Alison F. Feder

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Appointments

2023- Affiliate Investigator, Public Health Sciences, *Fred Hutchinson Cancer Center*
2021- Assistant Professor, Department of Genome Sciences, *University of Washington*
2018-2021 Miller Fellow, Department of Integrative Biology, *University of California, Berkeley*

Education

2013-2018 PhD, Biology, Stanford University, Stanford, CA
2012-2013 MSc (by Research), Statistics, University of Oxford, Oxford, UK
2008-2012 BA, Mathematics, *summa cum laude*, University of Pennsylvania, Philadelphia, PA

Research Funding

2022-2027 NIH Director's New Innovator's Award [Website]
2022-2024 Cystic Fibrosis Foundation Pilot and Feasibility Award [Website]
2022-2024 UW Cystic Fibrosis Research Development Program Pilot and Feasibility Grant [Website]
2022-2024 Gilead Research Scholars Program in HIV [Website]

Research Fellowships

2018-2021 Miller Fellowship [Website]
2017-2018 Stanford Center for Computational, Evolutionary & Human Genomics Fellowship [Website]
2016-2017 Gerald J. Lieberman Fellowship [Website]
Awarded yearly to twelve Stanford graduate students whose teaching, research and university service demonstrate potential for academic leadership.
2012-2017 National Science Foundation Graduate Research Fellowship [Website]
2012-2013 Thouron Award [Website]

Awards & Honors

2022 NIH Director's New Innovator Award
2018 Milner Prize in Evolutionary Biology
2018 Samuel Karlin Prize in Mathematical Biology
2018 James F. Crow Early Career Researcher Finalist (Genetics Society of America)
2017 Omenn Prize for the best evolutionary medicine article published in the previous year
2015 Excellence in Teaching Award (Department of Biology, Stanford)
2014 Center for Computational, Evolutionary and Human Genomics Trainee Grant
2012 Penn Genome Frontiers Institute Excellence in Genomics Undergraduate Award
2012 Phi Beta Kappa (University of Pennsylvania)

Pre-prints (mentored co-author)

15. Y. Gao, **A. F. Feder** (2024). Detecting branching rate heterogeneity in multifurcating trees with applications in lineage tracing data. bioRxiv 2024.06.27.601073. [Link]

Peer-Reviewed Publications (* equal contributions, † co-corresponding authors, mentored co-author)

14. E. V. Romero, **A. F. Feder** (2024). Elevated HIV viral load is associated with higher recombination rate *in vivo*. *Molecular Biology & Evolution*, 41(1), msad260. [Link, OUP press]

13. I Yousaf*, W. W. Hannon*, R. C. Donohue, C. K. Pfaller, K. Yadav, R. J. Dikdan, S. Tyagi, D. C. Schroeder, W Shieh, P. A. Rota, **A. F. Feder**†, R. Cattaneo† (2023). Brain tropism acquisition: The spatial dynamics and evolution of a measles virus collective infectious unit that drove lethal subacute sclerosing panencephalitis. PLOS Pathogens 19(12): e1011817. [Link, Mayo Press, Fred Hutch Spotlight].

12. M. Lewinsohn, T. Bedford, N. F. Müller*, **A. F. Feder*** (2023). State-dependent evolutionary models reveal modes of solid tumor growth. *Nature Evology & Evolution* 7, 581–596. [Link, News & Views, This Week in Evolution (TWiEVO)]

11. **A. F. Feder**, K. Harper, C. J. Brumme, P. S. Pennings (2021). Understanding patterns of HIV multi-drug resistance through models of temporal and spatial drug heterogeneity. *eLife*, 10:e69032. [Link, Highlight in Nature Ecology & Evolution]

10. **A. F. Feder**, P. S. Pennings, D. A. Petrov (2021). The clarifying role of time series data in the population genetics of HIV. *PLOS Genetics* 17(1): e1009050. [Link]

9. **A. F. Feder**, P. S. Pennings, J. Hermisson*, D. A. Petrov* (2019). Evolutionary dynamics in structured populations under strong population genetic forces. *(G3: GENES, GENOMES, GENETICS)* 9(10):3395-3407. [Link , Highlight in 2019 G3 Spotlight issue]

8. R. S. Mehta, **A. F. Feder**, S. M. Boca, N. A. Rosenberg (2019). The relationship between haplotype-based F_{ST} and haplotype length. *Genetics* 213(1):281-295. [Link]

7. K. Theys*, **A. F. Feder***, M. Gelbart*, M. Hartl, A. Stern, and P. S. Pennings (2018). Within-patient HIV mutation frequencies reveal fitness costs of CpG dinucleotides, drastic amino acid changes and G $\rightarrow$ A mutations. *PLoS Genetics* 14(6): e1007420. [Link]

6. **A. F. Feder**, C. Kline, P. Polacino, M. Cottrell, A. D. Kashuba, B. F. Keele, S.-L. Hu, D. A. Petrov, P. S. Pennings*, and Z. Ambrose* (2017). A spatio-temporal assessment of simian/human immunodeficiency virus (SHIV) evolution reveals a highly dynamic process within the host. *PLoS Pathogens*, 13(5): e1006358. [Link]

5. B. A. Wilson*, N. R. Garud*, **A. F. Feder***, Z. J. Assaf*, and P. S. Pennings (2016). The population genetics of drug resistance evolution in natural populations of viral, bacterial and eukaryotic pathogens. *Molecular Ecology*, 25(1):42–66. [Link]

4. **A. F. Feder**, S.-Y. Rhee, S. P. Holmes, R. W. Shafer, D. A. Petrov*, and P. S. Pennings* (2016). More effective drugs lead to harder selective sweeps in the evolution of drug resistance in HIV-1. *eLife*, 5:e10670. [Link, Stanford News]

3. **A. F. Feder***, S. Kryazhimskiy*, and J. B. Plotkin (2014). Identifying signatures of selection in genetic time series. *Genetics*, 196(2):509–522. [Link]

Peer-Reviewed Publications (cont.)

2. **A. F. Feder**, D. A. Petrov, and A. O. Bergland (2012). LDx: estimation of linkage disequilibrium from high-throughput pooled resequencing data. *PLoS One*, 7(11):e48588. [Link]

1. K. E. Lohmueller, A. Albrechtsen, Y. Li, S. Y. Kim, T. Korneliussen, N. Vinckenbosch, G. Tian, E. Huerta-Sanchez, **A. F. Feder**, N. Grarup, T. Jørgensen, T. Jiang, D. R. Witte, A. Sandbæk, I. Hellmann, T. Lauritzen, T. Hansen, O. Pedersen, J. Wang, R. Nielsen (2011). Natural selection affects multiple aspects of genetic variation at putatively neutral sites across the human genome. *PLoS Genetics*, 7(10):e1002326. [Link]

Current Research Supervision

2024	[R] Megan Taylor, GS Rotation student, *U. Washington*
2024	[R] Karl Young, GS Rotation student, *U. Washington*
2024	Linh Tran, Postdoctoral scholar, *U. Washington*
2024-	Yirui Chen, undergraduate researcher, *U. Washington*
2023-	Samuel Hart, Postdoctoral scholar, *U. Washington* (joint with K. Harris)
2023-	Iris Jia, Genome Sciences PhD student, *U. Washington*
2022-	Alex Robertson, MCB PhD student, *U. Washington* (joint with B. Kerr)
2022-	Yingnan Gao, Postdoctoral scholar, *U. Washington*
2021-	Hunter Colegrove, Genome Sciences PhD student, *U. Washington*
2021-	Elena Romero, Genome Sciences PhD student, *U. Washington*

Past Research Supervision *[R] rotation project*

2024	[R] Allie Kreitman, MSTP Rotation student, *U. Washington*
2022-	Dylan Clark, undergraduate researcher, *U. Washington*
2020-2023	Will Hannon, Molecular & Cellular Biology PhD student, *Fred Hutch* (J. Bloom lab)
2023	[*R*] Nashwa Ahmed, Molecular & Cellular Biology PhD student, *U. Washington*
2022	[*R*] Laura Baquero Galvis, Molecular & Cellular Biology PhD student, *U. Washington*
2020-2023	Maya Lewinsohn, MSTP student (Genome Sciences), *U. Washington* (T. Bedford lab)
2020	Helen Sakharova, Comp. Biology PhD rotation student, *UC Berkeley* (O. Hallatschek lab)
2016	Michael Herschl, undergraduate student, *Stanford University* (D. Petrov lab)

Trainee committees

2024-	Rohin Gilman, Bozic Lab, Applied Mathematics
2024-	Qi Yu, Shendure Lab, Genome Sciences
2024-	Ruibo Zhang, Bozic Lab, Applied Mathematics
2024-	Amin Bemanian, Bedford Lab, Pediatric Infectious Disease Fellow
2024-	Nashwa Ahmed, Bedford Lab, Molecular & Cellular Biology
2024-	Sophia Kogut, Blanco-Melo Lab, Molecular & Cellular Biology
2023-	Caroline Phan, Lehman Lab, Molecular & Cellular Biology
2023-	Caleb Carr, Bloom lab, Genome Sciences
2022-	Laura Baquero Galvis, Douletov lab, Molecular & Cellular Biology
2022-	Rechel Geiger, Emerman & Malik labs, Molecular & Cellular Biology
2022-	Timothy Yu, Bloom lab, Molecular & Cellular Biology
2022-	Gabrielle Ferra, Harris & Dunham labs, Genome Sciences
2021-2024	Cassia Wagner, Bedford Lab, Genome Sciences
2021-2023	William Hannon, Bloom lab, Molecular & Cellular Biology
2021-2023	Maya Lewinsohn, Bedford lab, Genome Sciences

Invited Presentations

[v] *virtually*

2024	Fields Institute for Research in Mathematical Sciences, Toronto, Canada
2024	USC Dept of Quantitative and Computational Biology, Los Angeles, USA
2024	Society of Molecular Biology & Evolution, Puerto Vallarta, Mexico
2024	The Social Lives of Viruses meeting, San Juan, USA
2024	Society of Molecular Biology & Evolution Regional Meeting, Taipei, Taiwan
2024	Vaccine and Infectious Diseases Division, Fred Hutchinson Cancer Center, Seattle, USA
2023	Integrated Mathematical Oncology Division, Moffitt Cancer Center, Tampa, USA
2023	American Association of Cancer Researchers: Translating Cancer Evolution and Data Science: the Next Frontier, Boston, USA
2023	Computational Molecular Biology Retreat, Seattle, USA
2023	Statistical and Quantitative Genetics Symposium at UW Biostatistics, Seattle, USA
2023	Computational Biology (COMBI) seminar at UW, Seattle, USA
2022[v]	City College London Department of Mathematics, London, UK
2022	Georgia Tech School of Biological Sciences Seminar, Atlanta, USA
2022	University of Michigan Molecular Mechanisms in Microbial Pathogenesis Training Grant Invited Speaker, Ann Arbor, USA
2022	PNRI Student/Postdoc Invited Seminar Series, Seattle, USA
2022[v]	University of Virginia Ecology and Evolutionary Biology Seminar, Charlottesville, USA
2022[v]	Mathematical Models in Ecology and Evolution, IHP Workshop, Paris, France
2022[v]	Carnegie Mellon - Pitt Program in Computational Biology, Pittsburgh, USA
2021[v]	NIH Laboratory of Viral Diseases, Bethesda, USA
2021[v]	Temporal Genomics Working Group
2021[v]	Miller Institute for Basic Research in Science, UC Berkeley, Berkeley, USA
2021[v]	Quantitative Evolution, Phylogeny and Ecology: IHP Workshop, Paris, France
2021[v]	Institute of Ecology & Evolution, University of Oregeon, Eugene, USA
2020[v]	Ecology & Evolution Seminar, University of California, Davis, USA
2020	Department of Genome Sciences, University of Washington, Seattle, USA
2019	Department of Ecology & Evolutionary Biology, University of Chicago, Chicago, USA
2019	Department of Computational Biology, Cornell University, Ithaca, USA
2019	Science & Mathematics Seminar, University of Puget Sound, Tacoma, USA
2019	European Society of Evolutionary Biology, Turku, Finland
2019	Society of Molecular Biology & Evolution, Manchester, UK
2019	Trainee Invited Speaker Series, Arjun Raj Lab at Penn, Philadelphia, USA
2019	Science & Technology Seminar, Joint Genome Institute, Walnut Creek, USA
2019	Departmental seminar, University of San Francisco, San Francisco, USA
2018	Palo Alto Research Center, Palo Alto, USA
2018	Milner Prize Lecture, University of Bath, Bath, UK
2018	Systems Biology Seminar, Cancer Research UK Cambridge Institute, UK
2018	Ad hoc seminar, University of California, Davis, USA
2018	Institute for Disease Modeling Annual Symposium, Seattle, USA

Invited Presentations (continued)

^{v} *virtually*

2017	Center for Theoretical Evolutionary Genomics, University of California, Berkeley, USA
2017	Institute for Disease Modeling, Bellevue, USA
2017	Center for Inference and Dynamics of Infectious Disease, Fred Hutchinson Cancer Research Institute, Seattle, USA
2017	Omenn Prize talk at the International Society of Evolution, Medicine and Public Health, Groningen, Netherlands
2017	Program for Evolutionary Dynamics, Harvard University, Cambridge, USA
2016	"Darwin's Weekly" Seminar, University of Chicago, Chicago, USA

Contributed/selected presentations

* *talk* † *poster*

2018	[*] Society for Molecular Biology & Evolution, Yokohama, Japan
2018	[*] James F. Crow Award finalist session at PEQG, Madison, USA
2018	[*] HIV Dynamics & Evolution, Leavenworth, USA
2017	[†] Gordon Research Conference: Microbial Population Biology, Andover, USA
2017	[*] Gordon Research Seminar: Microbial Population Biology, Andover, USA
2017	[*] Society for Molecular Biology & Evolution Annual Meeting, Austin, USA
2016	[*] International Society of Evolution, Medicine and Public Health, Raleigh, USA
2016	[*] International HIV Drug Resistance Workshop, Boston, USA
2016	[† †] Conference on Retroviruses and Opportunistic Infections (CROI), Boston, USA
2015	[†] Bio-X Interdisciplinary Initiatives Symposium, Stanford, USA
2015	[*] Society for Molecular Biology & Evolution Annual Meeting, Vienna, Austria
2015	[†] "Forecasting Evolution?" SFB 680 Conference, Lisbon, Portugal
2015	[*] Biomedical Computation at Stanford (BCATS), Stanford, USA
2011	[*] NIMBioS Undergraduate Research Conference at the Interface of Biology and Mathematics, Knoxville, USA
2011	[††] Society for Molecular Biology & Evolution Annual Meeting, Kyoto, Japan

Teaching

University:

Spring 2024-	UW Genome 373: Genomic Informatics (with D. Fowler)
Winter 2024-	UW Genome 562: Population Genetics (with K. Harris)
Spring 2023	UW Genome 373: Genomic Informatics (with J. Thomas)
Fall 2022	Guest lecture for UW Biology 481, *Experimental Evolutionary Ecology*
Fall 2015	Co-teacher for BioCore Exploration (3 hour course), 'Are we still evolving?' with L. Uricchio
Spring 2015	TA for Stanford Biology 143, *Evolution*
Spring 2014	TA for Stanford Biology 43, *Evolution, Ecology & Plant Biology*

High School:

2016	Guest lecturer, *Evolutionary genomics theory, application and you!* Stanford Pre-Collegiate Institute
2014-2016	Stanford Splash! Teacher Taught 6 one-session mini-courses to high school students (two each on mathematical/logical thinking, population genetics and statistics/probability).

Public Outreach

2024	Invited speaker at Wednesday Evenings at the Genome seminar series
2019	Invited speaker at Nerd Nite East Bay, a general audience seminar series
2017	Finalist in Evolution Film Festival for "Intra-patient Simian-HIV drug resistance evolution: does blood tell the whole story?"
2016	Finalist in Evolution Film Festival for "Better drugs lead to harder sweeps in HIV-1"

Competitive travel support

2018	Young Investigator Travel Award from SMBE (Yokohama, Japan)
2016	International Society for Evolutionary Medicine and Public Health Travel Award (Durham, USA)
2016	CROI Young Investigator Scholarship (Boston, USA)
2015	Wellcome Trust Travel Award (for "Forecasting Evolution?" meeting, Lisbon, Portugal)
2013	Cargese Summer School in Quantitative Genetics Grant (Cargese, France)
2011	NiMBioS Undergraduate Conference Grant (Knoxville, USA)

Academic, Community & University Service

2024	SMBE Graduate Student Excellence Award and Young Investigator Award judge
2023-2024	UW Genome Sciences faculty search committee
2023-	UW Genome Sciences graduate program admissions committee
2023	Co-organizer of SMBE 2023 symposium on 'Evolutionary approaches to understand cancer across scales' with R. Noble
2022-	UW Genome Sciences Seminar Committee
2022	UW Genome Sciences Retreat organizer
2021	Williams Prize Committee
2020-2021	Miller Institute DEI Working Group
2019-2021	Miller Symposium Planning Committee
2018	Co-organizer of SMBE 2018 symposium on 'Intra-host evolutionary dynamics' with K. Xue
2016-2017	Department of Biology TA Mentorship Program mentor and program organizer
2014-2017	Stanford Bioscience Students Association new student Mentor
2014-2015	Mentored student writing NSF Graduate Research Fellowship application

Referee for American Society of Naturalists, Communications Medicine, eLife, Evolution, Genetics, Genome Biology and Evolution, Journal of Theoretical Biology, Molecular Biology and Evolution, Nature Ecology & Evolution, PCI Evolutionary Biology, PLOS Computational Biology, PLOS Genetics, PLOS Pathogens, PNAS, Trends in Cell Biology, Virus Evolution