parasite-Host Interactions (Roscoff, France)
- 2004 Genomics Days Symposium (Lausanne, Switzerland)
- 2004 Laboratoire de Biométrie et Biologie Évolutive. CNRS (Lyon, France)
- 2004 IGERT in Evolutionary Genomics symposium lecture (Tucson, AZ)
- 2005 Microbial Sciences Initiative Symposium Harvard University (Cambridge MA)
- 2005 Beneficial Microbes (American Society of Microbiology, Lake Tahoe, NV)
- 2005 Radcliffe Distinguished Scholar Lecture (Cambridge, MA)
- 2005 International Union of Microbiological Societies (San Francisco, CA),
- 2005 Congress on the Auchenorrhyncha (Berkeley, CA)
- 2005 Department of Entomology, University of Arizona (Tucson, AZ)
- 2006 Keystone Symposium, Genomics of microbial communities (Lake Tahoe, NV)
- 2006 University of Arizona IGERT conference on comparative genomics (Tucson, AZ)
- 2006 University of Wisconsin (Madison, WI)
- 2006 International Society for Microbial Ecology congress (Vienna, Austria)
- 2006 Indiana University IGERT symposium on Evolutionary Innovation (Bloomington, IN)
- 2006 Department of Plant and Microbial Sciences, University of California (Berkeley, CA)
- 2006 National Academy of Sciences Sackler Colloquium “Origins of Biological Complexity” (Irvine, CA)
- 2007 Conference on Metagenomics, Joint Genome Institute (Walnut Creek, CA)
- 2007 Jacques Monod Conference on Genome Evolution (Roscoff, France)

- 2007 Symposium on reductive evolution in bacterial genomes, American Society of Microbiology National Meetings (Toronto, Canada)
- 2007 Joint Genome Institute seminar (Walnut Creek, CA)
- 2007 Bay Area BioSystematics Group (Berkeley, CA)
- 2007 Emory University Luminaries in Science Series (Atlanta, GA)
- 2007 Conference on Genes, Medicine and the Environment (San Diego, CA)
- 2007 Univ. Iowa (Iowa City, IA)
- 2007 Kansas Ecological Genomics meeting (Kansas City, KS)
- 2007 Pierce's Disease Research Workshop (San Diego, CA)
- 2007 West Coast Conference on Bacterial Physiology (Asilomar, CA)
- 2008 Frontiers in Biology Seminar, Stanford University (Palo Alto, CA)
- 2008 Helen Whiteley Lecture, University of Washington (Seattle, WA)
- 2008 Keystone Symposium, Molecular Evolution of Infectious Disease (Breckenridge)
- 2008 Plenary Talk, International Congress on Microbial Ecology (Cairns, Australia)
- 2009 Dean's Symposium, invited speaker, University of California (San Diego, CA)
- 2009 National Academy of Science Annual Meeting Symposium "Darwin would be amazed!", co-organizer and speaker, Washington, DC
- 2009 American Society for Microbiology Annual meeting, Plenary Speaker and symposium speaker (Philadelphia, PA)
- 2009 Invited Speaker, Microbes and Health, Sackler Colloquium (Irvine, CA)
- 2009 Society for Molecular Biology and Evolution Annual meeting Plenary speaker (Iowa City, IA)
- 2009 Stanford Microbial Diversity course guest lecturer, Hopkins Marine Laboratory (Monterey, CA)
- 2009 International Symbiosis Society plenary talk (Madison, WI)
- 2010 Society for Molecular Biology and Evolution annual meeting (Lyon, France)
- 2010 International Society of Microbial Ecology (Seattle, WA)
- 2010 Workshop on Quantitative Genomics (Okinawa, Japan)
- 2010 EMBO annual meeting (Barcelona, Spain)
- 2010 Cornell University, Center for Comparative & Population Genomics (Ithaca, NY)
- 2010 Wesleyan University, Department of Biology (Middletown, CT)
- 2010 Symposium on Symbiosis in honor of Dr. Nancy A. Moran, Tsukuba, Japan
- 2011 Stanford University, Department of Microbiology & Immunology (Palo Alto, CA)
- 2011 Cedar Crest College, Darwin Day Lecture (Allentown, PA)
- 2011 Bat Sheva Symposium on Symbiosis, Plenary Speaker (Tel Aviv, Israel)
- 2011 C. P. Alexander Lecture, University of Massachusetts (Amherst, MA)
- 2011 The Hopwood Lecture, John Innes Centre, Norwich, United Kingdom
- 2011 Iowa State University, Genetics and Entomology programs (Ames, IA)
- 2011 University of Texas-Austin, Integrative Biology (Austin, TX)
- 2011 American Society for Microbiology symposium speaker (New Orleans, LA)
- 2011 Woods Hole Microbial Diversity Symposium (Woods Hole, MA)
- 2011 Gordon Research Conference on Microbial Population Biology (Andover, MA)
- 2011 Society for Molecular Biology and Evolution, plenary lecture at annual meeting (Kyoto, Japan)

- 2011 Institut de Biologie Intégrative et des Systèmes, Université Laval (Quebec City)
2011 New York University, Department of Biology (New York, NY)
2011 University of Connecticut, Ecology and Evolutionary Biology (Storrs, CT)
2011 University of California-Irvine, Ecology and Evolutionary Biology (Irvine, CA)
2011 University of Chicago, Symposium on Adaptation and Evolution, organized by Genetics program (Chicago, IL)
- 2012 Harvard Medical School, Microbiology and Immunology (Boston, MA)
2012 University of California Riverside, Department of Entomology, Boyce Lecture (Riverside, CA)
2012 University of Illinois Genomic Biology Institute, keynote speaker at symposium (Urbana, IL)
2012 University of Michigan, Rackham Centennial Alumni Lecture (Ann Arbor, MI)
2012 International Society of Microbial Ecology meeting, Invited speaker and session organizer (Copenhagen, Denmark)
2012 Meeting for Graduate Research School in Genomic Ecology (Geneco) invited speaker (Klippan Sweden)
2012 Sao Paulo School of Advance Science Evolution course for graduate students and postdoctoral researchers. University of Sao Paulo (Ihla Bella, Brazil)
2012 Presentation on bee nutrition and microbial symbionts, USDA meeting on Bee Health, (Alexandria, VA)
2012 Beneficial Microbes meeting, American Society for Microbiology, invited speaker (San Antonio, TX)
- 2013 State University of New York at Stony Brook, Department of Ecology and Evolutionary Biology
2013 Wellcome Trust (Sanger Centre) Conference on the Origin and Evolution of Parasite Genomes, plenary speaker (Cambridge, England)
2013 University of California at Davis, Storer Lecture on Major Issues in Modern Biology (Davis, CA)
2013 Biology of Pollinators, Pennsylvania State University (State College, PA)
2013 Texas A&M University, Department of Entomology (College Station, TX)
2013 Laboratorio Nacional de Genómica para la Biodiversidad (Irapuato, Mexico)
2013 Entomological Society of America annual meeting (Austin, TX)
- 2014 Keystone Symposium "Mechanisms and Consequences of Invertebrate Microbe Interactions" (Tahoe City, CA)
2014 Keynote Speaker at Special Symposium "The Causes of Genome Evolution", in honor of Tomoko Ohta (National Institute of Genetics, Mishima, Japan)
2014 Program in Genetics and Genomics, Duke University (Chapel Hill, NC)
2014 Keynote Speaker at "Biology of Genomes" conference, Cold Spring Harbor Biological Laboratories, (Cold Spring Harbor, NY)
2014 Department of Fundamental Microbiology, University of Lausanne (Lausanne, Switzerland)
2014 Ecology, Evolution, Environment & Behaviour UZH / ETH Joint Seminar Series (Zürich, Switzerland)

- 2014 Invited Speaker, Arthropod Genomics Symposium (Urbana, IL)
2014 Plenary Speaker, Hemipteran Plant-Interactions Symposium (Riverside, CA)
2014 Plenary Speaker, European Congress of Entomology (York, United Kingdom)
2014 Jim Tiedje Award lecture, International Society for Microbial Ecology (Seoul, Korea)
2014 Invited Speaker, International Microbial Genomes Conference (Lake Arrowhead, CA)
2014 Biochemistry, Cell and Development, and Genetics and Genomics Divisions, University of California at Berkeley (Berkeley, CA)
2014 Instituto Gulbenkian de Ciencia (Lisbon, Portugal)
2014 Invited Speaker, Symbioses becoming permanent, Sackler Colloquium (Irvine, CA)
2014 Invited Speaker, NESCENT meeting on bee microbiota (Durham, NC)
2014 Russell Marker Lectureship in Evolutionary Biology, Penn State University (State College, PA)
- 2015 Department of Microbiology, University of Washington (Seattle, WA)
2015 Plenary Speaker at the Annual Conference 2015 of the Association for General and Applied Microbiology (VAAM) (Marburg, Germany)
2015 Scientific Speaker at the American Society for Microbiology Conference on Undergraduate Education (Austin, TX)
2015 Symposium on Evolution of Microbial Communities, Society for Molecular Biology and Evolution (Vienna, Austria)
2015 European Campus of Excellence course on Host-Microbe Symbioses (Oeiras, Portugal)
2015 Ohio State University, Department of Evolution, Ecology and Organismal Biology (Columbus, OH)
2015 *Exploring Diversity of Life* Workshop, Joint Genome Institute (Pacifica, CA)
2015 North Carolina State University, Keck Center, Department of Biological Sciences (Raleigh, NC)
- 2016 *Dimensions of Biodiversity* Awardees conference, National Science Foundation (Arlington, VA)
2016 Microbiology Society, Annual Conference (Liverpool, England)
2016 Warner Lecture, Department of Biology, University of Wisconsin-LaCrosse (Lacrosse, WI)
2016 Randall Lecture, Bioinformatics and Computational Biology, University of Idaho (Moscow, ID)
2016 Distinguished Wenner-Gren Lecture, Stockholm University, Stockholm, Sweden
2016 Invited Speaker, Uppsala University, Uppsala Sweden
2016 Invited Speaker, Rocky Mountain Biological Laboratory (Gothic, CO).
2016 Invited lectures, Workshop on The Multi-genic Bases of Microevolutionary Processes, Guangzhou, China
2016 Invited Speaker, Institute for Laboratory Animal Research and National Academy of Sciences, Workshop on models for microbiome research (Washington DC)

- 2017 Plenary Speaker, Population Genetics Group (Cambridge England)
- 2017 Plenary Speaker, BioGenomics2017, Global Biodiversity Genomics Conference, Smithsonian National Museum of Natural History (Washington, DC)
- 2017 Invited lecture, conference on “Symbiosis in evolution, biology, and human health” (Paris, France)
- 2017 Vanzant Lecture, invited by graduate students in Ecology and Evolutionary Biology, Rice University (Houston, TX)
- 2017 Invited lecture, Drexel University, Department of Biology (Philadelphia, PA)
- 2017 Lecture, DARPA Biological Robustness in Complex Settings program meeting (Miami, FL)
- 2017 Invited lecture, Gordon Research Conference on Animal-Microbe Symbiosis (Mount Snow, VT)
- 2017 Beijing Normal University, Invited lectures, Workshop on Evolutionary Ecology and Genomics, Beijing, China
- 2017 Invited lectures, European Campus of Excellence course on Host-Microbe Symbioses (Gulbenkian Institute of Science, Oeiras, Portugal)
- 2017 Invited lecture, annual meeting of the Society for Invertebrate Pathology (San Diego, CA)
- 2017 Fairfield Osborne Memorial Lecture, The Rockefeller University (New York, NY)
- 2017 Yale Immunobiology Program Annual Student Symposium, Yale University (New Haven, CT)
- 2017 University of British Columbia (Vancouver Canada)
- 2017 Workshop on Symbiosis and Microbial Communities, Company of Biologists, Wiston House, England

Teaching and Advising

Formal courses

University of Texas (2013-)

- Genomes and Evolution Junior Tutorial, Fall 2015, Fall 2016
- Evolutionary Biology, Fall 2013
- Molecular and Genomic Evolution, Spring 2015
- Freshman Research Initiative –initiated new research stream “Bugs in Bugs”, Spring 2015 to present
- Guest lectures in Honors Biology, Deans’ Scholar Seminar, Evolutionary Biology, Plant Biology Graduate Core Course, EEB Graduate Core Course
- Honors thesis advisor or reader (Nikita Prasad, Evelyn Abbott), 2017

Yale University (2010-2013)

- Evolutionary Biology, undergraduate course
- Evolutionary Applications of Genomic Technologies, graduate course
- Genome Evolution, graduate course
- Arthropod Diversity, Guest lecturer
- Senior thesis advisor to Charlie Huang (2012), Ingrid Rochon (2013)

University of Arizona (1986-2010):

Insect Ecology, undergraduate/graduate course
 Introductory Biology, undergraduate course
 Evolutionary Biology, undergraduate course
 The Analysis of Biological Diversification, undergraduate/graduate course
 Molecular Evolution, graduate course
 Biology of Symbiosis, graduate course
 Evolutionary and Functional Genomics, undergraduate/graduate course
 Genomics and Evolution, Freshman Honors Colloquium

Guest lectures in: Microbial Diversity, honors Introductory Biology, Fundamentals of Evolution (graduate course), Evolution of Infectious Disease

Graduate Student Advising

University of Texas at Austin (Sept 2013 - present)

Daren Eiri (EEB doctoral student, withdrew Oct 2014)

Margaret Steele (Microbiology doctoral student, coadvised with M. Whiteley)

Erick da Silva Motta (Plant Biology doctoral student)

Sean Leonard (CMB doctoral student, coadvised with J. Barrick)

Serena Zhao (EEB doctoral student, Sept 2015-present)

Julie Perreau (Microbiology doctoral student, coadvised with J. Barrick, May 2017-)

Lab rotations for ICMB graduate students: 4 in 2014, 2 in 2015, 2 in 2016

2014: served on 2 oral exam committees and 1 EEB proposal defense

2015: served on Microbiology Part A exam committee, 2 EEB proposal defenses (Eleisha Jackson, Rachel Wright), 1 MCB proposal defense (Rayna Harris)

2016: served on final defense (Eleisha Jackson)

Doctoral defense outside examiner for dissertation defense of Ewa Chrostek, Instituto Gulbenkian de Ciencia, Portugal, October 2014.

Masters thesis committee for Javier Carpinteyro Ponce, Unidad de Genómica Avanzada, CINVESTAV Unidad Irapuato, Mexico, 2014-2015.

Yale (2010-2015):

Doctoral advisor to Waldan Kwong (2015, current position: Postdoctoral Fellow, University of British Columbia)

Thesis committees for Daniel Goldhill, Andy Moeller (EEB doctoral students)

Preliminary exam committee for Jessica Miles (Microbiology)

University of Arizona (1986-2011):

Major advisor to 8 doctoral students (graduate date, current position):

Vincent Martinson (2012, Postdoctoral Researcher, University of Rochester)

Kevin Vogel (2012, NIH Postdoctoral Fellow, University of Georgia)

Gaelen Burke (2010, Assistant Professor, University of Georgia)

Patrick Degnan (2009, Assistant Professor, University of Illinois)

Jacob Russell (2004, Associate Professor, Drexel University)

John Stireman (2001, Associate Professor, Wright State University)

Patrick Abbot (2001, Associate Professor, Vanderbilt University)

Goggy Davidowitz (1998, Associate Professor, Entomology, Univ. Arizona)

Mentor to additional doctoral students who worked in the Moran lab:

Tamara Haselkorn (2010 from UCSD, postdoctoral fellow, Washington Univ.)

Kerry Oliver (2006, Assistant Professor, University of Georgia)

Michael Singer (2001, Associate Professor, Wesleyan University)

Major advisor to 4 Master's students (graduate date, current position):

Gregory Simmons (1992, USDA entomologist)

Margaret Wilch (1999, Biology teacher at Tucson High Magnet School)

Jude Glass (1992, Biology teacher at Vail Middle School, Tucson)

Jay Withgott (1999, science textbook writer, Pearson Educational)

Member of 36 additional thesis committees at University of Arizona (31 Ph.D., 5 M.S. in EEB, Molecular and Cellular Biology, Insect Science, Entomology)

Postdoctoral Advising (Dates advised and current position):

Daniel Papaj (1989-1991, Professor, University of Arizona)

Carol von Dohlen (1991-1994, Professor, Utah State University)

Ben Normark (1993-1995, Professor, University of Massachusetts -Amherst)

Daniel Funk (1997-1999, Associate Professor, Vanderbilt University)

Jonas Sandström (1997-1999, Scientist, Swedish Biodiversity Centre)

Claude Rispe (1998-1999, Research Scientist, INRA, Nantes, France)

Jennifer Wernegreen (1999-2001, Associate Professor, Duke University)

Alejandro Mira (2000- 2002, Senior Scientist, Center for Advanced Research in Public Health, Valencia, Spain)

Colin Dale (2001- 2003, Associate Professor, University of Utah)

Jennifer Wilcox (2001- 2003, Veterinarian, Tucson, Arizona)

Gordon Plague (1999- 2004, Associate Professor, SUNY Potsdam)

Emmanuelle Lerat (2002 - 2004, Research Scientist, CNRS, Lyon)

Mariana Mateos (2004 –2005, Associate Professor, Texas A&M University)

Alexandra C. Wilson (2003 –2006, Associate Professor, University of Miami)

Atsushi Nakabachi (2006 - 2007, Associate Professor, Toyohashi University)

Nicole Gerardo (2004 - 2007), Associate Professor, Emory University)

Kerry Oliver (2006 - 2008, Assistant Professor, University of Georgia)

John McCutcheon (2006 - 2010, Assistant Professor, University of Montana)

Zakee Sabree (2008 - 2012, Assistant Professor, Ohio State University)

Allison Hansen (2009 - 2013, Assistant Professor, University of Illinois)

Baoyu Tian (2010 - 2011, Assistant Professor, Fujian Normal University)

Daniel Sloan (2011 - 2013, Assistant Professor, Colorado State University)

Philipp Engel (2011- 2013, Assistant Professor, University of Lausanne)

Hauke Koch (Aug 2012 - Aug 2015, Research Scientist, Kew Garden, London)

Gordon Bennett (Sept 2012 - Aug 2015; Assistant Professor, University of Hawaii)

Rebecca Chong (Sept 2014 – Dec 2017; Assistant Professor, University of Hawaii)
 Kasie Raymann (Oct 2014 - Dec 2017; Assistant Professor, University of North Carolina at Greensboro)

Hao Zheng (Jan 2016 - Dec 2017; Assistant Professor, China Agriculture University)

Jo-Anne Holley (current postdoc and Research Educator for Freshman Research Initiative stream, Jan 2015 -)

Thomas E. Smith (current, Feb. 2017 -)

Kerri Coon (current, April 2017 -)

Undergraduate advising

University of Arizona (1995 - 2011)

Advisor for honors theses, senior theses and projects for 44 undergraduates

Yale (2010 - 2013)

Advisor for honors theses and undergraduate research for: Charlie Huang (Yale), Brian Chang (Yale), Ingrid Rochon (Yale), Katherine Urban-Mead (Yale), Lara Zipperer (Yale), Adam Hejmowski (Univ. of New Haven), Nibal Fadhil (Univ. of New Haven), Kelsey Bartlett (Univ. of New Haven), Katherine Filush (Univ. New Haven), Cindy Barlan (Quinnipiac University),

University of Texas (Aug 2013 - present)

Advisor for 26 undergraduate researchers: Anne Bolz, Cody Cole, Megan Damico, Dylan Dey, Edwin Escobar, Gabriel Espinosa, Brianna Flynn, Eva Frederick, Luke Heckman, Luke Hollifield, Allison Joyce, Josh Lara, Coral Lockerman, Amanda Mancenido, Luis Medina, Blair Mockler, Shivani Patel, Anna Perkins, Nikita Prasad, Nalin Ratnayake, Darby Richart, Aaron Saleen, Zachary Shaffer, Dat Tran, Edwin Umanzor, Kelly Yu.

Undergraduates winning UT undergraduate fellowship awards: Anne Bolz, Allison Joyce, Amanda Mancenido, Blair Mockler, Zachary Shaffer

Dean's Scholar Advisor for Integrative Biology

Guest speaker SURGe (undergrad research club)

Host to international students and scholars

University of Arizona (1995 - 2011):

Vaclav Hypša (Czech Republic, BRAVO scholar, 1999)

Tania Rosas (Mexico, supported on Mexican scholarship, Summer 2008)

Ariceli Lamelas (Spain, supported on Spanish fellowship, 6 months in 2008)

Yale (2010 - 2013)

Eva Nováková (Czech Republic, Fulbright scholar, Sept 2010-Sept 2011)

Dr. Baoyu Tian (China, Chinese Scholarship Council, Nov 2010 - Apr 2012)

Dr. Ryuichi Koga (Japan, July 2011 - April 2013)

University of Texas (Aug 2013 - present)

Dr. Yueli Yun (China, Chinese Scholarship Council, Sept 2013 - Sept 2014)

Catherine Girard (Canada, Fulbright Fellowship, Sept 2015 - June 2016)

K-12 science outreach:

- Sponsored booths at “Explore UT” during 2015 and 2016, for school kids and parents to learn about the lab research
- Creator of “Biotechnology Laboratory for Arizona Students and Teachers” (“BLAST”), a biotechnology laboratory at Tucson High Magnet School, 2005-present. This program continues following my departure from Arizona.
- Instructor “Genes, Biotechnology and the Environment”, a summer intensive laboratory course for high school students and high school teachers at Tucson High Magnet School, July 2006-2009 (co-instructor with Margaret Wilch).
- Laboratory host for a Yale Science Pathways event for 20 New Haven public high school students to learn about science and scientists.
- Sponsored Jericho High School student to work on bee microbiota, summer 2011.
- Organized and taught a module on insect-associated bacteria for AP Biology course at Common Ground High School in New Haven CT (2011-2013).
- Advised staff at Common Ground High School (New Haven CT) on biology teaching programs (2011-2013)

Publications: Popular articles and commentaries

- Moran, N. A. 2016. Old and new symbiotic partners in lachnine aphids. *Environmental Microbiology Reports*, *in press* doi: 10.1111/1462-2920.13516
- Moran, N. A. 2016. Insights into the roles of bacterial symbionts within flagellates of termite guts. *Environmental Microbiology Reports*, *in press*. doi/10.1111/1758-2229
- Moran, N. A. 2016. When obligate partners melt down. *mBio* 7(6):e01904-16. doi:10.1128/mBio.01904-16
- Moran, N. A. 2015. Genomics of gut microbial communities in honey bees and bumble bees. *Antenna* (Newsletter of the Royal Entomological Society)
- Moran, N. A. 2014. Evolution: The Complexity Chronicles. Review of *One Plus One Equals One: Symbiosis and the Evolution of Complex Life* by J. Archibald. *Nature* 510: 338–339
- Moran, N. A. 2012. Microbial symbiosis and evolution. pages 191-196 in *Microbes and Evolution: The World that Darwin Never Saw*, edited by R. Kolter and S. Maloy, ASM Press.
- Moran, N. A. 2002. Genome evolution in endosymbiotic bacteria. *American Society of Microbiology News* 68:499-505.
- Moran, N. A. 2001. Coevolucio de bacteris endosimbiotics i insectes. *Methodes* 28: 40-43, Catalan language popular magazine about science (translated).
- Moran, N. A. 2000. The secret to success in sap-sucking insects. *Wings* (essays on invertebrate conservation) 23: 12-16.
- Moran, N. A. 1992. Quantum leapers: aphids take risks to satisfy ancient tastes. *Natural History* 4/92: 34-39.

Scientific Publications (Peer-reviewed, in reverse chronological order, 239 total)

- Raymann, K., L. M. Bobay, and N. A. Moran. Antibiotics reduce genetic diversity of core species in the honeybee gut microbiome. *Molecular Ecology*, in press. doi: 10.1111/mec.14434
- Mockler, B. K., W. K. Kwong, N. A. Moran, and H. Koch. Microbiome structure influences infection by the parasite *Crithidia bombi* in bumble bees. *Applied and Environmental Microbiology*, in press
- Chong, R. and N. A. Moran. Evolutionary loss and replacement of *Buchnera*, the obligate endosymbiont of aphids. *ISME Journal*, in press.
- Steele, M. I., W. K. Kwong, M. Whiteley, and N. A. Moran. Diversification of type VI secretion system toxins reveals ancient antagonism among bee gut microbes *mBio*, 8:e01630-17. doi.org/10.1128/mBio.01630-17.
- Martinson, V. G., J. Carpinteyro-Ponce, N. A. Moran, and T. A. Markow. in press. A distinctive and host-restricted gut microbiota in populations of a cactophilic *Drosophila* species. *Applied and Environmental Microbiology* doi: 10.1128/AEM01551-17
- Zheng, H., J. E. Powell, M. I. Steele, C. Dietrich, and N. A. Moran. 2017. Honeybee gut microbiota promotes host weight gain via bacterial metabolism and hormonal signaling. *Proceedings of the National Academy of Sciences USA* 114: 4775-4780.
- Kwong, W. K., H. Zheng, and N. A. Moran. 2017. Convergent evolution of a modified acetate-driven TCA cycle in bacteria. *Nature Microbiology* 2: 17067
- Kwong, W. K., L. A. Medina, H. Koch, K. W. Sing, E. J. U. Soh, J. S. Ascher, R. Jaffe, and N. A. Moran. 2017. Dynamic microbiome evolution in social bees. *Science Advances* 3(3):e1600513.
- Raymann, K., Z. Shaffer, and N. A. Moran. 2017. Antibiotic exposure perturbs the gut microbiota and elevates mortality in honeybees. *PloS-Biology*, 15(3):E2001861.
- Kwong W. K., A. L. Mancenido, and N. A. Moran. 2017. Immune system stimulation by the native gut microbiota in honey bees. *Royal Society Open Science* doi: 10.1098/rsos.170003
- Neuvonen, M. M., D. Tamarit, K. Näslund, J. Leibig, H. Feldhaar, N. Moran, L. Guy, and S. Andersson. 2016. The genome of Rhizobiales bacteria in predatory ants reveals urease gene functions but no genes for nitrogen fixation. *Scientific Reports* 6: 39197.
- Powell, J. E., S. P. Leonard, W. K. Kwong, P. Engel, and N. A. Moran. 2016. Genome-wide screen identifies host colonization determinants in a bacterial gut symbiont. *Proceedings of the National Academy of Sciences USA* 113: 13887-13892.
- Chong, R. A. and N. A. Moran. 2016. Intraspecific genetic variation in hosts affects regulation of obligate heritable symbionts. *Proceedings of the National Academy of Sciences USA* 113: 13114-13119.

- Zheng, H. A. Nishida, W. K. Kwong, H. Koch, P. Engel, M. I. Steele and N. A. Moran. 2016. Metabolism of toxic sugars by the bee gut symbiont, *Gilliamella apicola*. *mBio* 7(6): e01326-16.
- Powell, J. E., N. Ratnayeke, and N. A. Moran. 2016. Strain diversity and host specificity in a specialized gut symbiont of honey bees and bumble bees. *Molecular Ecology* 25: 4461-4471.
- Schwarz, R. S., N. A. Moran, and J. D. Evans. 2016. Early gut colonizers shape parasite susceptibility and microbiota composition in honey bee workers. *Proceedings of the National Academy of Sciences USA* 113: 9345-9350.
- Kwong, W. K. and N. A. Moran. 2016. Gut microbial communities of social bees. *Nature Reviews Microbiology* 14: 374-384.
- Tian, B. and N. A. Moran. 2016. Genome sequence of *Hafnia alvei* bta3_1, a bacterium with antimicrobial properties isolated from honey bee gut. *Genome Announcements* 4:e004399-16.
- Dainat, B. et al. (33 authors total). The bee microbiome: impact on bee health and model for evolution and ecology of host-microbe interactions. *mBio* 7: 02184-15.
- Kwong, W. K. and N. A. Moran. 2016. *Apibacter adventoris* gen. nov., sp. nov., a member of the phylum Bacteroidetes isolated from honey bees. *International Journal of Systematic and Evolutionary Microbiology* 66:13:1323-1329.
- Bennett, G. M., J. P. McCutcheon, B. R. McDonald, and N. A. Moran. 2015. Lineage-specific patterns of genome deterioration in obligate symbionts of sharpshooter leafhoppers. *Genome Biology and Evolution* 10.1093/gbe/evv159
- Moran, N. A. and D. B. Sloan. 2015. The hologenome concept—helpful or hollow? *PloS-Biology* 13: e1002311. doi:10.1371/journal.pbio.1002311
- Bennett, G. M. and N. A. Moran. 2015. Heritable symbiosis: the advantages and perils of an evolutionary rabbit hole. *Proceedings of the National Academy of Sciences USA* 112: 10169-10176.
- Li, J., J. E. Powell, J. Guo, J. D. Evans, J. Wu, P. Williams, Q. Lin, N. A. Moran, and Z. Zhang. 2015. Two gut community enterotypes recur in diverse bumblebee species. *Current Biology* 25: R652-R653.
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- Moran, N. A. 2015. Genomics of the honey bee microbiome. *Current Opinions in Insect Science* 10: 22-28.
- Kwong, W. and N. A. Moran. 2015. Evolution of host specialization in gut microbes: the bee gut as a model. *Gut Microbes* 6: 214-220.
- Moran, N. A. and Y. Yun. 2015. Experimental replacement of an obligate insect symbiont. *Proceedings of the National Academy of Sciences USA*. 112:2093-2096.
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- Hansen, A. K. and N. A. Moran. 2013. The impact of microbial symbionts on host plant utilization by herbivorous insects. *Molecular Ecology* 23: 1473-1486. PMID: 23952067

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- Engel, P. E., W. Kwong, and N. A. Moran. 2013. *Frischella perrara*, gen. nov., sp. nov. a gammaproteobacterium isolated from the gut of *Apis mellifera*. *International Journal of Systematic and Evolutionary Microbiology* 63: 3646-3651. PMID: 23606484
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