

Justin R. Meyer

Associate Professor
Vice Chair Biological Sciences PhD Program
University of California, San Diego
Ecology Behavior & Evolution | Quantitative Biology

Contact Information

jrmeyer@ucsd.edu
<http://labs.biology.ucsd.edu/meyer>

517-898-5529
2203 Muir Biology Bldg. 9500 Gilman Dr. 0116
La Jolla CA 92093

EDUCATION

Postdoc	Systems Biology Departmental Fellow, Harvard Medical School	2014
PhD	Zoology and Ecology, Evolutionary Biology & Behavior, Michigan State University	2012
MSc	Biology, University of Ottawa	2007
BSc	Biology, Cornell University	2004

PROFESSIONAL APPOINTMENTS

Research technician	Cornell University	2004 – 2005
Field research assistant	Tanzania	Summers 2004 & 2007
Graduate research assistant	University of Ottawa	2005 – 2007
Graduate research assistant	Michigan State. University	2007 – 2012
Systems Biology Fellow	Harvard Medical School	2012 – 2014
Assistant Professor	UC San Diego	2014 – 2020
Associate Professor	UC San Diego	2020 – present

HONORS AND AWARDS

Hellman Fellowship **2017**
Pittsburgh Public School Hall of Fame **2017**
James S. McDonnell Foundation's Fellowship Award in Studying Complex Systems **2012**
Shaver Fellowship **2011**
Barnett Fellowship **2011**
Hensley Fellowship **2011**
Michigan State Graduate Fellowship **2007**
NSF Research Experience for Undergraduates Fellowship (graduate mentor role) **2007**
NSF Research Experience for Undergraduates Fellowship **2004**

PUBLICATIONS

Peer-reviewed

Proceedings of the National Academy of Sciences USA 118, e2104592118 (2021)
Coevolutionary phage training leads to greater bacterial suppression and delays the evolution of phage resistance
Joshua M. Borin, Sarit Avrani, Jeffrey E. Barrick, Katherine L. Petrie, Justin R. Meyer

Nature Communications 12, 342 (2021)
Viral speciation through subcellular genetic isolation and virogenesis incompatibility
V. Chaikerasitak, E. A. Birkholz, A. M. Prichard, M. E. Egan, A. Mylvara, P. Nonejuie, K. T. Nguyen, J. Sugie, J. R. Meyer, J. Pogliano

Evolutionary Applications 14, 658-673 (2020)
Trade-off drives Pareto optimality of within- and among-year emergence timing in response to increasing aridity

Joseph Waterton, Susan J. Mazer, Justin R. Meyer, Elsa E. Cleland

Evolution 74: 764-774 (2020)

Bacteriophage lambda overcomes a perturbation in its host-viral genetic network through cooperation and evolution of life history traits

Animesh Gupta, Anechelle N. Soto, Sarah J. Medina, Katherine L. Petrie, Justin R. Meyer

Evolution in Action – Past, Present, and Future: A Festschrift in Honor of Erik Goodman’s 75th Birthday, book chapter (2020)

Subtle environmental differences have cascading effects on the ecology and evolution of a model microbial community

Justin R. Meyer, Richard E. Lenski

Evolution 72: 2234-2243 (2018)

Gain-of-function experiments in bacteriophage lambda uncover residues under diversifying selection in nature

R. Maddamsetti, D. T. Johnson, S. J. Spielman, K. L. Petrie, D. S. Marks, J. R. Meyer

PLoS Biology 16: e2005971 (2018)

Leaky Resistance and the Conditions for the Existence of Lytic Bacteriophage

W. Chaudhry, M. Pleška, N. Shah, H. Weiss, I. McCall, Justin R. Meyer, A. Gupta, C. C. Guet, B. R. Levin

Science 359: 1542-1545 (2018)

Destabilizing mutations encode nongenetic variation that drives evolutionary innovation

K. L. Petrie, N. D. Palmer, D. T. Johnson, S. J. Medina, S. J. Yan, V. Li, A. R. Burmeister, J. R. Meyer

R Soc Open Sci 4: 170497 (2017)

Evolution of organismal stoichiometry in a long-term experiment with *Escherichia coli*

Caroline B. Turner, Brian D. Wade, Justin R. Meyer, Brooke A. Sommerfeld, Richard E. Lenski

Science 354,1301-1304 (2016)

Ecological Speciation of Bacteriophage Lambda in Allopatry and Sympatry

Justin R. Meyer, Devin T. Dobias, Sarah J. Medina, Lisa Servilio, Animesh Gupta, Richard E. Lenski

Proceedings of the Royal Society B 283, 20161528 (2016)

Host coevolution alters the adaptive landscape of a virus

Alita B. Burmeister, Richard E. Lenski, Justin R. Meyer

Nature Communications 6, doi:10.1038/ncomms7278 (2015)

Biophysics of biodiversity: Cellular mechanisms that generate trade-off geometries

Justin Meyer, Ivana Gudelj, Robert Beardmore

PLoS Biology 12, e1002023 (2014)

Coevolution drives the emergence of complex traits and promotes evolvability

Luis Zaman, Justin R. Meyer, Suhas Devangam, David M. Bryson, Richard E. Lenski, Charles Ofria

Trends in Microbiology 21, 82-91 (2013)

Phage-bacteria interaction networks

J.S. Weitz, T. Poisot, J.R. Meyer, C. O. Flores, S. Valverde, M.B. Sullivan, M.E Hochberg

A-Life Proceedings 13, 532-533 (2012)

Key innovation in a virus catalyzes a coevolutionary arms race

Justin R. Meyer, Cesar Flores, Joshua S. Weitz, Richard E. Lenski

Science 335, 428-432 (2012)

Repeatability and contingency in the evolution of a key innovation in Lambda Phage

J. R. Meyer, D. T. Dobias, J. S. Weitz, J. E. Barrick, R. T. Quick, R. E. Lenski

Freshwater Biology 56, 2082-2093 (2011)

Scale-dependent processes of community assembly in an African rift lake

Justin R. Meyer, Ellinor Michel, Peter McIntyre, Brittany Huntington, Dustin Long, Genifer Lara

Proceedings of the National Academy of Sciences USA 108, E288-297 (2011)

Statistical structure of host-phage interactions

Cesar Flores, Justin R. Meyer, Sergi Valverde, Lauren Farr, Joshua S. Weitz

Ecology Letters 13, 1073-1084 (2010)

An integrative approach for understanding diversity: from intracellular to community structure

I. Gudelj, J. S. Weitz, T. Ferenci, M. C. Horner-Devine, C. J. Marx, J. R. Meyer, S. E. Forde.

Proceedings of the Royal Society B 278, 392-398 (2010)

Overshooting dynamics in a model adaptive radiation

Justin R. Meyer, Sijmen E. Schoustra, Josianne Lachapelle, Rees Kassen

Evolution 64, 3024–3034 (2010)

Parallel changes in host resistance to viral infection during 45,000 generations of relaxed selection

J. R. Meyer, A. A. Agarwal, R. T. Quick, D. T. Dobias, D. Schneider, R. E. Lenski.

Evolutionary Ecology Research 10, 735-746 (2008)

Selection for predator resistance varies with resource supply in a model adaptive radiation

Alex Hall, Justin R. Meyer, Rees Kassen

Nature 446, 432-435 (2007)

The effects of competition and predation on diversification in a model adaptive radiation

Justin R. Meyer, Rees Kassen

Proceedings of the National Academy of Sciences USA 103, 10690-10695 (2006)

Prey evolution on the time scale of predator-prey dynamics revealed by allele-specific quantitative PCR

Justin R. Meyer, Stephen P. Ellner, Nelson G. Hairston, Jr., Laura E. Jones, Takehito Yoshida

Preprints

bioRxiv <https://www.biorxiv.org/content/10.1101/2021.06.25.449783v1>

Host-parasite coevolution promotes innovation through deformations in fitness landscapes

A. Gupta, L. Zaman, H. M. Strobel, J. G., A. R. Burmeister, B. Kerr, E. S. Tamar, R. Kishony, J. R. Meyer

bioRxiv <https://www.biorxiv.org/content/10.1101/2020.10.31.337758v1>

Leapfrog dynamics in phage-bacteria coevolution revealed by joint analysis of cross-infection phenotypes and whole genome sequencing

Animesh Gupta, Shengyun Peng, Chung Yin Leung, Joshua M. Borin, Joshua S. Weitz, Justin R. Meyer

bioRxiv <https://www.biorxiv.org/content/10.1101/771998v1>

Viral host-range evolvability changes in response to fluctuating selection

M. E. Mouchka, D. M. Dorsey, G. L. Malcangio, S. J. Medina, E. C. Stuart, J. R. Meyer

bioRxiv <https://www.biorxiv.org/content/10.1101/818492v1>

Canonical host-pathogen tradeoffs subverted by mutations with dual benefits

Robert Beardmore, Mark Hewlett, Rafael Peña-Miller, Carlos Reding, Ivana Gudelj, Justin R. Meyer

Commentaries

The Conversation March. 29, 2018

Discovery of a surprise multitasking gene helps explain how new functions and features evolve

Katherine L. Petrie & Justin R. Meyer

Proceedings of the National Academy of Science 110, 1047-1046 (2013)

Sticky phage protect animal cells

Justin R. Meyer

Journal of American Human Biology 24, 388-389 (2012)

Book Review: Adaptive Dynamics

Justin R. Meyer

RESEARCH SUPPORT

Co-PI, **National Science Foundation BEE-** Ecology of adaptation to food quality by genes and microbiomes in lake plankton, 8/20 – 7/25 (full award \$1,452,679, fraction to my group \$290,535)

PI, **National Science Foundation** Experimental tests of the role genetic architecture, resource competition, and gene flow play during speciation, 3/20 – 3/23, (full award of \$739,139 to my group)

PI, **University of California Office of the President’s Multicampus Research Programs and Initiatives (MRPI)**, Exploring a mechanism for viral host range evolution, 1/1/19 – 12/31/20, (total \$270,000, fraction for my group \$90,000)

Co-PI, **United State – Israel Binational Science Foundation** Controlling cyanobacterial blooms with natural ecology. 9/01/18 - 8/31/20 (total \$150,000, fraction for my group \$75,000)

Co-PI, **DARPA** Safely engineering various classes of gene drives to control a major invasive disease, 07/01/17 - 09/30/18, (total \$498,590, fraction for my group \$249,295)

Co-PI, **National Science Foundation** Engineered Selective Pressure: Challenges and Opportunities, 8/1/16 - 7/31/20 (total \$1,167,762, fraction for my group \$46,710)

SCIENTIFIC LEADERSHIP

Conferences organized

Co-Chair, **California Experimental Evolution Symposium**, 2017

Chair, **UCSD-Salk Institute Biology Retreat**, annually, 2016 – 2020

Institutional administrative responsibilities

Vice Chair Biological Sciences Graduate Program	2021 – present
Graduate recruitment committee	2015 – present
Education committee	2020 – 2021
Faculty search committees	2014, 2015, 2019, 2020
Graduate admissions committee	2014 – 2015

Memberships (subset)

National Evolutionary Synthesis Center Working Group

UCSD’s Center for Microbiome Innovation

Tata Institute for Genetics and Society

Innovative Phage Applications and Therapeutics

Viral Information Institute

Society for the Study of Evolution

American Society for Microbiology

PRESENTATIONS

Invited Talks and Lectures

American Society of Virology, 2021, Virtual
TIGS Center for the Study of Active Genetics, 2020, Virtual
Biology Department, University of Missouri – St. Louis, 2020, Virtual
Biology Department, William and Mary, 2020, Virtual
Society for Advancement of Chicanos/Hispanics and Native Americans in Science, 2020, Virtual
Center for Innovative Phage Applications and Therapeutics, 2019, San Diego, CA
Nelson Hairston Jr. Retirement Symposium, 2019, Ithaca, NY
Gordon Research Conference Microbial Population Biology, 2019, Hanover, NH
American Society for Microbiology, 2019, San Francisco, CA
Memorial lecture for Dr. Shelley N. Grimes, 2019, U. Minnesota, Minneapolis, MN
Biology Department Seminar, SDSU, 2018, San Diego, CA
Plant and Microbial Biology, UC Berkeley, 2018, Berkeley, CA
BEACON Center for the Study of Evolution in Action, 2018, East Lansing, MI
TIGS Center for the Study of Active Genetics, 2018, La Jolla, CA
Ecology Behavior and Evolution Section, UC San Diego, 2017, La Jolla, CA
Ecology and Evolution Dept. Seminar, University of Chicago, 2017, Chicago IL
Systems Biology Symposium, UC Irvine, 2017, Irvine CA
Mathematics Department Seminar, Howard University, 2017, Washington DC
Microbiology and Immunology Department Seminar, U. British Columbia, 2016, Vancouver, BC
BEACON Congress meeting, Michigan State University, 2016, East Lansing, MI
Ecology and Evolution of Infectious Disease Symposium, Cornell University, 2016, Ithaca, NY
Genomic Sciences Symposium, University of Washington, 2016, Seattle, WA
Biology Department In the Lab Seminar, UCSD, 2016, La Jolla CA
Biology Department Seminar, Howard University, 2015, Washington DC
Biology Department Retreat, UCSD, 2015, Lake Arrowhead, CA
100 Years of Phage Symposium, SDSU, 2015 San Diego CA
San Diego joint Microbiology meeting, 2014, La Jolla CA
BioCircuits Seminar, UCSD, 2014 La Jolla CA
EEB Departmental Seminar and Colloquium Speaker, Cornell University, 2014 Ithaca NY
Biology Department Retreat, UCSD, 2014, Lake Arrowhead, CA
Biophysics Departmental Seminar, Massachusetts Institute for Technology, 2014 Cambridge MA
System's Biology Internal Departmental Seminar, Harvard Medical School, 2014 Boston MA
University at Albany Biology Department Seminar, Albany NY
Biennial Evergreen International Phage Meeting 2013, Olympia WA
Gordon Research Conference: Microbial Population Biology 2013, Hanover NH
Gordon Research Seminar: Microbial Population Biology 2013, Hanover NH
Society for Molecular Biology and Evolution 2013, Chicago IL
Purdue University, Dept. Biological Sciences 2013, West Lafayette IN
Quantitative Evolutionary Dynamics 2013, Teignmouth United Kingdom
Microbial Evolution Meetings at Harvard University 2012, Cambridge MA
Artificial Life 13 2012, East Lansing MI
Society for the Study of Evolution 2012, Ottawa ON
EEPB Department Washington University 2011, St. Louis MO
Ecological Society of America 2010, Pittsburgh PA
Ecological Society of America 2009, Albuquerque NM
ETH 2008, Zurich Switzerland.
ESEB 2007, Uppsala Sweden
CSEE 2007, Toronto ON
OCIB Symposium 2007, Ottawa ON
ESA 2006 Meeting, Memphis TN
Cornell University EEB Lunch Bunch, 2006, Ithaca NY

MENTORING

Postdocs

Animesh Gupta, Justin Shaver, Morgan Mouchka, Katherine Petrie

PhD Students

Elizabeth Stuart, Joshua Borin, Hannah Strobel, Animesh Gupta

MSc Students

Elijah Horwitz, Dillon Dorsey, Everardo Hegewisch-Solloa

TEACHING (professorship years)

BIEB 152 Evolution of Infectious Diseases	2016 – present	>400 students
BGGN 200 Introduction to Graduate Studies in the Biological Science	2020	~30 students
BGGN 212 Quantitative Evolutionary Biology	2017 – 2020	~15 students
Guest lecture annually for BGGN 204 (graduate level ecology and evolution, BGGN 238A (graduate level microbiology), BIMM140 (undergraduate quantitative biology), Advanced Topics in Molec and Cell Biol, and graduate student boot camp		

OUTREACH (professorship years)

Mentor for Biology Undergraduate and Master's Mentorship Program	2020 – present
Member of UC San Diego First Generation Student Organization	2017 – present
Participant and speakers for UCSD O-STEM (an LGBTQ organization)	2017 – present
Pandemic Science communication	
UCTV: Evolution of Infectious Diseases, 19 lectures	2020
UCTV: A Deep Look into the Biology of COVID19	2020
Prof. Beery Lounge, The Science of COVID19, 4 YouTube videos	2020
COVID Calls, YouTube	2021
Recruitment and a talk given at SACNAS and ABRCMs	2017, 2019, & 2020
Marshall College Mentorship Program	2015 – 2016
Recruitment lectures at HBCUs (Howard (2) and Xavier (1))	2015 – 2017
STARS Research mentor for HBCU students	2015
Volunteer, JUMA mentorship program for first generation university students	2014 – 2016