



Elizabeth Costello

Basic Life Research Scientist, Medicine - Med/Infectious Diseases

SUPERVISORS

- David Relman

Bio

HONORS AND AWARDS

- Walter V. and Idun Berry Postdoctoral Fellowship, Stanford University (2009-2013)
- K99 Pathway to Independence Award, NIH/NICHHD (2013-2016)

EDUCATION AND CERTIFICATIONS

- Postdoc, Stanford University (2013)
- Postdoc, University of Colorado Boulder (2009)
- PhD, University of Colorado Boulder (2007)
- BS, Cornell University (1999)

LINKS

- Relman Lab: <https://med.stanford.edu/relmanlab.html>

Publications

PUBLICATIONS

- **Effects of parental care on skin microbial community composition in poison frogs.** *eLife*
Fischer, M. T., Xue, K. S., Costello, E. K., Dvorak, M., Raboisson, G., Robaczewska, A., Caty, S. N., Relman, D. A., O'Connell, L. A.
2025; 14
- **Sub-communities of the vaginal microbiota in pregnant and non-pregnant women.** *Proceedings. Biological sciences*
Symul, L., Jeganathan, P., Costello, E. K., France, M., Bloom, S. M., Kwon, D. S., Ravel, J., Relman, D. A., Holmes, S.
2023; 290 (2011): 20231461
- **Abrupt perturbation and delayed recovery of the vaginal ecosystem following childbirth.** *Nature communications*
Costello, E. K., DiGiulio, D. B., Robaczewska, A., Symul, L., Wong, R. J., Shaw, G. M., Stevenson, D. K., Holmes, S. P., Kwon, D. S., Relman, D. A.
2023; 14 (1): 4141
- **Rookery through rehabilitation: Microbial community assembly in newborn harbour seals after maternal separation.** *Environmental microbiology*
Switzer, A. D., Callahan, B. J., Costello, E. K., Bik, E. M., Fontaine, C., Gulland, F. M., Relman, D. A.
2023
- **Early prediction and longitudinal modeling of preeclampsia from multiomics.** *Patterns (New York, N.Y.)*

- Maric, I., Contrepois, K., Moufarrej, M. N., Stelzer, I. A., Feyaerts, D., Han, X., Tang, A., Stanley, N., Wong, R. J., Traber, G. M., Ellenberger, M., Chang, A. L., Fallahzadeh, et al
2022; 3 (12): 100655
- **Short-Term Dairy Product Elimination and Reintroduction Minimally Perturbs the Gut Microbiota in Self-Reported Lactose-Intolerant Adults.** *mBio*
Smith, C. J., Dethlefsen, L., Gardner, C., Nguyen, L., Feldman, M., Costello, E. K., Kolodny, O., Relman, D. A.
2022: e0105122
 - **Characterizing the oral and distal gut microbiota of the threatened southern sea otter (*Enhydra lutris nereis*) to enhance conservation practice.** *Conservation science and practice*
Dudek, N. K., Switzer, A. D., Costello, E. K., Murray, M. J., Tomoleoni, J. A., Staedler, M. M., Tinker, M. T., Relman, D. A.
2022; 4 (4)
 - **The human gut microbiome and health inequities.** *Proceedings of the National Academy of Sciences of the United States of America*
Amato, K. R., Arrieta, M., Azad, M. B., Bailey, M. T., Broussard, J. L., Bruggeling, C. E., Claud, E. C., Costello, E. K., Davenport, E. R., Dutilh, B. E., Swain Ewald, H. A., Ewald, P., Hanlon, et al
2021; 118 (25)
 - **Microbiota assembly, structure, and dynamics among Tsimane horticulturalists of the Bolivian Amazon.** *Nature communications*
Sprockett, D. D., Martin, M., Costello, E. K., Burns, A. R., Holmes, S. P., Gurven, M. D., Relman, D. A.
2020; 11 (1): 3772
 - **Complete Genome Sequences of Six *Lactobacillus iners* Strains Isolated from the Human Vagina.** *Microbiology resource announcements*
France, M. T., Rutt, L. n., Narina, S. n., Arbaugh, S. n., McComb, E. n., Humphrys, M. S., Ma, B. n., Hayward, M. R., Costello, E. K., Relman, D. A., Kwon, D. S., Ravel, J. n.
2020; 9 (20)
 - **Replication and refinement of a vaginal microbial signature of preterm birth in two racially distinct cohorts of US women.** *Proceedings of the National Academy of Sciences of the United States of America*
Callahan, B. J., DiGiulio, D. B., Goltsman, D. S., Sun, C. L., Costello, E. K., Jeganathan, P. n., Biggio, J. R., Wong, R. J., Druzin, M. L., Shaw, G. M., Stevenson, D. K., Holmes, S. P., Relman, et al
2017
 - **Candidatus *Mycoplasma girerdii* replicates, diversifies, and co-occurs with *Trichomonas vaginalis* in the oral cavity of a premature infant.** *Scientific reports*
Costello, E. K., Sun, C. L., Carlisle, E. M., Morowitz, M. J., Banfield, J. F., Relman, D. A.
2017; 7 (1): 3764
 - **Marine mammals harbor unique microbiotas shaped by and yet distinct from the sea.** *Nature communications*
Bik, E. M., Costello, E. K., Switzer, A. D., Callahan, B. J., Holmes, S. P., Wells, R. S., Carlin, K. P., Jensen, E. D., Venn-Watson, S., Relman, D. A.
2016; 7: 10516-?
 - **Temporal and spatial variation of the human microbiota during pregnancy.** *Proceedings of the National Academy of Sciences of the United States of America*
DiGiulio, D. B., Callahan, B. J., McMurdie, P. J., Costello, E. K., Lyell, D. J., Robaczewska, A., Sun, C. L., Goltsman, D. S., Wong, R. J., Shaw, G., Stevenson, D. K., Holmes, S. P., Relman, et al
2015
 - **Population health: immaturity in the gut microbial community.** *Nature*
Costello, E. K., Relman, D. A.
2014; 510 (7505): 344-345
 - **Genetically dictated change in host mucus carbohydrate landscape exerts a diet-dependent effect on the gut microbiota** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Kashyap, P. C., Marcobal, A., Ursell, L. K., Smits, S. A., Sonnenburg, E. D., Costello, E. K., Higginbottom, S. K., Domino, S. E., Holmes, S. P., Relman, D. A., Knight, R., Gordon, J. I., Sonnenburg, et al
2013; 110 (42): 17059-17064
 - **Biphasic assembly of the murine intestinal microbiota during early development.** *ISME journal*
Pantoja-Feliciano, I. G., Clemente, J. C., Costello, E. K., Perez, M. E., Blaser, M. J., Knight, R., Dominguez-Bello, M. G.

2013; 7 (6): 1112-1115

- **Distinct Distal Gut Microbiome Diversity and Composition in Healthy Children from Bangladesh and the United States** *PLOS ONE*
Lin, A., Bik, E. M., Costello, E. K., Dethlefsen, L., Haque, R., Relman, D. A., Singh, U.
2013; 8 (1)
- **Time series community genomics analysis reveals rapid shifts in bacterial species, strains, and phage during infant gut colonization** *GENOME RESEARCH*
Sharon, I., Morowitz, M. J., Thomas, B. C., Costello, E. K., Relman, D. A., Banfield, J. F.
2013; 23 (1): 111-120
- **Microbiome assembly across multiple body sites in low-birthweight infants.** *mBio*
Costello, E. K., Carlisle, E. M., Bik, E. M., Morowitz, M. J., Relman, D. A.
2013; 4 (6): e00782-13
- **Cohabiting family members share microbiota with one another and with their dogs.** *eLife*
Song, S. J., Lauber, C., Costello, E. K., Lozupone, C. A., Humphrey, G., Berg-Lyons, D., Caporaso, J. G., Knights, D., Clemente, J. C., Nakielny, S., Gordon, J. I., Fierer, N., Knight, et al
2013; 2
- **Distinct cutaneous bacterial assemblages in a sampling of South American Amerindians and US residents** *ISME JOURNAL*
Blaser, M. J., Dominguez-Bello, M. G., Contreras, M., Magris, M., Hidalgo, G., Estrada, I., Gao, Z., Clemente, J. C., Costello, E. K., Knight, R.
2013; 7 (1): 85-95
- **The Application of Ecological Theory Toward an Understanding of the Human Microbiome** *SCIENCE*
Costello, E. K., Stagaman, K., Dethlefsen, L., Bohannan, B. J., Relman, D. A.
2012; 336 (6086): 1255-1262
- **Sources of Bacteria in Outdoor Air across Cities in the Midwestern United States** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*
Bowers, R. M., Sullivan, A. P., Costello, E. K., Collett, J. L., Knight, R., Fierer, N.
2011; 77 (18): 6350-6356
- **Minimum information about a marker gene sequence (MIMARKS) and minimum information about any (x) sequence (MIxS) specifications** *NATURE BIOTECHNOLOGY*
Yilmaz, P., Kottmann, R., Field, D., Knight, R., Cole, J. R., Amaral-Zettler, L., Gilbert, J. A., Karsch-Mizrachi, I., Johnston, A., Cochrane, G., Vaughan, R., Hunter, C., Park, et al
2011; 29 (5): 415-420
- **Supervised classification of human microbiota** *FEMS MICROBIOLOGY REVIEWS*
Knights, D., Costello, E. K., Knight, R.
2011; 35 (2): 343-359
- **Strain-resolved community genomic analysis of gut microbial colonization in a premature infant** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Morowitz, M. J., Deneff, V. J., Costello, E. K., Thomas, B. C., Poroyko, V., Relman, D. A., Banfield, J. F.
2011; 108 (3): 1128-1133
- **Global patterns in the biogeography of bacterial taxa** *ENVIRONMENTAL MICROBIOLOGY*
Nemergut, D. R., Costello, E. K., Hamady, M., Lozupone, C., Jiang, L., Schmidt, S. K., Fierer, N., Townsend, A. R., Cleveland, C. C., Stanish, L., Knight, R.
2011; 13 (1): 135-144
- **Moving pictures of the human microbiome** *GENOME BIOLOGY*
Caporaso, J. G., Lauber, C. L., Costello, E. K., Berg-Lyons, D., Gonzalez, A., Stombaugh, J., Knights, D., Gajer, P., Ravel, J., Fierer, N., Gordon, J. I., Knight, R.
2011; 12 (5)
- **The bacterial microbiota in the oral mucosa of rural Amerindians** *MICROBIOLOGY-SGM*
Contreras, M., Costello, E. K., Hidalgo, G., Magris, M., Knight, R., Dominguez-Bello, M. G.
2010; 156: 3282-3287

- **Postprandial remodeling of the gut microbiota in Burmese pythons** *ISME JOURNAL*
Costello, E. K., Gordon, J. I., Secor, S. M., Knight, R.
2010; 4 (11): 1375-1385
- **Delivery mode shapes the acquisition and structure of the initial microbiota across multiple body habitats in newborns** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Dominguez-Bello, M. G., Costello, E. K., Contreras, M., Magris, M., Hidalgo, G., Fierer, N., Knight, R.
2010; 107 (26): 11971-11975
- **QIIME allows analysis of high-throughput community sequencing data** *NATURE METHODS*
Caporaso, J. G., Kuczynski, J., Stombaugh, J., Bittinger, K., Bushman, F. D., Costello, E. K., Fierer, N., Pena, A. G., Goodrich, J. K., Gordon, J. I., Huttley, G. A., Kelley, S. T., Knights, et al
2010; 7 (5): 335-336
- **Forensic identification using skin bacterial communities** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Fierer, N., Lauber, C. L., Zhou, N., McDonald, D., Costello, E. K., Knight, R.
2010; 107 (14): 6477-6481
- **Direct sequencing of the human microbiome readily reveals community differences** *GENOME BIOLOGY*
Kuczynski, J., Costello, E. K., Nemergut, D. R., Zaneveld, J., Lauber, C. L., Knights, D., Koren, O., Fierer, N., Kelley, S. T., Ley, R. E., Gordon, J. I., Knight, R.
2010; 11 (5)
- **Bacterial Community Variation in Human Body Habitats Across Space and Time** *SCIENCE*
Costello, E. K., Lauber, C. L., Hamady, M., Fierer, N., Gordon, J. I., Knight, R.
2009; 326 (5960): 1694-1697
- **Regulation of myocardial ketone body metabolism by the gut microbiota during nutrient deprivation** *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCES OF THE UNITED STATES OF AMERICA*
Crawford, P. A., Crowley, J. R., Sambandam, N., Muegge, B. D., Costello, E. K., Hamady, M., Knight, R., Gordon, J. I.
2009; 106 (27): 11276-11281
- **Soil CO₂ flux and photoautotrophic community composition in high-elevation, 'barren' soil** *ENVIRONMENTAL MICROBIOLOGY*
Freeman, K. R., Pescador, M. Y., Reed, S. C., Costello, E. K., Robeson, M. S., Schmidt, S. K.
2009; 11 (3): 674-686
- **Fumarole-Supported Islands of Biodiversity within a Hyperarid, High-Elevation Landscape on Socompa Volcano, Puna de Atacama, Andes** *APPLIED AND ENVIRONMENTAL MICROBIOLOGY*
Costello, E. K., Halloy, S. R., Reed, S. C., Sowell, P., Schmidt, S. K.
2009; 75 (3): 735-747
- **Environmental DNA sequencing primers for eutardigrades and bdelloid rotifers.** *BMC ecology*
Robeson, M. S., Costello, E. K., Freeman, K. R., Whiting, J., Adams, B., Martin, A. P., Schmidt, S. K.
2009; 9: 25-?
- **The earliest stages of ecosystem succession in high-elevation (5000 metres above sea level), recently deglaciated soils** *PROCEEDINGS OF THE ROYAL SOCIETY B-BIOLOGICAL SCIENCES*
Schmidt, S. K., Reed, S. C., Nemergut, D. R., Grandy, A. S., Cleveland, C. C., Weintraub, M. N., Hill, A. W., Costello, E. K., Meyer, A. F., Neff, J. C., Martin, A. M.
2008; 275 (1653): 2793-2802
- **Biogeochemical consequences of rapid microbial turnover and seasonal succession in soil** *ECOLOGY*
Schmidt, S. K., Costello, E. K., Nemergut, D. R., Cleveland, C. C., Reed, S. C., Weintraub, M. N., Meyer, A. F., Martin, A. M.
2007; 88 (6): 1379-1385
- **Microbial diversity in alpine tundra wet meadow soil: novel Chloroflexi from a cold, water-saturated environment** *ENVIRONMENTAL MICROBIOLOGY*
Costello, E. K., Schmidt, S. K.
2006; 8 (8): 1471-1486

- **Structure and function of alpine and arctic soil microbial communities** *RESEARCH IN MICROBIOLOGY*
Nemergut, D. R., Costello, E. K., Meyer, A. F., Pescador, M. Y., Weintraub, M. N., Schmidt, S. K.
2005; 156 (7): 775-784
- **The rate and pattern of cladogenesis in microbes** *EVOLUTION*
Martin, A. P., Costello, E. K., Meyer, A. F., Nemergut, D. R., Schmidt, S. K.
2004; 58 (5): 946-955