

Cameron Amadeus Myhrvold

Assistant Professor of Molecular Biology
Princeton University
M161 Moffett Lab
Washington Road
Princeton, NJ 08544

Email: cmhrvol@princeton.edu

Website: <https://myhrvoldlab.com>

Twitter: @cambearon

[Google Scholar](#)

ORCID: 0000-0002-8971-184X

Education

Ph.D., Systems Biology, Harvard University 2011-16
A.B., Molecular Biology, Princeton University, *magna cum laude*,
with a certificate in Quantitative and Computational Biology 2007-11

Research

Assistant Professor of Molecular Biology: Princeton University 2021-present
CRISPR-based technology development for studying RNA

Postdoctoral research: Broad Institute of MIT and Harvard 2016-2020
Cas13-based technologies for viral detection and destruction. Advisor: Pardis Sabeti.

Graduate thesis research: Department of Systems Biology, Harvard Medical School 2011-2016
Synthetic biology and nanotechnology. Advisors: Pamela Silver and Peng Yin.

Undergraduate thesis research: Department of Molecular Biology, Princeton University 2009-2011
Microbiology, quorum sensing. Advisor: Bonnie Bassler.

High school and undergraduate research: Department of Biology, University of Washington 2005-2008
Insect mechanosensing and flight control. Advisor: Thomas Daniel.

Honors and Awards

Broad Excellence Award (for extraordinary work related to COVID-19) 2020
STAT Magazine Wunderkind Award 2020
Forbes 30 Under 30, Healthcare category 2019

Last Author Publications

(* denotes equal contribution, underline denotes corresponding authors, Myhrvold lab members are **bolded**)

1. **Kimchi O***, **Larsen BB***, **Dunkley ORS**, te Velthuis AJW, and **Myhrvold C**. RNA structure modulates Cas13 activity and enables mismatch detection. [bioRxiv](#).
2. Siddiqui SM*, Welch NL*, Nguyen TG*, Razmi A, Chang T, Senft R, Arizti-Sanz J, Mirhashemi ME, Stirling DR, Ackerman CM, Cimini BA, Blainey PC, Sabeti PC*, and **Myhrvold C***. Bead-based approaches to CRISPR diagnostics. [medRxiv](#). *In review*.
3. **Kang B**, Zhang J, Schwoerer MP, Nelson AN, Shoeman E, **Guo A**, Ploss A, and **Myhrvold C**. Highly multiplexed mRNA quantitation with CRISPR-Cas13. [bioRxiv](#). *In review*.
4. Zhang YB*, Arizti-Sanz J*, Bradley A, Kosko-Thoroddsen TK, Sabeti PC*, and **Myhrvold C***. CRISPR-based assays for point of need detection and subtyping of influenza. 2023. [medRxiv](#). *In revision*.
5. **Lamb CH**, **Kang B**, and **Myhrvold C**. Multiplexed CRISPR-based Methods for Pathogen Nucleic Acid Detection. 2023. [Current Opinion in Biomedical Engineering](#) 27: 100471. (review)
6. **Sharma S** and **Myhrvold C**. Optimizing the Cas13 Antiviral Train: Cargo and Delivery. 2023. [EMBO Molecular Medicine](#) 15: e17146. (commentary)
7. Arizti-Sanz J, Bradley A, Zhang YB, **Boehm CK**, Freije CA, **Grunberg ME**, Kosoko-Thoroddsen TF, Welch NL, Pillai PP, Mantena S, **Kim G**, Uwanibe JN, John OG, Eromon PE, Kocher G, Gross R, Lee JS, Hensley LE, Johnson J, Springer M, Happi CT, Sabeti PC*, and **Myhrvold C***. Simplified Cas13-based assays for the fast identification of SARS-CoV-2 and its variants. 2022. [Nature Biomedical Engineering](#) 6: 932-943.
8. Metsky HC, Welch NL, Pillai PP, Haradhvala NJ, Rumker L, Mantena S, Zhang YB, Yang DK, Ackerman CM, Weller J, Blainey PC, **Myhrvold C***, Mitzenmacher M*, Sabeti PC*. Designing sensitive viral diagnostics with machine learning. 2022. [Nature Biotechnology](#) 40: 1123-1131.
9. Welch NL, Zhu M, Hua C, Weller J, Ezzaty Mirhashemi M, Nguyen TG, Mantena S, Bauer MR, Shaw BM, Ackerman CA, Thakku SG, Tse MW, Kehe J, Uwera M-M, Eversley JS, Bielwaski DA, McGrath G,

- Braidt J, Johnson J, Cerrato F, Moreno GK, Krasilnikova LA, Petros BA, Gionet GL, King E, Huard RC, Jalbert SK, Cleary ML, Fitzgerald NA, Gabriel SB, Gallagher GR, Smole SC, Madoff LC, Brown CM, Keller MW, Wilson MM, Kirby MK, Barnes JR, Park, JK, Siddle KJ, Happi CT, Hung DT, MacInnis BL, Lemieux JE, Rosenberg E, Branda JA*, Blainey PC*, Sabeti PC* and **Myhrvold, C***. Multiplexed CRISPR-based microfluidic platform for clinical testing of respiratory viruses and identification of SARS-CoV-2 variants. 2022. [Nature Medicine](#) 28: 1083-1094.
10. Arizti-Sanz J*, Freije CA*, Stanton AC, Boehm CK, Petros BA, Siddiqui S, Shaw BM, Adams G, Kosoko-Thoroddsen TF, Kembal ME, Uwanibe JN, Ajogbasile FV, Eromon PE, Gross R, Wronka L, Caviness K, Hensley LE, Bergman NH, MacInnis BL, Happi CT, Lemieux JE, Sabeti PC*, and **Myhrvold C***. Streamlined inactivation, amplification, and Cas13-based detection of SARS-CoV-2. 2020. [Nature Communications](#) 11: 5921.
11. Metsky H, Freije CA, Kosoko-Thoroddsen TF, Sabeti PC, and **Myhrvold C**. CRISPR-based surveillance for COVID-19 using genomically-comprehensive machine learning design. 2020. [bioRxiv](#).

First Author Publications

- (* denotes equal contribution, underline denotes corresponding authors, Myhrvold lab members are **bolded**)
12. Ackerman CM*, **Myhrvold C***, Thakku SG, Freije CA, Metsky HC, Yang DK, Ye SH, Boehm CK, Kosoko-Thoroddsen TF, Kehe J, Nguyen TG, Carter A, Kulesa A, Barnes JR, Dugan VG, Hung DT, Blainey PC*, and Sabeti PC*. Massively multiplexed nucleic acid detection with Cas13. 2020. [Nature](#) 582: 277-282.
- * equal contributions and listed alphabetically.
13. Freije CA*, **Myhrvold C***, Boehm CK, Welch NL, Lin AE, Carter A, Metsky HC, Luo CY, Abudayyeh OO, Gootenberg JS, Yozwiak NL, Zhang F, Sabeti PC. Programmable inhibition and detection of RNA viruses using Cas13. 2019. [Molecular Cell](#) 76: 1-12.
14. **Myhrvold C***, Freije CA*, Gootenberg JS, Abudayyeh OO, Metsky HC, Durbin AF, Kellner MJ, Tan AL, Paul LM, Parham LA, Garcia KF, Barnes KG, Chak B, Mondini A, Nogueira ML, Isern S, Michal SF, Lorenzana I, Yozwiak NL, MacInnis BL, Bosch I, Gehrke L, Zhang F, and Sabeti PC. Field-deployable viral diagnostics using CRISPR-Cas13. 2018. [Science](#) 360(6387): 444-448.
15. Sachdeva G*, **Myhrvold C***, Yin P, Silver PA. Synthetic RNA Scaffolds for Spatial Engineering in Cells. 2018. [Synthetic Biology: Parts, Devices and Applications](#) (book chapter)
16. **Myhrvold C**, Baym M, Hanikel N, Ong LL, Gootenberg JS, and Yin P. Barcode Extension for Analysis and Reconstruction of Structures. 2017. [Nature Communications](#) 8: 14698.
17. **Myhrvold C***, Polka J*, and Silver PA. Synthetic Lipid-Containing Scaffolds Enhance Indigo Production by Colocalizing Enzymes. 2016. [ACS Synthetic Biology](#) 5(12): 1396-1403.
18. **Myhrvold C**, Kotula JW, Hicks WM, Conway NJ, and Silver PA. A Distributed Cell Division Counter Reveals Growth Dynamics in the Mammalian Gut. 2015. [Nature Communications](#) 6: 10039.
19. **Myhrvold C** and Silver PA. Using synthetic RNAs as scaffolds and regulators. 2015. [Nature Structural and Molecular Biology](#) 22(1): 8-10. (review)
20. **Myhrvold C**, Dai M, Silver PA, and Yin P. Isothermal self-assembly of complex DNA structures under diverse and biocompatible conditions. 2013. [Nano Letters](#) 13(9): 4242-4248.

Collaborative Publications

- (* denotes equal contribution, Myhrvold lab members are **bolded**)
21. Mantena S, Pillai PP, Petros BA, Welch NL, **Myhrvold C**, Sabeti PC*, Metsky HC*. Model-directed generation of CRISPR-Cas13a guide RNAs designs artificial sequences that improve nucleic acid detection. 2023. [bioRxiv](#). *In review*.
22. Sengupta T, St. Ange J, Moore R, Kaletsky R, **Marogi J**, **Myhrvold C**, Gitai Z, Murphy CT. A small RNA from a natural bacterial pathogen of *C. elegans* induces transgenerational inheritance of learned avoidance. 2023. [bioRxiv](#). *Submitted*.
23. Kellog EH, Gootenberg J, Abudayyeh O, Wong ASL, Dahlman JE, Lapinaite A, **Myhrvold C**, Liu CC, Hsu PD, Mali P, Qi LS. What are the current bottlenecks in developing and applying CRISPR technologies? 2022. [Cell Systems](#) 13(8):589-593. (commentary)
24. Thakku SG, Ackerman CA, **Myhrvold C**, Bhattacharyya RP, Livny J, Ma P, Isabella G, Sabeti PC, Blainey PC, Hung DT. Multiplexed detection of bacterial nucleic acids using Cas13 in droplet microarrays. [PNAS Nexus](#) 1(1). 2022.

25. Botti-Lodovico Y, Nair P, Nosamiefan D, Stremlau M, Schaffner S, Ayodeji O, Colubri A, Dada I, Elhamoumi S, Eromon P, Fallah M, Ugwu C, Happi AN, Folarin OA, Fry B, Grant DS, Jackson J, Kemball M, **Myhrvold CA**, Ndiaye D, Ojide K, Okogbenin SA, Okokhere P, Park DJ, Philippakis AA, Ricks A, Rimoin A, Schreiber M, Ulrich T, Vodzak ME, Andersen K, Garry R, MacInnis B, Sabeti PC, Happi C. The Origins and Future of Sentinel: An Early-Warning System for Pandemic Preemption and Response. 2021. [Viruses](#) 13(8): 1605.
26. Lemieux JE, Siddle KJ, Shaw BM, Loreth C, Schaffner SF, Gladden-Young A, Adams G, Fink T, Tomkins-Tinch CH, Krasilnikova LA, DeRuff KC, Rudy M, Bauer MR, Lagerborg KA, Normandin E, Chapman SB, Reilly SK, Anahtar MN, Lin AE, Carter A, **Myhrvold C**, Kemball ME, Chaluvadi S, Cusick C, Flowers K, Neumann A, Cerrato F, Farhat M, Slater D, Harris JB, Branda JA, Hopper D, Gaeta JM, Baggett TP, O'Connell JO, Gnirke A, Lieberman TD, Philippakis A, Burns M, Brown CM, Luban J, Ryan ET, Turbett SE, LaRocque RC, Hanage WP, Gallagher GR, Madoff LC, Smole S, Pierce VM, Rosenberg E, Sabeti PC, Park DJ, MacInnis BL. Phylogenetic analysis of SARS-CoV-2 in Boston highlights the impact of superspreading events. 2021. [Science](#) 371(6529) eabe3261.
27. Barnes KG*, Lachenauer AE*, Nitido A, Siddiqui S, Gross R, Beitzel B, Siddle KJ, Freije CA, Dighero-Kemp B, Mehta S, Carter A, Uwanibe J, Ajogbasile F, Olumade T, Odia I, Sandi JD, Momo M, Metsky HC, Boehm CK, Lin AE, Kemball M, Park DJ, Grant DS, Happi CT, Branco L, Boisen M, Sullivan BM, Amara M, Tihamiyu A, Parker Z, Iroezindo M, Modjarrad K, **Myhrvold C**, Garry RF, Palacios G, Hensley LE, Schaffner SF, Colubri A, Sabeti PC. Deployable CRISPR-Cas13a diagnostic tools to detect and report Ebola and Lassa virus cases in real-time. 2020. [Nature Communications](#) 11: 4131.
28. Woods D*, Doty D*, **Myhrvold C**, Hui J, Zhou F, Yin P, and Winfree E. Diverse and robust molecular algorithms using reprogrammable DNA self-assembly. 2019. [Nature](#) 567: 366-372.
29. Han D*, Qi X*, **Myhrvold C**, Wang B, Dai M, Jiang S, Bates M, Liu Y, An B, Zhang F, Yan H* and Yin P*. Single-stranded DNA and RNA Origami. 2017. [Science](#) 358(6369): eaao2648.
30. Ong LL, Hanikel N, Yaghi OK, Grun C, Strauss MT, Bron P, J Lai-Kee-Him J, Schueder F, Wang B, Wang P, Kishi JY, **Myhrvold C**, Zhu A, Jungmann R, Bellot G, Ke Y, and Yin P. Programmable self-assembly of three-dimensional nanostructures from 10⁴ unique components. 2017. [Nature](#) 552: 72-77.
31. Gootenberg JS*, Abudayyeh OO*, Lee JW, Essletzbichler P, Dy AJ, Joung J, Verdine V, Donghia N, Daringer NM, Freije CA, **Myhrvold C**, Bhattacharyya RP, Livny J, Regev A, Koonin EV, Hung DT, Sabeti PC, Collins JJ*, and Zhang F*. Nucleic acid detection with CRISPR-Cas13a/C2c2. 2017. [Science](#) 356(6336): 438-442.
32. Wei B, Dai M, **Myhrvold C**, Ke Y, Jungmann R, and Yin P. Design space for complex DNA structures. 2013. [Journal of the American Chemical Society](#) 135(48):18080-8.
33. Caudy AA, Guan Y, Jia Y, Hansen C, DeSevo C, Hayes AP, Agee J, Alvarez-Dominguez JR, Arellano H, Barrett D, Bauerle C, Bisaria N, Bradley PH, Breunig JS, Bush E, Cappel D, Capra E, Chen W, Clore J, Combs PA, Doucette C, Demuren O, Fellowes P, Freeman S, Frenkel E, Gadala-Maria D, Gawande R, Glass D, Grossberg S, Gupta A, Hammonds-Odie L, Hoisos A, Hsi J, Hsu YH, Inukai S, Karczewski KJ, Ke X, Kojima M, Leachman S, Lieber D, Liebowitz A, Liu J, Liu Y, Martin T, Mena J, Mendoza R, **Myhrvold C**, Millian C, Pfau S, Raj S, Rich M, Rokicki J, Rounds W, Salazar M, Salesi M, Sharma R, Silverman S, Singer C, Sinha S, Staller M, Stern P, Tang H, Weeks S, Weidmann W, Wolf A, Young C, Yuan J, Crutchfield C, McClean M, Murphy CT, Llinás M, Botstein D, Troyanskaya OG, and Dunham MJ. A New System for Comparative Functional Genomics of Saccharomyces Yeasts. 2013. [Genetics](#) 195(1): 275-287.
34. Daniel TL, Diudonne A, Fox JL, **Myhrvold C**, Sane SP, and Wark B. Inertial guidance systems in insects: from the neurobiology to the structural of biological gyroscopes. 2008. [NAVIGATION: Journal of the Institute of Navigation](#) 55(4): 235-240.

Academic Talks (selected)

Invited Seminar, Public Health Research Institute, Rutgers New Jersey Medical School, Newark, NJ	2023
The Scientist Symposium: COVID-19: Lessons Learned (invited talk, virtual)	2022
Labroots CRISPR 2022 (invited talk, virtual)	2022
Keystone Symposia on COVID and Beyond (invited talk), Brussels, Belgium	2022
CSHL meeting on Genome Engineering: CRISPR Frontiers (invited talk), Cold Spring Harbor, NY	2022
International Conference on Emerging Infectious Diseases (invited talk), Atlanta, GA	2022
NIH Workshop: CRISPR-based diagnostics for infectious diseases(invited talk), virtual	2022

Columbia COVID-19 Virtual Symposium (invited talk), virtual	2022
Northeast Bioengineering Conference (invited talk), New York, NY	2022
Princeton Virology Meeting (internally invited talk), Princeton, NJ	2021
Gates Foundation Grand Challenges Annual Meeting (invited talk), virtual	2021
UNAH Instituto de Investigaciones en Microbiologia (invited seminar in Spanish), virtual	2021
TEDx Boston (invited talk), Boston, MA	2021
Princeton Catalysis Initiative Symposium (internally invited talk), Princeton, NJ	2021
4th International Conference on CRISPR Technologies (invited talk), virtual	2021
Engineering Life Initiative, Ludwig-Maximilians-Universität Munich (invited talk), virtual	2021
World Society for Virology Annual Meeting (keynote talk), virtual	2021
NIH Workshop: Applications of CRISPR-Cas and Similar Techniques for Established and Emerging Infectious Diseases (invited talk), virtual	2021
Princeton Bioengineering Colloquium (internally invited talk), virtual	2021
ACS Spring Meeting (invited talk), virtual	2021
Gates Foundation Learning Session on Programmable Therapies for Pandemics (invited talk), virtual	2021
AIP Horizons Online Symposium on COVID-19 & Photonics (invited talk), virtual	2020
International Conference on Clinical Metagenomics: COVID-19 (invited talk), virtual	2020
CDC COVID-19 Response Task Force (invited talk), virtual	2020
CSHL meeting on Genome Engineering: CRISPR Frontiers (invited talk), virtual	2020
Hertz Foundation Summer Workshop (invited talk), virtual	2020
Broad Infectious Disease and Microbiome Seminar (internally invited talk), virtual	2020
COV-IRT Virtual Symposium on COVID-19 (invited talk), virtual	2020
Massachusetts Consortium on Pathogen Readiness Seminar (invited talk), virtual	2020
Broad Institute Annual Retreat (invited talk), Boston, MA	2019
ASTMH Annual Meeting (invited talk), National Harbor, MD	2019
CRISPR Technologies Conference (abstract selected for talk), Wurzberg, Germany	2019
Broad Infectious Disease and Microbiome Seminar (internally invited talk), Cambridge, MA	2019
Synthetic Biology: Engineering, Evolution & Design (abstract selected for talk), New York, NY	2019
6 th Sapporo Summer Symposium for One Health (invited talk), Sapporo, Japan	2018
Broad Global Health Symposium (internally invited talk), Cambridge, MA	2018
Festival of Genomics (invited talk), Boston, MA	2017
Broad Infectious Disease and Microbiome Seminar (internally invited talk), Cambridge, MA	2017

Conference organization

Session chair, American Society for Virology Annual Meeting, Athens, GA	2023
Session co-chair, CSHL meeting on Genome Engineering: CRISPR Frontiers, Cold Spring Harbor, NY	2022
Hertz Foundation Summer Workshop Organizing Committee	2016-2019

Patents

1. United States Patent Application No. 2022/0228150 A1. CRISPR system high throughput diagnostic systems and methods.	2022
2. United States Patent Application No. 2021/039676 A1. CRISPR effector system based diagnostics for hemorrhagic fever detection.	2021
3. United States Patent Application No. 2021/0102197 A1. Designing sensitive, specific, and optimally active binding molecules for diagnostics and therapeutics.	2021
4. International Patent Application No. 2020/102610 A1. CRISPR system based droplet diagnostic system and methods.	2020
5. United States Patent No. 10,550,145. Single-stranded dna nanostructures.	2020
6. United States Patent Application No. 2019/061574. Multiplexing highly evolving viral variants with sherlock.	2019
7. United States Patent Application No. 2018/041099. CRISPR system based antiviral therapy.	2018
8. United States Patent Application No. 2018/022764. CRISPR effector system based diagnostics for virus detection.	2018
9. United States Patent No. 9,975,916. Compositions and methods relating to complex nucleic acid nanostructures	2018

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| 10. United States Patent No. 9,751,812. Taggant for cement authentication. | 2017 |
| 11. United States Patent No. 8,851,518. Energy dissipative cushioning elements. | 2014 |
| 12. United States Patent No. 8,327,564. Repeatably displaceable emanating element display. | 2012 |
| 13. United States Patent No. 8,096,069 Repeatably displaceable emanating element display. | 2012 |
| 14. United States Patent No. 8,059,000. Wearable/portable protection for a body. | 2011 |
| 15. United States Patent No. 7,548,168. Wearable/portable protection for a body. | 2009 |

Entrepreneurship

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| Chairman of the Scientific Advisory Board, Carver Biosciences Inc. | 2023-present |
| Member of the Board of Directors, Carver Biosciences Inc. | 2021-present |
| Co-founder, Carver Biosciences Inc. | 2021-present |

Teaching

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| Teaching, MOL445: Pathogens, Pandemics, Technologies, Princeton University | 2022- |
| Guest lecturer for CBE260, MOL443 | 2022- |
| Teaching fellow, SB200: A Systems Approach to Biology, Harvard University | 2013 |

Peer Review

- Referee for *Cell*, *Nature Biotechnology*, *Nature Chemical Biology*, *Nature Structural & Molecular Biology*, *Nature Biomedical Engineering*, *Nature Communications*, *Emerging Infectious Diseases*, *Molecular Therapy*, *ACS Synthetic Biology*, *ACS Nano*, *Nano Letters*, *Analytical Chemistry*, *Biotechnology Journal*, *Communications Biology*, *Cell Reports Methods*, *Molecular Therapy – Nucleic Acids*, *iScience*, *Communications Medicine*, *Microbiology Spectrum*, *Applied Physics Letters*, *Biochemistry*, *Biosensors and Bioelectronics*, *ACS Sensors*, *Sensors & Diagnostics*, *PLoS One*, *BMC Infectious Diseases*, *BMC Genomics*, *Biotechnology Advances*
- | | |
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| Guest Editor for <i>ACS Synthetic Biology</i> | 2023 |
| Member, Early Career Advisory Board, <i>ACS Synthetic Biology</i> | 2024-5 |

Grant Review

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| Princeton Bioengineering Initiative Collaborations | February 2023 |
| NIAID SBIR Study Section ZAI1 SJ-M (C3) | February 2023 |
| Princeton 2022 IP Accelerator Fund | January 2023 |
| NJACTS Pilot Grant Program | November 2022 |

Service at Princeton

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| Member, Princeton Molecular Biology Department Retreat Organizing Committee | 2023-present |
| Member, Princeton Molecular Biology Butler Seminar Series Organizing Committee | 2022-present |
| Member, Princeton Molecular Biology Diversity and Inclusion Committee | 2021-present |
| Member, Princeton Institutional Biosafety Committee | 2021-present |