

Cara E. Brook

Department of Integrative Biology, University of California, Berkeley

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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 Synanthropic 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*)

2020

1. **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

2. **Brook CE**. 2019. A batty concept goes viral. *Nature Ecology & Evolution*. doi: 10.1038/s41559-019-1045-5.
3. 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.
4. **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.
*equal senior contributions
5. **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.
6. 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. *=equal senior contributions.

2018

7. **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

8. **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.
*= equal senior contributions.

2016

9. 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.
*= equal lead contributions; [±] = equal senior contributions.

2015

10. **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.
11. Rist CL, Ngonghala CN, Garchitorena A, **Brook CE**, Ramananjato, Miller AC, Randrianarivelosia 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.
12. **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.
13. **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.
14. 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.
15. 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

16. **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

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- 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

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- 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

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| | <i>Lloyd-Smith, H McCallum, L McGuire, V Munster, CR Parrish, AJ Peel, O Restif, T Schountz. \$10,000,000.</i> |
| | “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. |
| 2017-present | “A transcriptomic window into zoonotic bat virus seasonality in Madagascar.” 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. |
| 2016-2017 | “Investigating seasonal drivers of viral zoonoses from Madagascar fruit bats.” Princeton Environmental Institute, Walbridge Graduate Award. PI. \$10,000. |
| 2016-2017 | “Climate Change, Resource Scarcity, & Emerging Fruit Bat Zoonoses in Madagascar.” National Science Foundation, Doctoral Dissertation Improvement Grant. co-PI with AP Dobson and AL Graham. \$13,000. |
| 2015-2016 | “Within-host seasonal drivers of pathogen dynamics in a fruit bat reservoir.” PIVOT Research Award. co-PI with AP Dobson and J-M Héraud. \$15,000. |
| 2015-2016 | “Investigating spillover of viral hemorrhagic fevers from fruit bats in Madagascar.” National Geographic Society: Waitt Grant. PI. \$15,000. |
| 2013-2014 | “Investigating risks for Ebola virus spillover from Madagascar fruit bats.” Lubee Bat Conservancy. Bacardi Conservation & Research Fund. PI. \$5,000. |
| 2013-2014 | “Bushmeat harvesting impacts on risk for henipavirus spillover among fruit bats in Madagascar.” Bat Conservation International. Student Research Scholarship. PI. \$3,200. |
| 2013-2014 | “Bushmeat harvesting impacts on population dynamics and corresponding risk for henipavirus spillover in Malagasy fruit bats.” The Explorer’s Club. Exploration Fund. PI. \$2,250. |
| 2013-2014 | “Mechanisms for viral persistence among mixed species fruit bat populations in Madagascar.” Bill and Melinda Gates Foundation: Grand Challenges in Global Health Explorations. co-PI with MH Bonds, PC Wright, and TR Gillespie. \$100,000. |
| 2013-2014 | “Quantifying the economic burden of disease in Ranomafana NP, Madagascar.” Princeton University: Health Grand Challenges Grant. PI. \$5,000. |
| 2013 | “Biodiversity and human livelihood: Quantifying vector-control impact of insectivorous bats on human malaria burden in Ranomafana, Madagascar.” American Society of Mammalogist: Grants-in-Aid. PI. \$1,500. |
| 2013 | “Mammalian Biodiversity, Metapopulation Connectivity, & Potential for Zoonosis.” National Geographic Society: Young Explorer Grant. PI. \$5,000. |
| 2013 | “Habitat Modification and the Ecology of Plague Emergence in Madagascar.” Princeton University: Health Grand Challenges Grant. PI. \$1,200. |
| | “Habitat Modification and Plague Emergence in Madagascar.” |

Teaching Experience

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| 2016-present | E²M²: Ecological and Epidemiological Modeling in Madagascar. <i>Founder, Instructor: E2M2.org</i> |
| | - 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. <i>Workshop Faculty: ici3d.org</i> |
| | - 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 Andrianiana (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

- UC Berkeley Ecology and Evolution of Infections 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)