Cara E. Brook
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Education

2012-2017 **Ph.D. Ecology and Evolutionary Biology, Princeton University**
Elucidating mechanisms of viral hosting in bat reservoirs for emerging zoonotic disease.
Advised by: Dr. Andrew P. Dobson

2012-2014 **M.Sc. Ecology and Evolutionary Biology, Princeton University**
Deciphering the role of bats as reservoirs in emerging disease.
Advised by: Dr. Andrew P. Dobson

2006-2010 **B.S. Earth Systems, Stanford University**
The Synanthropizatic Raven: Anthropogenic resource use and the invasion of Corvus corax *in Yosemite National Park.* Advised by: Dr. Elizabeth Hadly

Appointments

2017-present **Miller Postdoctoral Fellow**, Department of Integrative Biology, UC Berkeley, CA
2016-present **Affiliate Researcher**, Virology Unit, Institut Pasteur of Madagascar, Antananarivo, Madagascar

Awards and Fellowships

2017-2020 Miller Postdoctoral Fellowship, UC Berkeley
2013-2017 National Science Foundation, Graduate Research Fellowship
2013 National Defense, Science, and Engineering Graduate Fellowship *(Declined in favor of NSF)*
2010 Firestone Medal, Undergraduate Research Excellence, Stanford University
2010 Earth Systems Award, Senior Thesis Excellence, Stanford University

Peer-Reviewed Publications *(in reverse chronological order; *equal lead/ ±equal senior contributions)*

In Review

1. Annapragada A, **Brook CE**, Luskin MS, Rahariniaina RP, Helin M, Razafinarivo O, Ralaiarison AR, Randriamady HJ, Olson LE, Goodman SM, Golden CD. *In Review.* Evaluation of tenrec population viability and potential sustainable management under hunting pressure in northeastern Madagascar. *Biodiversity and Conservation.*

2020

2. Olival KJ*, Cryan PM*, Amman BR, Baric RS, Blehert DS, **Brook CE,** Calisher CH, Castle KT, Coleman JTH, Daszak P, Epstein JH, Field H, Frick WF, Gilbert AT, Hayman DTS, Ip HS, Karesh WB, Johnson CK, Kading RK, Kingston T, Lorch JM, Mendendall IH, Peel AJ, Phelps KL, Plowright RK, Reeder DM, Reichard JD, Sleeman JM, Streicker DG, Towner JS, and Wang L-F. *In Press*. Possible risks of SARS-CoV-2 spillover to free-ranging wildlife: a case study of bats. *PLoS Pathogens.*
3. Amen AM, Barry KW, Boyle JM, **Brook CE**, Choo S, Cornmesser LT, Dilworth DJ, Doudna JA±, Ehrenberg AJ, Fedrigo I, Friedline SE, Graham TGW, Green R, Hamilton JR, Hirsh A, Hochstrasser ML, Hockemeyer D±, Krishnappa N, Lari A, Li H, Lin-Shiao E, Lu T, Lyons EF, Mark KG, Martell LA, Martins ARO, McDevitt SL, Mitchell PS, Moehle EA, Naca CL, Nandakumar D, O'Brien E, Pappas DJ, Pestal K, Quach DL, Rubin BE, Sachdeva R, Stahl EC, Syed AM, Tan I-L, Tollner AL, Tsuchida CA, Tsui CK, Turkalo TK, Urnov F±, Warf MB, Whitney ON, Witkowsky LB. 2020. Blueprint for a Pop-up SARS-CoV-2 Testing Lab. *Nature Biotechnology.* doi: 10.1038/s41587-020-0583-3
4. **Brook CE,** Boots M, Chandran KC, Dobson AP, Drosten C, Graham AL, Grenfell BT, Müller MA, Ng M, Wang L-F, and van Leeuwen A. 2020. Accelerated viral dynamics in bat cell lines, with implications for zoonotic emergence. *eLife.* 9:e48401. doi: 10.7554/eLife.48401.

2019

5. **Brook CE.** 2019. A batty concept goes viral. *Nature Ecology & Evol.* doi:10.1038/s41559-019-1045-5.

6. Guth S, Visher E, Boots M, and **Brook CE**. 2019. Host phylogenetic distance drives trends in virus virulence and transmissibility across the animal-human interface. *Philosophical Transactions of the Royal Society* 374(1782): 20190296. doi: 10.1098/rstb.2019.0296.
7. **Brook CE,** Ranaivoson HC, Broder CC, Cunningham AA, Héraud J-M, Peel AJ, Gibson L, Wood JLN, Metcalf CJE±, and Dobson AP±. 2019. Disentangling serology to elucidate henipa- and filovirus transmission in Madagascar fruit bats. *Journal of Animal Ecology.* doi: 10.1111/1365-2656.12985.
8. **Brook CE,** Ranaivoson HC, Andriafidison D, Ralisata M, Razafimanahaka J, Héraud JM, Dobson AP, and Metcalf CJE. 2019. Population trends for two Malagasy fruit bats. *Biological Conservation* 234:165-171. doi: 10.1016/j.biocon.2019.03.032.
9. Ranaivoson HC, Héraud JM, Goethert HK, Telford SR, Rabetafika L± and **Brook CE**±. 2019. Babesial infection in the Madagascan flying fox, *Pteropus rufus* É. Geoffroy, 1803. *Parasites & Vectors* 12(51): 1307101933. doi: 10.1186/s13071-019-3300-7.

2018

10. **Brook CE,** Herrera JP, Borgerson C, Fuller E, Andriamahazoarivosoa P, Rasolofoniaina BJR, Randrianasolo JLRR, Rakotondrafarasata ZRE, Randriamady HJ, Dobson AP and Golden CD. 2018. Population viability and harvest sustainability for Madagascar lemurs. *Conservation Biology* 33(1): 99-111. doi: 10.1111/cobi.13151.

2017

11. **Brook CE**, Bai Y, Yu EO, Ranaivoson HC, Shin H, Dobson AP, Metcalf CJE±, Kosoy MY±, and Dittmar K±. 2017. Elucidating transmission dynamics and host-parasite-vector relationships for rodent-borne *Bartonella* spp. in Madagascar. *Epidemics* 20: 56-66. doi:10.1016/j.epidem.2017.03.004.

2016

12. Wesolowski A*, Mensah K*, **Brook CE***, Andrianjafimasy M, Winter A, Buckee CO, Razafindratsimendresy R, Tatem AJ, Heraud J-M±, and Metcalf CJE±. 2016. Introduction of Rubella-Containing-Vaccine to Madagascar: Implications for roll-out and local elimination across low-income countries. *Journal of the Royal Society Interface* 13(177): 20151101. doi:10.1098/rsif.2015.110.

2015

13. **Brook CE**, Beauclair R, Ngwenya O, Worden L, Ndeffo-Mbah M, Lietman TM, Satpathy SK, Galvani AP, and Porco TP. 2015. Spatial heterogeneity in projected leprosy trends in India. *Parasites & Vectors* 8(1): 542. doi: 10.1186/s13071-015-1124-7.
14. Rist CL, Ngonghala CN, Garchitorena A, **Brook CE**, Ramananjato, Miller AC, Randrianarivelojosia M, Wright PC, Gillespie TR, and Bonds MH. 2015. Modeling the burden of poultry disease on the rural poor in Madagascar. *One Health* 1: 60-65. doi: 10.1016/j.onehlt.2015.10.002.
15. **Brook CE**, Bai Y, Dobson AP, Osikowicz L, Ranaivoson HC, Zhu Q, Kosoy MY, and Dittmar K. 2015. Bartonella spp. in fruit bats and blood-feeding ectoparasites in Madagascar. *PLoS Neglected Tropical Diseases* 10(2): e0003532. doi:10.1371/journal.pntd.0003532.
16. **Brook CE** and Dobson AP. 2015. Bats as 'special' reservoirs for emerging zoonotic pathogens. *Trends in Microbiology* 23(3): 172-180. doi:10.1016/j.tim.2014.12.00.
17. Guyton J and **Brook CE**. 2015. African Bats: Conservation in the Time of Ebola. *Therya* 6(1): 69-88. doi: 10.12933/therya-15-244.
18. Young HS, McCauley DJ, Dirzo R, Goheen JR, Agwanda B, **Brook CE**, Castillo EO, Ferguson AW, Kinyua SN, McDonough MM, Palmer TM, Pringle RM, Young TP, and Helgen KM. 2015. Context - dependent effects of large wildlife declines on small mammal communities in central Kenya. *Ecological Applications* 25(2): 348–60. doi:10.1890/14-0995.1.

2013

19. **Brook CE**, Bernstein DP, and Hadly EA. 2013. Human food subsidies and Common Raven occurrence in Yosemite National Park, CA. *Western Birds* 44(2):127-34.

Selected Oral Presentations

2019 *Interdisciplinary Disease Across Scales Seminar Series,* Univ. of Georgia, Athens, GA. ***invited talk**
2019 *Association for Tropical Biology & Conservation Annual Meeting,* Antananarivo, Madagascar.
2018 *Fall Biology Seminar Series,* University of San Francisco, CA. ***invited talk**
2018 *Ecology and Evolution of Infectious Diseases*, University of Glasgow, Scotland.
2018 *Modeling in Epidemiology and Ecology,* Institut Pasteur, Antananarivo, Madagascar.***invited talk**
2017 *International Bat Infectious Diseases Conference.* Colorado State University, Fort Collins, CO.
2015 *North American Society Bat Research, Annual Meeting.* Monterey, CA. ***session organizer**

Research Grants

2020-present **Innovative Genomics Institute.** *PI.* $100,000.
"Next Generation Sequencing to Inform COVID-19 Outbreak Response in Madagascar."

2019-present **Bill & Melinda Gates Foundation Grand Challenges Explorations.** *PI.* $100,000.
"Metagenomics and the Etiology of Zoonotic Disease: Deciphering Bat-to-Human Viral Transmission in Madagascar."

2018-present **DARPA PREdicting Emerging Pathogenic Threats (PREEMPT).** *co-PI with RK Plowright (lead), H Arguilar-Carreno, N Bharti, P Ebby, E Gurley, B Han, PJ Hudson, JO Lloyd-Smith, H McCallum, L McGuire, V Munster, CR Parrish, AJ Peel, O Restif, T Schountz.* $10,000,000.
"Preventing emergence and spillover of bat viruses in high-risk global hotspots"**.**

2018-2019 **Center for Emerging and Neglected Tropical Diseases, Thomas C. Alber Science and Engineering Fellowship.** *PI.* $10,000.
"A transcriptomic window into zoonotic bat virus seasonality in Madagascar."

2017-present **National Institutes of Health, International Research in Infectious Diseases (R01).**
Senior/Key Personnel with co-PIs JM Héraud, CJ Metcalf, C Golden, and LF Wang (PI status not permitted for graduate students at time of submission). $625,000.
"Investigating seasonal drivers of viral zoonoses from Madagascar fruit bats."

2016-2017 **Princeton Environmental Institute, Walbridge Graduate Award.** *PI.* $10,000.
"Climate Change, Resource Scarcity, & Emerging Fruit Bat Zoonoses in Madagascar."

2016-2017 **National Science Foundation, Doctoral Dissertation Improvement Grant.**
co-PI with AP Dobson and AL Graham. $13,000.
"Within-host seasonal drivers of pathogen dynamics in a fruit bat reservoir."

2015-2016 **PIVOT Research Award.** *co-PI with AP Dobson and J-M Héraud.* $15,000.
"Investigating spillover of viral hemorrhagic fevers from fruit bats in Madagascar."

2015-2016 **National Geographic Society: Waitt Grant.** *PI.* $15,000.
"Investigating risks for Ebola virus spillover from Madagascar fruit bats."

2013-2014 **Lubee Bat Conservancy. Bacardi Conservation & Research Fund.** *PI.* $5,000.
"Bushmeat harvesting impacts on risk for henipavirus spillover among fruit bats in Madagascar."

2013-2014 **Bat Conservation International. Student Research Scholarship.***PI.* $3,200.
"Bushmeat harvesting impacts on population dynamics and corresponding risk for henipavirus spillover in Malagasy fruit bats."

2013-2014 **The Explorer's Club. Exploration Fund.** *PI.* $2,250.
"Mechanisms for viral persistence among mixed species fruit bat populations in Madagascar."

2013-2014 **Bill and Melinda Gates Foundation: Grand Challenges in Global Health Explorations.**
co-PI with MH Bonds, PC Wright, and *TR Gillespie.* $100,000.
"Quantifying the economic burden of disease in Ranomafana NP, Madagascar. "

2013-2014 **Princeton University: Health Grand Challenges Grant.** *PI.* $5,000.
"Biodiversity and human livelihood: Quantifying vector-control impact of insectivorous bats on human malaria burden in Ranomafana, Madagascar."

2013 **American Society of Mammalogist: Grants-in-Aid.** *PI.* $1,500.

"Mammalian Biodiversity, Metapopulation Connectivity, & Potential for Zoonosis."

2013 **National Geographic Society: Young Explorer Grant.** *PI.* $5,000.
"Habitat Modification and the Ecology of Plague Emergence in Madagascar."

2013 **Princeton University: Health Grand Challenges Grant.** *PI.* $1,200.
"Habitat Modification and Plague Emergence in Madagascar."

Teaching Experience

2016-present **E^2M^2: Ecological and Epidemiological Modeling in Madagascar.**
Founder, Instructor: **E2M2.org**
- Design and deliver lectures and exercises for introductory programming (R) workshop for Malagasy students in biology, medicine, public health

2015-2016 **International Clinics on Infectious Disease, Dynamics, and Data.**
Workshop Faculty: ici3d.org
- Designed and delivered lectures and exercises for introductory programming (R) workshop for African/N. American students in biology, medicine, public health

2014 **Evolution & Behavior of Sexes.** EEB 301. Princeton University. *Assistant-in-Instruction.*
- Taught weekly discussion section, designed exams and assignments for upper-division seminar in Ecology and Evolutionary Biology (EEB)

2012-2013 **Life on Earth.** EEB 211. Princeton University. *Assistant-in-Instruction.*
- Taught weekly discussion section, designed exams, labs and assignments for primary introductory course in the EEB major

2009 **Introduction to Earth Systems.** ES10. Stanford University. *Teaching Assistant*.
- Taught weekly classroom section, wrote and graded assignments, and designed curriculum for the primary introductory course in the ES major

Advising

UC Berkeley Graduate Students (informal mentor)**:**
- Sarah Guth (Ph.D., 2018-*current*)
  Seasonal movement and spatial infection dynamics in Madagascar fruit bats
- Mattina Allonge (Ph.D., 2018-*current*)
  Seasonal resource allocation to growth, reproduction, and immunity in Madagascar fruit bats

University of Antananarivo Advisees:
- Voloniaina Raharinosy (postdoc, 2018-*current*)
  Coronavirus diversity in Madagascar fruit bats
- Santino Andry (Ph.D., 2019-*current*)
  Quantifying cross-species contact networks in Madagascar fruit bats
- Fifi Ravelomanantsoa (Ph.D., 2019-*current*)
  Seasonal dynamics of microbiome diversity in the context of nutrition for Madagascar fruit bats
- Angelo Andrianiaina (Ph.D., 2018-*current*)
  Population dynamics of fruit bat ectoparasites in Madagascar
- Christian Ranaivoson (Ph.D., 2013-*current*)
  Seasonality of Babesia spp. infection in Madagascar fruit bats

Post-Baccalaureate Advisees:
- Anecia Gentles (Field Project Manager, 2019-*current*)
  Isotopic tracking of seasonal cross-species contact rates in Madagascar fruit bats
- Samantha Kreling (Field Project Manager, 2019)
- Katheryn Fitzgerald (Field Project Manager, 2019)
- Kimberly Rivera (Field Project Manager, 2019)

Princeton University Undergraduate Advisees
- Yun-Yun Li (2016, undergraduate research exchange)

- Emily Yu (2015, senior thesis)
  A study on Bartonella *spp. prevalence, strain diversity, & dynamics in* Rattus rattus *in Madagascar*
- Evaline Cheng (2014, senior thesis)
  Modeling the impacts of biodiversity loss on malaria transmission in Madagascar

Service and Outreach

- Bay Area Ecology and Evolution of Infectious Diseases Conference – *Co-Organizer* (2020)
- UC Berkeley Ecology and Evolution of Infectious Diseases Seminar Series – *Co-Organizer* (2019-*present*)
- Miller Institute Annual Symposium – *Planning Committee* (2018-*present*)
- Women's March Madagascar, Ranomafana, Madagascar – *Co-Founder, Co-Organizer* (2019)
- Women-In-Science Partnership, Princeton University – *Organizer* (2015-2017)

Skills

- **Writing:** National Geographic Society (NGS) Open Explorer Blog (2019-*current*): https://openexplorer.nationalgeographic.com/expedition/ekipafanihy/
- **Writing:** NGS Voices (2013-2018): http://voices.nationalgeographic.com/author/carabrook/
- **Language:** French (highly proficient written and spoken). Malagasy (highly proficient spoken).
- **Computer:** R, MatLab, C++, ArcGIS, Microsoft Office (Powerpoint, Word, Excel)