

Kevin Bonham, Ph.D.

Senior Research Scientist

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Education

2008 - 2014 | **Harvard - Cambridge, MA**
PhD in Immunology
Thesis: Cellular and Biochemical Events in Toll-like Receptor Signaling

2002 - 2006 | **University of California, San Diego**
BS Cum laude in Biochemistry and Cell Biology

Research Positions

Jan 2019 - Present | **Wellesley College – Wellesley, MA**
Senior Research Scientist
Promoted from Research Scientist to Senior RS in March, 2021.
Projects:

- ECHO - Longitudinal cohort of child brain development and the microbiome
- GaPLAC - Gaussian Process modeling software tool for microbiome analysis
- BISC195 - Essential Skills for Computational biology course
- *B. infantis* human milk oligosaccharide (HMO) utilization

May 2017 - Dec 2018 | **Broad Institute and Harvard T.H. Chan School of Public Health – Boston, MA**
Postdoctoral Fellow - Huttenhower Lab
Projects:

- Human microbiome associations with inflammatory arthritis
- Human Microbiome Project phase 2 (HMP-II)
- Workshops for utilization of bioBakery tools

May 2014 - Apr 2017 | **Harvard University and UCSD – Cambridge, MA**
Postdoctoral Fellow - Dutton Lab
Project: Horizontal gene transfer (HGT) in cheese-associated bacteria

Sep 2008 - Apr 2014 | **Boston Children's Hospital – Boston, MA**
Graduate Research Assistant - Kagan Lab
Project: Cellular localization and function of TIRAP in endosomal Toll-like receptor (TLR) signaling

May 2006 - Aug 2008 | **Scripps Research Institute – La Jolla, CA**
Lab Manager, Research Technician - Mowen Lab
Project: Small molecule inhibitors of protein arginine methyl transferases (PRMTs) in T-cell signaling

Honors and Awards

- 2014 | Jeffry Modell Immunology Prize
- 2003 - 2006 | Provost's Honor
- 2002 - 2006 | UCSD Millenium Scholarship

Research Funding

Current

- 2021 - present | **Co-Investigator on Wellcome LEAP 1kD**
A multi-scale approach to characterizing developing executive function

Past

- 2018-2019 | **Sloan Foundation - JuliaLang Diversity and Inclusion Award**
Increasing Representation of Women in Computational Biology
- 2009 - 2013 | **NSF Graduate Research Fellowship** *Integration of Distinct Signaling Pathways: Toll-like Receptors and Cytokine-Activated Macrophages*

Major Research Interests

1. Dynamics of microbial communities
2. Human microbiome epidemiology
3. Computational and statistical methods for longitudinal microbiome research

Narrative report

Microbial communities exist in a multitude of environments, including in and on animal hosts, and have enormous impact on biotic and abiotic systems. These communities are also dynamic, necessitating statistical models that capture complex and interdependent changes *over time*. My current focus is on understanding the role of the human microbiome in the neurocognitive development of human children, and on developing software tools that facilitate investigation of longitudinal microbiome data.

Publications

* indicates co-first authorship.

† indicates corresponding authorship.

- In review |
 1. **Bonham, K. S.**, McCann, S. H., Rowland, S., Volpe, A. R., Dyer, K., D'Sa, V., Deoni, S. C. L. & Klepac-Ceraj, V. A longitudinal dataset of childhood gut microbiome linked with cognitive evaluation. *Nature Scientific Data*.
 2. * Thompson, K. N., **Bonham, K. S.**, *et al.* Alterations in the gut microbiome in inflammatory arthritis implicate key taxa and metabolic pathways across arthritis phenotypes. *Nature Microbiology*.

- 2021 | 3. Gauthier, A. E., Chandler, C. E., *et al.* Deep-sea microbes as tools to refine the rules of innate immune pattern recognition. en. *Sci Immunol* **6** (Mar. 2021).
4. Lewis, C. R., **Bonham, K. S.**, McCann, S. H., Volpe, A. R., D'Sa, V., Naymik, M., De Both, M. D., Huentelman, M. J., Lemery-Chalfant, K., Highlander, S. K., Deoni, S. C. L. & Klepac-Ceraj, V. Family SES Is Associated with the Gut Microbiome in Infants and Children. en. *Microorganisms* **9**, 1608 (July 2021).
5. Peterson, D., **Bonham, K. S.**, Rowland, S., Pattanayak, C. W., RESONANCE Consortium & Klepac-Ceraj, V. Comparative Analysis of 16S rRNA Gene and Metagenome Sequencing in Pediatric Gut Microbiomes. en. *Front. Microbiol.* **12**, 670336 (July 2021).
6. * Tso, L., **Bonham, K. S.**, Fishbein, A., Rowland, S. & Klepac-Ceraj, V. Targeted High-Resolution Taxonomic Identification of *Bifidobacterium longum* subsp. *infantis* Using Human Milk Oligosaccharide Metabolizing Genes. en. *Nutrients* **13**, 2833 (Aug. 2021).
- 2020 | 8. **Bonham, K. S.**, Bruchhage, M. M. K., Rowland, S., Volpe, A. R., Dyer, K., RESONANCE Consortium, D'Sa, V., Huttenhower, C., Deoni, S. C. L. & Klepac-Ceraj, V. Gut microbes and their genes are associated with brain development and cognitive function in healthy children. en. *bioRxiv*, 2020.02.13.944181 (June 2020).
- 2019 | 13. Lloyd-Price, J., Arze, C., *et al.* Multi-omics of the gut microbial ecosystem in inflammatory bowel diseases. en. *Nature* **569**, 655–662 (May 2019).
16. Tett, A., Huang, K. D., *et al.* The *Prevotella copri* Complex Comprises Four Distinct Clades Underrepresented in Westernized Populations. en. *Cell Host Microbe* **26**, 666–679.e7 (Nov. 2019).
- 2017 | 19. † **Bonham, K. S.** & Stefan, M. I. Women are underrepresented in computational biology: An analysis of the scholarly literature in biology, computer science and computational biology. en. *PLoS Comput. Biol.* **13**, e1005134 (Oct. 2017).
20. **Bonham, K. S.**, Wolfe, B. E. & Dutton, R. J. Extensive horizontal gene transfer in cheese-associated bacteria. en. *Elife* **6** (June 2017).
- 2015 | 23. Brubaker, S. W., **Bonham, K. S.**, Zanoni, I. & Kagan, J. C. Innate immune pattern recognition: a cell biological perspective. en. *Annu. Rev. Immunol.* **33**, 257–290 (Jan. 2015).
- 2014 | 24. **Bonham, K. S.** & Kagan, J. C. Endosomes as platforms for NOD-like receptor signaling. en. *Cell Host Microbe* **15**, 523–525 (May 2014).
25. **Bonham, K. S.**, Orzalli, M. H., Hayashi, K., Wolf, A. I., Glanemann, C., Weninger, W., Iwasaki, A., Knipe, D. M. & Kagan, J. C. A promiscuous lipid-binding protein diversifies the subcellular sites of toll-like receptor signal transduction. *Cell* **156**, 705–716 (2014).
- 2010 | 27. **Bonham, K. S.**, Hemmers, S., Lim, Y.-H., Hill, D. M., Finn, M. G. & Mowen, K. A. Effects of a novel arginine methyltransferase inhibitor on T-helper cell cytokine production. *FEBS J.* **277**, 2096–2108 (2010).
28. Fathman, J. W., Gurish, M. F., Hemmers, S., **Bonham, K. S.**, Friend, D. S., Grusby, M. J., Glimcher, L. H. & Mowen, K. A. NIP45 controls the magnitude of the type 2 T helper cell response. en. *Proc. Natl. Acad. Sci. U. S. A.* **107**, 3663–3668 (Feb. 2010).

Presentations

Invited Talks

- 2019 | **Wellesley Science Center Faculty Seminar - Wellesley, MA**
The role of human gut microbial communities in the neurocognitive development of children
- JuliaCon - Baltimore, MD**
Raising Diversity and Inclusion among Julia users
with Anna Harris and Elwin van t' Wout
- 2018 | **HSPH Biostatistics Retreat - Boston, MA**
Strain-resolved microbial profiling in inflammatory arthritis
- 2016 | **Bowdoin College Biology Department Seminar - Brunswick, ME**
Extensive horizontal gene transfer in cheese-associated bacteria

Workshops Taught

- 2018 | **Juvenile Diabetes Research Foundation Microbiome Initiative - Cambridge, MA**
The bioBakery for human microbiome epidemiology
- Wageningen University - Wageningen, Netherlands**
Creating Effective Graphics for Scientific Presentations
- SETAC, North Atlantic Chapter - Durham, NH**
Creating Effective Graphics for Scientific Presentations
- Physalia Microbiome Analysis, Berlin DE**
Taxonomic profiling with MetaPhlan
Functional profiling with HUMAnN
Targeted functional profiling with ShortBRED
Searching for horizontal gene transfer with WAAFL
- 2017 | **ACM Conference on Bioinformatics, Computational Biology, and Health Informatics - Boston, MA**
Workshop on Algorithms in Bioinformatics - HUMAnN2
- PEGS Summit - Boston, MA**
Immunology for Drug Discovery Scientists
- 2016 | **PEGS Summit - Boston, MA**
Immunology for Drug Discovery Scientists

Conference Posters

Since 2014

- 2020 | 7. **Bonham, K. S.**, Bruchhage, M., Rowland, S., Volpe, A., Dyer, K., D'Sa, V., Huttenhower, C., Deoni, S. & Klepac-Ceraj, V. *Gut microbes and their genes are associated with brain development and cognitive function in healthy children.* June 2020.
9. Peterson, D., Rowland, S., **Bonham, K. S.** & Klepac-Ceraj, V. *Comparing early childhood gut microbiomes obtained from 16S rRNA gene and metagenome sequencing.* July 2020.
10. Tso, L., **Bonham, K. S.**, Rowland, S. & Klepac-Ceraj, V. *Baby steps: Characterizing Bifidobacterium longum subsp. infantis and its presence in American infants.* June 2020.
11. Tso, L., **Bonham, K. S.**, Rowland, S. & Klepac-Ceraj, V. *Baby steps: Characterizing Bifidobacterium longum subsp. infantis and its presence in American infants.* July 2020.

- 2019 | 12. **Bonham, K. S.**, Rowland, S., Bruchhage, M., D'Sa, V., Huttehnow, C., Deoni, S. & Klepac-Ceraj, V. *The relationship of the gut microbiome, environmental exposure and neurocognitive development in infants and children* May 2019.
14. Peterson, D., Rowland, S., Tso, L., **Bonham, K. S.**, Bruchhage, M., D'Sa, V., Huttehnow, C. & Klepac-Ceraj, V. *The relationship of the gut microbiome, environmental exposures, and neurocognitive development in infants and children* Mar. 2019.
15. Rowland, S., **Bonham, K. S.**, Bruchhage, M., D'Sa, V., Huttehnow, C., Deoni, S. & Klepac-Ceraj, V. *The early childhood gut microbiome, environmental exposures, and neurocognitive development.* June 2019.
- 2018 | 17. **Bonham, K. S.**, Peterson, D., Tso, L., Rowland, S., Deoni, S., Huttenhower, C. & Klepac-Ceraj, V. *The role of the gut microbiome in early childhood cognitive development* Sept. 2018.
18. **Bonham, K. S.**, Franzosa, E. A., Sayoldin, B., Ilott, N. E., Fehlner-Peach, H., Bullers, S., Littman, D. R., Young, S. P., Raza, K., Powrie, F. & Huttenhower, C. *Strain-resolved microbial and metabolomic profiling in inflammatory arthritis* Jan. 2018.
- 2017 | 21. **Bonham, K. S.**, Wolfe, B. E. & Dutton, R. J. *Extensive horizontal transfer in cheese-associated bacteria* Mar. 2017.
- 2015 | 22. **Bonham, K. S.**, Wolfe, B. E. & Dutton, R. J. *Extensive horizontal transfer in cheese-associated bacteria* May 2015.
- 2014 | 26. **Bonham, K. S.**, Wolfe, B. E. & Dutton, R. J. *Identifying horizontal transfer in cheese-associated bacteria* May 2014.

Teaching

Positions

- May 2016 - Apr 2017 | **Harvard Medical School – Boston, MA**
Course Lead - Harvard Medical School Online
 Course: Biochemistry Fundamentals
- May 2014 - Apr 2016 | **Harvard Medical School – Boston, MA**
Instructor in Microbiology and Immunobiology, Curriculum Fellow
 Role: Founding instructor for HMS Masters of Medical Science in Immunology. Designed and taught 2 courses:
 - Research Methods in Experimental Immunology
 - Understanding Immunology Literature
- Spring 2015 | **Harvard Extension School – Cambridge, MA**
Instructor
 Course: Viruses: Molecular machines existing on the boundaries of life
- Spring 2012, 2014 | **Emmerson College – Boston, MA**
Adjunct Professor
 Course: Plagues and Pandemics

Graduate Courses

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|-----------|---|
| 2018 | Harvard T.H. Chan School of Public Health - Boston, MA
<i>BST273 - Introduction to programming</i>
Co-taught with Eric Franzosa. |
| 2014-2016 | Harvard Medical School - Boston, MA
<i>IMM701 - Research Methods in Experimental Immunology</i> |
| 2014-2016 | Harvard Medical School - Boston, MA
<i>IMM703 - Understanding Immunology Literature</i> |

Undergraduate Courses

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| 2021 | Wellesley College - Wellesley, MA
<i>BISC195 - Essential skills for computational biology</i> |
| 2016-2017 | Harvard Medical School Online - Boston, MA
<i>Biochemistry essentials</i> |
| 2015 | Harvard Extension School - Cambridge, MA
<i>BIOS E-157 - Viruses: A molecular arms race</i> |
| 2013, 2014 | Emmerson College - Boston, MA
<i>SC214 - Plagues and Pandemics</i> |

Open Source

Package Author

- | | |
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| 2020-present | GaPLAC - bioBakery
http://github.com/biobakery/GaPLAC <ul style="list-style-type: none">• Gaussian Process (GP) command line tool• Ideal for longitudinal data, especially when sampled at irregular intervals• Use GLM model-like syntax for specifying formula |
| 2016-present | Microbiome.jl - BioJulia
http://github.com/BioJulia/Microbiome.jl <ul style="list-style-type: none">• Data structures for biosamples, sample features (eg taxa)• Attaching metadata to biosamples• Data structures for taxonomic and community profiles• Interfaces with statistical packages (eg <code>Distances.jl</code> and <code>Hclust.jl</code>) BiobakeryUtils.jl - BioJulia
http://github.com/BioJulia/BiobakeryUtils.jl <ul style="list-style-type: none">• Utilities for I/O of file types used with bioBakery tools• Plotting utilities |
| 2014-2016 | Kvasier - Dutton Lab
https://github.com/DuttonLab/kvasir <ul style="list-style-type: none">• Python-based command line tool for HGT discovery• Stores genomic information, BLAST hits in MongoDB• API for reading genomes, performing search, and generating tables |

Package Maintainer

2017-present	Co-founder, BioJulia http://github.com/BioJulia/ YAML.jl - JuliaData http://github.com/JuliaData/YAML.jl
2018-present	ClusterManagers.jl - JuliaParallel https://github.com/JuliaParallel/ClusterManagers.jl
2020-present	PowerAnalysis.jl https://github.com/johnmyleswhite/PowerAnalysis.jl

Package Contributor

2021	Franklin.jl - https://github.com/tlienart/Franklin.jl <ul style="list-style-type: none">• #817 Add option to pass default value to pagevar• #809 Add note on trailing backslash in inline code• #802 A couple of missed <code>_html_parts</code> LoggingExtras.jl - https://github.com/JuliaLogging/LoggingExtras.jl <ul style="list-style-type: none">• #44 Reexport <code>Logging.jl</code> EcoBase.jl - https://github.com/EcoJulia/EcoBase.jl <ul style="list-style-type: none">• #17 Make assemblage printing customizable
2020	Julia - https://github.com/JuliaLang/julia <ul style="list-style-type: none">• #38878 Add <code>getindex</code> methods for <code>NamedTuple</code> DataFrames.jl - https://github.com/JuliaData/DataFrames.jl <ul style="list-style-type: none">• #2548 Zero after decimal• #2547 Optional args style• #2546 Spaces after commas• #2447 Implement <code>permutedims</code> CSV.jl - https://github.com/JuliaData/CSV.jl <ul style="list-style-type: none">• #764 add 0 and 1 to default false/true strings Documenter.jl - https://github.com/JuliaDocs/Documenter.jl <ul style="list-style-type: none">• #1284 Add example admonition css to example build Literate.jl - https://github.com/fredrikekre/Literate.jl <ul style="list-style-type: none">• #99 Add RISE examples to output formats and <code>example.jl</code> LightGraphs.jl - https://github.com/JuliaGraphs/LightGraphs.jl <ul style="list-style-type: none">• #1367 Update ancient <code>Dict</code> syntax SQLite.jl - https://github.com/JuliaDatabases/SQLite.jl <ul style="list-style-type: none">• #208 Add <code>analyze kwarg</code> to <code>load!</code>• #195 Docs cleanup

- 2019 | **StatsPlots.jl** - <https://github.com/JuliaPlots/StatsPlots.jl>
- #243 Add hclust heatmap and optimal order
 - #231 Drop older versions of plots
 - #230 Add ordinations (MDS and PCA)
 - #229 Plot recipe for MDS from MultivariateStats.jl
 - #228 General registry compatibility
- Documenter.jl** - <https://github.com/JuliaDocs/Documenter.jl>
- #1025 Add option to change working directory for evaluation of example code
- DataDeps.jl** - <https://github.com/oxinabox/DataDeps.jl>
- #90 Fix findfirst syntax
- Clustering.jl** - <https://github.com/JuliaStats/Clustering.jl>
- #170 Add optimal ordering methods
- language-weave** - <https://github.com/JunoLab/language-weave>
- #19 Add Documenter compatibility
- 2018 | **Colors.jl** - <https://github.com/JuliaGraphics/Colors.jl>
- #329 Use ReshapedArray for show
- Julia** - <https://github.com/JuliaLang/julia>
- #29679 Add isnothing
- DataFrames.jl** - <https://github.com/JuliaData/DataFrames.jl>
- #1475 Matrix coversion method
- StatsPlots.jl** - <https://github.com/JuliaPlots/StatsPlots.jl>
- #243 Grouped box- and violin plots
- SpatialEcology.jl** - <https://github.com/EcoJulia/SpatialEcology.jl>
- #27 Update for 0.7
- 2017 | **Distances.jl** - <https://github.com/JuliaStats/Distances.jl>
- #76 Add Bray-Curtis
- BioSequences.jl** - <https://github.com/BioJulia/BioSequences.jl>
- #19 Add minhash function for generic reader
- Bio.jl** - <https://github.com/BioJulia/Bio.jl>
- #415 Genomic distances using MASH

Outreach

Online Publications

- 2014-2019 | **Co-founder of “Emmunity.org”**
Co-Host of the podcast Audiommunity
- 2014-Present | **Creator: Adobe Illustrator for Scientists tutorial videos (youtube)**

2013-2016

Blogger: “Food Matters” Scientific American Blogs

Notable posts (links included):

- What’s in your poo?
- Time is the enemy, unless it’s colonic transfer time
- Antibiotics and Obesity—an Unexpected Casualty in the War on Microbes
- My new fermentation obsession
- Probiotics, the immune system, and mouse balls

2009-2013

Founder: “We, Beasties,” ScienceBlogs.com

Notable posts (links included):

- Snow, cold, influenza and colds - Temperature and Infectious Disease
- Ebola Outbreak in Uganda - Both More and Less Frightening Than You Think
- The future of science publishing
- Autoimmunity to spunk
- A Bitter Sweet Nobel - Beutler, Janeway, and the Dawn of Innate Immunity

Other

2016

Panel Moderator: Boston Fermentation Festival

2015

Presenter: Boston Science Museum Health Science Fair

2009-2013

Lecturer: Harvard Science in the News (SITN).

- Autoimmunity and Disease: When the Body Attacks Itself (2009)
- Our Microbial Organ: The Good and Bad Bugs of The Human Gut (2010)
- How to Spot a Virus: The Origins of an Immune Response (2011)
- Avian flu and scientific censorship: When should scientists keep their mouths shut? (2012)
- Living Factories: Engineering Cells to Manufacture Molecules (2013)

2010-2012

Co-founder: Harvard Policy PATH

2011

Student Advocate: ASBMB “Hill Day”