

Lawrence A. David

CONTACT INFORMATION

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EDUCATION

Massachusetts Institute of Technology	2005-2010
Ph.D., Computational & Systems Biology	
Thesis: Novel Phylogenetic Approaches to Problems in Microbial Genomics	
Columbia University	2001-2005
B.S., Biomedical Engineering, <i>summa cum laude</i>	

PROFESSIONAL EXPERIENCE

Associate Director, Duke Microbiome Center, Duke University	2017-
Assistant Professor, Biomedical Engineering, Duke University	2016-
Assistant Professor, Center for Genomic & Computational Biology, Duke University	2014-
Assistant Professor, Molecular Genetics & Microbiology, Duke University	2013-
Junior Fellow & PI, Harvard Society of Fellows - <i>Mentor:</i> Dr. Peter Turnbaugh	2010-2013
Ph.D. student, Massachusetts Institute of Technology - <i>Mentor:</i> Prof. Eric Alm	2005-2010
Undergraduate researcher, Columbia University - <i>Mentor:</i> Prof. Chris Wiggins	2002-2005

FELLOWSHIPS & AWARDS

2018 Damon Runyon-Rachleff Innovator (1 of 6 nationwide)
2018 Early-Career Systems Microbiologist, *mSystems*
2016 SN10: ScienceNews 10 Scientists to Watch
2015 Beckman Young Investigator (1 of 8 nationwide)
2015 Searle Scholar (1 of 15 nationwide)
2015 Hartwell Investigator (1 of 12 nationwide)
2014 Travel Grant, Duke-NUS Graduate Medical School
2014 Alfred P. Sloan Research Fellow (1 of 12 biologists nationwide)
2013 Whitehead Scholar, Duke University
2010 Elected Junior Fellow, Harvard Society of Fellows
2009 MIT Whitaker Health Sciences Fund Fellowship
2005 National Defense Science and Engineering Graduate Fellowship
2005 Dept. of Energy Computational Science Graduate Fellowship [declined]
2005 Ford Foundation Diversity Predoctoral Fellowship [declined]
2005 Thomas "Pop" Harrington Award, Columbia University
2005 Robert E. and Claire S. Reiss Graduate Prize, Columbia University
2004 Elected, Tau Beta Pi

2004 Barry M. Goldwater Scholarship
 2002 Westchester Filipino-American Scholarship
 2001 Columbia C.P. Davis Scholar

PUBLICATIONS

[* denotes equal contribution; current/former David Lab members underlined]

24. JD Silverman, HK Durand, RJ Bloom, S Mukherjee, **LA David**. Dynamic linear models guide design and analysis of microbiota studies within artificial human guts. *Accepted, Microbiome*, 2018.
23. AT Reese, FC Pereira, A Schintlmeister, D Berry, M Wagner, LP Hale, A Wu, S Jiang, HK Durand, Xiyu Zhou, R Premont, AM Diehl, TM O’Connell, SC Alberts, TR Kartzin, RM Pringle, RR Dunn, JP Wright, **LA David**. Mammals both induce and attenuate microbial nitrogen limitation in the large intestine. *Accepted, Nature Microbiology*, 2018.
22. A Washburne, J Silverman, J Morton, D Becker, D Crowley, S Mukherjee, **L David**, R Plowright. Phylofactorization - a graph partitioning algorithm to identify phylogenetic scales of ecological data. *Accepted, Ecological Monographs*, 2018.
21. AT Reese, EH Cho, B Klitzman, SP Nichols, NA Wisniewski, MM Villa, HK Durand, FS Midani, SN Nimmagadda, TM O’Connell, JP Wright, MA Deshusses, **LA David**. Antibiotic-induced changes in microbial respiration disrupt redox dynamics in the mouse gut. *eLife*, 7:e35987, Jun 2018.
20. FS Midani*, AA Weil*, F Chowdhury, YA Begum, AI Khan, MD Debela, HK Durand, AT Reese, SN Nimmagadda, JD Silverman, CN Ellis, ET Ryan, SB Calderwood, JB Harris, F Qadri, **LA David***, RC LaRocque*. Human Gut Microbiota Predicts Susceptibility to *Vibrio cholerae* Infection. *Journal of Infectious Diseases*, jiy192, Apr 2018.
19. **LA David**. Towards personalized control of human gut bacterial communities. *mSystems*, **3**(2) e00165-17, Mar 2018.
18. AT Reese, K Lulow, **LA David**, JP Wright. Plant community and soil conditions individually affect soil microbial community assembly in experimental mesocosms. *Ecology & Evolution*, **8**:1196-1205, Jan 2018.
17. JD Silverman, A Washburne, S Mukherjee, **LA David**. A phylogenetic transform enhances analysis of compositional microbiota data. *eLife*, 10.7554/eLife.21887, Feb 2017.
16. AD Washburne, J Silverman, JW Leff, DJ Bennett, J Darcy, S Mukherjee, N Fierer, **LA David**. Phylogenetic factorization of microbiome data yields lineage-level associations in microbiome datasets. *PeerJ*, **5**:e2969, Feb 2017.
15. Y Zhang, Y Zhao, **L David**, R Henao, L Carin. Dynamic Poisson Factor Analysis. *IEEE 16th International Conference on Data Mining*, 10.1109/ICDM.2016.0186, Dec 2016.
14. J Boursier, O Mueller, M Barret, M Machado, L Fizanne, F Araujo-Perez, C Guy, P Seed, J Rawls, **LA David**, G Hunault, F Oberti, P Cales, AM Diehl. The severity of NAFLD is associated with gut dysbiosis and shift in the metabolic function of the gut microbiota. *Hepatology*, **63**(3):764-775, Mar 2016.

13. S Wong, WZ Stephens, AR Burns, K Stagaman, **LA David**, BJM Bohannan, K Guillemin, JF Rawls. Ontogenetic Differences in Dietary Fat Influence Microbiota Assembly in the Zebrafish Gut. *mBio*, **6**(5):e00687-15, Sept 2015.
12. **LA David**, A Weil, ET Ryan, SB Calderwood, JB Harris, F Chowdhury, Y Begum, F Qadri, RC LaRocque, PJ Turnbaugh. Gut microbial succession follows acute secretory diarrhea in humans. *mBio*, **6**(3):e00381-15, May 2015.
11. **LA David**, AC Materna, J Friedman, I Baptista, MC Blackburn, A Perrotta, SE Erdman, EJ Alm. Host lifestyle affects human microbiota on daily timescales. *Genome Biol*, **15**:R89, Jul 2014.
10. **LA David**, CF Maurice, RN Carmody, DB Gootenberg, JE Button, BE Wolfe, AV Ling, AS Devlin, Y Varma, MA Fischbach, SB Biddinger, RJ Dutton, PJ Turnbaugh. Diet rapidly and reproducibly alters the gut microbiome. *Nature*, **505**(7484):559-563, Jan 2014.
9. G Szabo, SP Preheim, KM Kauffman, **LA David**, J Shapiro, EJ Alm, MF Polz. Reproducibility of *Vibrionaceae* Population Structure in Coastal Bacterioplankton. *ISME J*, **7**:509-519, Mar 2013.
8. CS Smillie*, MB Smith*, J Friedman, OX Cordero, **LA David**, EJ Alm. Ecology drives a global network of gene exchange connecting the human microbiome. *Nature*, **480**(7376):241-244, Dec 2011.
7. **LA David**, EJ Alm. Rapid evolutionary innovation during an Archean Genetic Expansion. *Nature*, **469**(7328):93-96, Jan 2011.
6. SP Preheim, Y Boucher, H Wildschutte, **LA David**, D Veneziano, EJ Alm and MF Polz. Metapopulation structure of Vibrionaceae among coastal marine invertebrates. *Environ Microbiol*, **13**:265-275, Jan 2011.
5. BJ Shapiro, **LA David**, J Friedman, EJ Alm. Looking for Darwin's footprints in the microbial world. *Trends Microbiol* **17**(5):196-204, May 2009.
4. BJ Dubin-Thaler, JM Hofman, Y Cai, H Xenias, I Spielman, AV Shneidman, **LA David**, HG Dobereiner, CH Wiggins, MP Sheetz. Quantification of Cell Edge Velocities and Traction Forces Reveals Distinct Motility Modules during Cell Spreading. *PLoS ONE*, **3**(11), Nov 2008.
3. DE Hunt*, **LA David***, D Gevers, SP Preheim, EJ Alm, MF Polz. Resource Partitioning and Sympatric Differentiation Among Closely Related Bacterioplankton. *Science*, **320**(5879):1081-85, May 2008.
2. **LA David**, CH Wiggins. Benchmarking of dynamic Bayesian Networks from stochastic time-series data. *Ann NY Acad Sci.*, **1115** 90-101, Dec 2007.
1. CF Glenn, DK Chow, **L David**, C Cooke, M Gami, W Iser, K Hanselman, I Goldberg and CA Wolkow. Behavioral deficits during early states of aging in *Caenorhabditis elegans* result from locomotory deficits possibly linked to muscle frailty. *J Gerontol A Biol Sci Med Sci.*, **59**(12):1251-60, Dec 2004.

FUNDED RESEARCH

External Support

- 2018-2021 Office of Naval Research, N00014-18-1-2616
Principal Investigator
- 2017-2019 Damon Runyon-Rachleff Innovation Award
Co-Principal Investigator (with Co-PI: Anthony Sung)
- 2017-2019 NASA NNX16A069A/T0106
Principal Investigator
- 2017-2022 NIH 1R01DK116187-01
Principal Investigator
- 2017-2018 CGIBD Pilot and Feasibility Award
Principal Investigator
- 2016-2021 NIH 1R24-DK110492-01
Co-Investigator (MPI: Rawls & Seed)
- 2016-2018 NIH 1R21-DK110496-01
Co-Investigator (PI: Valdivia)
- 2015-2019 Beckman Young Investigator Program
Principal Investigator
- 2015-2018 Searle Scholars Program
Principal Investigator
- 2015-2018 Hartwell Foundation, Individual Biomedical Research Award
Principal Investigator
- 2015-2017 National Science Foundation DDIG, DEB-1501495
Principal Investigator (Co-PIs: Aspen Reese, Justin Wright)
- 2014-2016 Alfred P. Sloan Foundation, Research Fellowship
Principal Investigator
- 2014-2015 Global Probiotics Council, Young Investigator Grant
Principal Investigator

Internal Support

- 2016-2017 Provost's Intellectual Community Planning Grant
Co-Principal Investigator (Organizer of 10 Co-PIs)
- 2016-2017 Collaborative Quantitative Approaches to Problems in Basic and Clinical Sciences,
Pilot Grant
Co-Principal Investigator (with Co-PI: Sayan Mukherjee)
- 2015-2016 Duke Center for Genomic & Computational Biology, Pilot Grant
Co-Principal Investigator (with Co-PI: Lingchong You)
- 2013-2014 Duke Center for the Genomics of Microbial Systems
Co-Principal Investigator (with Co-PI: Marc Deshusses)

2011-2012 Harvard University, Milton Fund
Principal Investigator

2011-2012 Harvard Center for AIDS Research, Feasibility Grant
Co-Principal Investigator (with Co-PI: Douglas Kwon)

MEDIA

Print and online media coverage of research includes: the BBC, Bloomberg, Boston Globe, the Daily Mail, GenomeWeb, HealthDay, LiveScience, MSNBC, National Geographic: Phenomena, the New Scientist, NPR, Prevention Magazine, Radio In Vivo (WCOM), Science Daily, Science Friday, Science News, The Scientist, Scientific American, StoryCollider, USA Today, and Wired.

PATENT

62/370,817 Compositions and Methods for Measuring Bacterial Growth, *Provisional filed* 2017

SERVICE

- Referee: *Bioinformatics, Biology Letters, BMC Bioinformatics, BMC Microbiology, Biotechnology & Bioengineering, British Journal of Nutrition, Canada Research Chair, Cell Host & Microbe, Cell Reports, Clinical Infectious Diseases, eLife, Environmental Microbiology, Genome Biology, Genome Research, Gut Microbes, InnoCentive, ISMEJ, J Clinical Investigation, mBio, Microbiome, National Science Foundation, Nature Microbiology, npj Biofilms and Microbiomes, PLoS Computational Biology, PLoS One, PLoS Pathogens, PNAS, Science Translational Medicine, Scientific Reports, Trends in Microbiology.*
- Chair: Diversity & Inclusion Committee, Duke MGM Department, 2018-
- Co-Chair: Duke Provost's Science Initiative, Genomics Subgroup, 2017-
- Committee member: Duke CBB Graduate Admissions 2013-2014, 2016-2017; Duke MGM Graduate Admissions 2014-2015; Duke UPGG Graduate Admissions 2015-2016.
- Editorial Board: Genome Magazine 2017-
- Founding member: NCBItech Microbiome Consortium 2016-
- Co-organizer: Duke GeMS Microbiome Service 2013-
- *Ad hoc* reviewer: NIH Modeling & Analysis of Biological Systems Study Section, 2017.
- Co-organizer: Duke Integrative Bioinformatics for Investigating and Engineering Microbiomes Symposium, 2017.
- Co-organizer: Duke MGM Retreat 2015-2017
- Panel member: Discussion on Interdisciplinary Training, Burroughs Wellcome Fund, 2016.
- Faculty liaison: CBB Seminar Series, 2016.
- Co-organizer: Duke GeMS Symposium, 2014.
- Instructor (1 of 4): ideSHi Genomics Workshop, International Centre for Diarrhoeal Disease Research, Bangladesh, March 3-5, 2014
- Founding member: ASM General Meeting Junior Advisory Group, 2011-2013.

MENTORSHIP

Post-doctoral Associates

- 2015- Dr. Max Villa
PhD, Materials Science & Engineering
Burroughs Wellcome Fund Postdoctoral Enrichment Program (2016) Rising Stars
in Biomedical Applications (2018)
- 2016-2017 Dr. Alex Washburne
PhD, Ecology & Evolutionary Biology
Postdoctoral Fellow, Plowright Lab, Montana State University (2017-)

Doctoral Students

- 2018- Jeffrey Letourneau
PhD Student, Molecular Genetics & Microbiology
- 2018- Brianna Petrone
MD/PhD Student
- 2017- Zachary Holmes
PhD Student, Molecular Genetics & Microbiology
Department of Defense NDSEG Fellowship (2017)
NSF Graduate Research Fellowship (2017, declined)
- 2015- Justin Silverman
MD/PhD Student, Computational Biology & Bioinformatics
- 2014- Rachael Bloom
PhD Student, University Program in Genetics & Genomics
UPGG Marcy Speer Fellowship (2014)
NSF Graduate Research Fellowship (2014)
- 2013-2018 Firas Midani
PhD Student, Computational Biology & Bioinformatics
Postdoctoral Fellow, Britton Lab, Baylor College of Medicine (2018-)
- 2013-2017 Aspen Reese
PhD Student, University Program in Ecology
NSF Graduate Research Fellowship (2014)
Department of Defense NDSEG Fellowship (2014, declined) NSF Doctoral Dissertation Improvement Grant (2015)
PI & Junior Fellow, Harvard Society of Fellows (2017-2020)

Undergraduate Students

- 2018- Savita Gupta, Neuroscience & English
- 2017-2018 Miranda Metz, Biology & Global Health
- 2015-2018 Andrew Grover, Biochemistry
- 2015-2017 Lionel Watkins, Biomedical Engineering
- 2014-2017 Anchi Wu, Biomedical Engineering
Duke Helmholtz Prize for best UG research project in BME (2017)

Duke Pratt Fellow (2015-2016)
 GCB Summer Research Fellowship (2015)
 2013-2017 Sai Nimmagadda, Biomedical Engineering
 IGSP Summer Research Fellowship (2014)
 SMIF Undergraduate User Program (2014)
 2015-2016 Vivek Sriram, Computer Science
 2013-2015 Eric Mastrolonardo, Biology
 2013-2014 Calvin Lau, Biology
 2013-2014 Olivia Lin, Biology
 2012 Noah Apthorpe (*at Harvard, supervised by Peter Turnbaugh*)
 2010 Shirley Galbiati (*at MIT, supervised by Eric Alm*) p
 2008-2010 Albert Wang (*at MIT, supervised by Eric Alm*)
 2008 Alexandra Konings (*at MIT, supervised by Eric Alm*)
 2008-2010 MacGregor F Entry (*at MIT, Graduate Resident Tutor*)

INVITED PRESENTATIONS

60. ASBMB Annual Meeting, Orlando, FL, Apr 2020
59. Precision Medicine World Conference, Duke University, Durham, NC, Sep 2019
58. CGIBD Seminar Series, UNC Chapel Hill, Chapel Hill, NC, Apr 2019
57. Pharmaceutical Sciences Conference, UNC Chapel Hill, Chapel Hill, NC, Jun 2018
56. Seminar Series, AgBiome, Research Triangle Park, NC, Dec 2017
55. 11th International Conference in Bioinformatics, Georgia Tech, Atlanta, GA, Nov 2017
54. Bioinformatics for the Microbiome Symposium, Stanford University, Palo Alto, CA, Sep 2017
53. Molecular Pathogenesis & Host Response Meeting, Cold Spring Harbor Laboratory, Cold Spring, NY, Sep 2017
52. Ecological Society of America Annual Meeting, Portland, OR, Aug 2017
51. Pharmaceutical Sciences Conference, UNC Chapel Hill, Chapel Hill, NC, May 2017
50. Precision Medicine World Conference, Duke University, Durham, NC, May 2017
49. Inflammation, Immunity, and Infectious Diseases Seminar, University of Utah, Salt Lake City, UT, May 2017
48. Microbiology Seminar, NC State University, Raleigh, NC, Mar 2017
47. RTP 180: Microbiomes, Raleigh, NC, Jan 2017
46. Triangle Microbial Interactions Seminar, Chapel Hill, NC, Dec 2016
45. Hartwell Foundation Symposium, Case Western University, Cleveland, OH, Sep 2016
44. Food-Microbiome Interaction: Implications for Human Health and Disease, Royal Society, London, UK, May 2016
43. BASF Plant Science, Research Triangle Park, NC May 2016
42. Bioinformatics and Genomics Seminar, UNC Charlotte, Charlotte, NC, Apr 2016

41. Microbiome Research in Progress Seminar, UNC Chapel Hill, Chapel Hill, NC, Mar 2016
40. First Workshop on Statistical and Algorithmic Challenges in Microbiome Data Analysis, New York, NY, Feb 2016
39. US Probiotics Scientific Board Meeting, New York, NY, Feb 2016
38. Department of Microbiology and Immunology Seminar, McGill University, Montreal, Canada, Dec 2015
37. Digestive Disease Lecture Series, University of Chicago, Chicago, IL, Nov 2015
36. Symposium on Biotechnology, University of Missouri, St. Louis, MO, Nov 2015
35. Hartwell Foundation Symposium, University of Wisconsin, Madison, WI, Sep 2015
34. HHMI Science Symposium, University of Richmond, Richmond, VA, Sep 2015 (Keynote)
33. Infectious Disease Seminar, NC State College of Veterinary Medicine, Raleigh, NC, Apr 2015
32. Duke-NUS Symposium, Duke-NUS Graduate Medical School, Singapore, Mar 2015
31. Alumni Association Board Meeting, Duke University, Durham, NC, Feb 2015
30. Biology of Populations Colloquium, Princeton University, Princeton, NJ, Dec 2014
29. Board of Trustees Meeting, Duke University, Durham, NC, Sep 2014
28. The Human and Environmental Microbiome Symposium, Duke University, Durham, NC, Sep 2014
27. The 20th International Microbial Genomes Conference, UCLA Conference Center, Lake Arrowhead, CA, Sep 2014
26. Grand Rounds, Department of Pediatrics, Duke University School of Medicine, Durham, NC, Sep 2014
25. Oral Biology Seminar Series, School of Dentistry, University of North Carolina, Chapel Hill, NC, Sep 2014
24. Grand Rounds, Department of Gastroenterology, Duke University School of Medicine, Durham, NC, Sep 2014
23. Bollum Symposium, University of Minnesota, Minneapolis, MN, May 2014
22. DCEG Fellows' Training Symposium, NIH/NCI, Bethesda, MD, Mar 2014
21. LadHyX Seminar, Ecole Polytechnique, Palaiseau, France, Feb 2014
20. Pasteur Fellowship Visiting Scholar, Institut Pasteur, Paris, France, Feb 2014
19. Duke University Program in Ecology Seminar, Durham, NC, Nov 2013
18. Duke Marine Lab Fall Seminar, Beaufort, NC, Sep 2013
17. Duke Computational Biology & Bioinformatics Seminar, Durham, NC, Sep 2013
16. Duke Genomic and Personalized Medicine Forum, Durham, NC, Sep 2013
15. Duke University Program in Genetics & Genomics Seminar, Durham, NC, Sep 2013
14. Genomics Standards Consortium 15, Bethesda, MD, Apr 2013
13. Museum of Science, Boston, MA, Mar 2013
12. National Institute of Health, Manila, Philippines, Feb 2013

11. Civil & Environmental Engineering Seminar, Duke University, Durham, NC, Dec 2012
10. icddr,b Seminar, Dhaka, Bangladesh, Aug 2012
9. International Research in Infectious Diseases Annual Meeting, Bethesda, MD, May 2012
8. MIT Synthetic Biology Lunch, Cambridge, MA, Apr 2012
7. Northeastern University, Boston, MA, Mar 2012
6. Memorial Sloan-Kettering Cancer Center, New York, NY, Feb 2012
5. Duke University, Durham, NC, Feb 2012
4. University of North Carolina, Chapel Hill, NC, Feb 2012
3. Microbiome Research in the Boston Area Seminar, Boston, MA, Oct 2011
2. Microbiome Seminar, New York University, New York, NY, Oct 2011
1. Paleobiology in the Genomics Era Conference, JCVI, San Diego, CA, May 2011
0. Quantitative Biology Workshop, MIT, Jan 2011
- 1. Ginkgo BioWorks, Boston, MA, Mar 2010