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## EDUCATION & RESEARCH

2020-present, Associate Professor in Ecology, Evolution and Public Affairs, Princeton University, USA.
2014-2020, Assistant Professor in Ecology, Evolution and Public Affairs, Princeton University, USA.
2010-2014, Royal Society University Research Fellow, Dept of Zoology, Oxford University, UK.
2009-2010, Post-doctoral research, Dept of Ecology and Evolution, Princeton University, USA.
2008-2009, Post-doctoral research, Center for Infectious Disease Dynamics, Penn State University, USA.
2006-2008, Duke Population Research Institute Post-doctoral Fellow, Duke University, Durham, USA.
2005-2006, Post-doctoral research, Max Planck Institute for Demographic Research, Rostock, Germany.
2002-2005, Imperial College London, UK Ph.D.
2000, University of Oxford, St Hugh's College, UK. B.A. (hons), Biology. First Class.
1996, Lycée Français d'Antananarivo, Madagascar. Baccalauréat S. Mention Très Bien

## PUBLICATIONS

### 2020

- **Metcalf, C.J.E.**, Morris, D.H., Park, S.W. 2020 Mathematical models to guide pandemic response. *Science* **369** 368-369 [link]
- Wagner, C.E., Hooshyar, M. Baker, R.E., Yang, W. Arinaminpathy, N., Vecchi, G., **Metcalf, C.J.E.**, Porporato, A., Grenfell B.T. 2020 Climatological, virological and sociological drivers of current and projected dengue fever outbreak dynamics in Sri Lanka *Journal of the Royal Society Interface* **17**, 20200075 [link]
- **Metcalf, C.J.E.**, Viboud, C., Spiro, D.J., Grenfell B.T. 2020. Using Serology with Models to clarify the trajectory of the SARS-CoV-2 emerging outbreak *Trends in Immunology* [link]
- Korevaar, H., **Metcalf, C.J.E.**, Grenfell B.T. 2020 Structure, space and size: competing drivers of variation in urban and rural measles transmission *Journal of the Royal Society Interface* **17** 20200010 [link]
- Motaze, N.V., Edoka, I., Wiysonge, C.S., **Metcalf, C.J.E.**, Winter, A.K. 2020. Rubella Vaccine Introduction in the South African Public Vaccination Schedule: Mathematical Modelling for Decision Making *Vaccines* **8** 383 [link]
- Miller, I.F., Becker, A.D., Grenfell, B.T., **Metcalf, C.J.E.**. 2020 Disease and healthcare burden of COVID-19 in the United States *Nature Medicine*, **1-6** [link]
- Mina, M.J., **Metcalf, C.J.E.**, McDermott, A.B, Douek, D.C., Farrar, J. & Grenfell, B.T. 2020. A Global Immunological Observatory to meet a time of pandemics. *eLife* [link]
- Haushofer, J.A. & **Metcalf, C.J.E.**. 2020. Which interventions work best in a pandemic. *Science* **368** 1063-1065 [link]
- Baker, R.E., Yang, W., Vecchi, G.A., **Metcalf, C.J.E.**, Grenfell, B.T. 2020. Susceptible supply limits the role of climate in the early SARS-CoV-2 pandemic. *Science* [link]
- Lau, M.S., Becker, A.D., Korevaar, H.M., Caudron, Q., Shaw, D.J., **Metcalf, C.J.E.**, Bjørnstad, O.N. and Grenfell, B.T., 2020. A competing-risks model explains hierarchical spatial coupling of measles epidemics en route to national elimination. *Nature Ecology & Evolution*, pp.1-6. [link]

- **Metcalf, C.J.E.**, Wesolowski, A., Winter, A.K., Lessler, J., Cauchemez, S., Moss, W.J., McLean, A.R. and Grenfell, B.T., 2020. Using serology to anticipate measles post-honeymoon period outbreaks. *Trends in Microbiology*. [link]
- Buckee, C.O., Balsari, S., Chan, J., Crosas, M., Dominici, F., Gasser, U., Grad, Y.H., Grenfell, B., Halloran, M.E., Kraemer, M.U. and Lipsitch, M., **Metcalf, C.J.E.**, Meyers, L.A., Perkins, T.A., Santillana, M., Scarpino, S.V., Viboud, C., Wesolowski, A., Schroeder, A. 2020. Aggregated mobility data could help fight COVID-19. *Science* **368** 145-146 [link]
- Schluter, B-S., Masquelier, B., **Metcalf, C.J.E.**, Raodoanomenjanahary, A. 2020 Long-term trends in seasonality of mortality in Madagascar: the role of the epidemiological transition. *Global Health Action* **13**: 1717411 [link]

## 2019

- Miller, I.F., **Metcalf, C.J.E.** 2019 Vaccine-driven virulence evolution: consequences of unbalanced reductions in mortality and transmission and implications for pertussis vaccines. *Journal of the Royal Society Interface* **16**: 20190642 [link]
- Baker, R.E., Mahmud, A.S., Wagner, C.E., Yang, W., Pitzer, V.E., Viboud, C., Vecchi, G.A., **Metcalf, C.J.E.** & Grenfell, B.T., 2019. Epidemic dynamics of respiratory syncytial virus in current and future climates. *Nature Communications*, **10**: 1-8. [link]
- Cutts, F.T., Dansereau, E., Ferrari, M.J., Hanson, M., McCarthy, K.A., **Metcalf, C.J.E.**, Takahashi, S., Tatem, A.J., Thakkar N., Truelove, S., Utazi., E., Wesolowski, A., Winter, A.K. Using models to shape measles control and elimination strategies in low- and middle-income countries: a review of recent applications. *Vaccine* **38** 979-992 [link]
- **Metcalf, C.J.E.**, Roth, O., Graham, A.L. 2019. Why leveraging sex differences in immune tradeoffs may illuminate the evolution of senescence *Functional Ecology* [link]
- Morella, N.M., Weng, F. C-H., Joubert, P., **Metcalf, C.J.E.**, Lindow, S., Koskella, B. 2019. Successive passaging of a plant-associated microbiome reveals robust habitat and host genotype-dependent selection *PNAS PNAS* **14** 1148-1159 [link]
- **Metcalf, C.J.E.**, Henry, L., Rebolleda-Gomez, M. Koskella, B. 2019. Why evolve reliance on the microbiome for timing of ontogeny? *mBio* [link]
- **Metcalf, C.J.E.**, Koskella, B. 2019. Protective microbiomes can limit the evolution of host pathogen defense *Evolution Letters* [link]
- Bruijning, M., **Metcalf, C.J.E.**, Jongejans, E., Ayroles, J.F. 2019. The evolution of variance control. *Trends in Ecology and Evolution* [link]
- Mina, M.J., Grenfell, B.T., **Metcalf, C.J.E.** 2019. Response to comment on Long-term measles induced immunomodulation increases overall childhood infectious disease mortality *Science* **365** 6449 [link]
- Bozick, B., Worby, C. **Metcalf, C.J.E.** 2019. Phylogeography of rubella virus in Asia: vaccination and demography shape synchronous outbreaks *Epidemics* **100346** [link]
- Kaminsky, J., Keegan, L., **Metcalf, C.J.E.**, Lessler, J. 2019. Perfect Counterfactuals for Epidemic Simulations. *Philosophical Transactions of the Royal Society* **234** [link]
- Graham, M., Winter, A.K., Ferrari, M., Grenfell, B.T., Moss, W.J., Azman, A.S., **Metcalf, C.J.E.**, Lessler, J. 2019. Measles and the Canonical Path to Elimination *Science* **364**: 584-587 [link]
- Utazi, C.E., Thorley, J., Alegana, V.A., Ferrari, M.J., Takahashi, S. **Metcalf, C.J.E.**, Lessler, J., Cutts, F.T., Tatem, A.J. 2019. Mapping vaccination coverage rates at high resolution to explore the effects of delivery mechanisms *Nature Communications* **10**: 1633 [link]

- Mensah, K., Heraud, J.-M., Takahashi, S., Winter, A.K., **Metcalf, C.J.E.**, Wesolowski, A. 2019. Seasonal gaps in measles vaccination coverage in Madagascar *Vaccine* **37**: 2511-2519 [link]
- Brook,C..E., Ranaivoson, H.C., Andriafidison, D., Ralisata, M., Razafimanahaka, J., Heraud, J-M., **Metcalf, C.J.E.**, Dobson, A.P. 2019. Age-based inference into population trends for two Malagasy fruit bats *Biological Conservation* **234**: 165-171 [link]
- Brook,C..E., Ranaivoson, H.C., Border, C.C., Cunningham, A.A., Heraud, J-M., Peel, A.J., Gibson, L., Wood, J.L.N., **Metcalf, C.J.E.**, Dobson, A.P. 2019. Disentangling serology to elucidate henipa- and filovirus transmission in Madagascar fruit bats *Journal of Animal Ecology* [link]
- Miller, I.F., **Metcalf, C.J.E.** 2019. Evolving resistance to novel pathogens. *Science* [Perspective] **363**: 1277-1278 [link]
- Truelove, S.A., Graham, M., Moss, W.J., **Metcalf, C.J.E.**, Ferrari, M., Lessler, J. 2019. Characterizing the impact of spatial clustering of susceptibility for measles elimination *Vaccine* **37**: 732-741[link]
- WHO Rabies Modelling Consortium. 2019. The potential impact of improved provision of rabies post-exposure prophylaxis in Gavi-eligible countries: a modelling study. *Lancet Infectious Diseases* **19**: 102-111 [link]

## 2018

- Rajeev, M., Edosoa, G., Hanitriniaina, C., Andriamandimby, S.F., Guis, H., Ramiandrasoa, R., Ratovoson, R., Randrianasolo, L., Andriamananjara, M., Heraud, J-M., Baril, L., **Metcalf, C.J.E.**, Hampson, K. 2018. Healthcare utilization, provisioning of post-exposure prophylaxis, and implications for human rabies: a case study from Madagascar *Vaccine* [link]
- **Metcalf, C.J.E** & Graham, A.L. 2018. Schedule and magnitude of reproductive investment under immune tradeoffs explains male-female sex differences in immunity *Nature Communications* **9**: 4391 [link]
- Dalziel, B.D., Kissler, S., Gog, J., Viboud, C., Bjørnstad, O.N., **Metcalf, C.J.E.**, Grenfell, B.T. 2018. Climate and Urbanization Interact to Drive Predictable Differences in the Intensity of Influenza Epidemics among US Cities *Science* **362**: 75-79 [link]
- Utazi, C.E., Thorley, J., Alegana, V.A., Ferrari, M.J., Takahashi, S. **Metcalf, C.J.E.**, Lessler, J., Tatem, A.J. 2018. A spatial regression model for the disaggregation of areal unit based data to high resolution grids with application to vaccination coverage mapping *Statistics in Medicine* 0962280218797362 [link]
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- Takahashi, S., **Metcalf, C.J.E.**, Arima, Y., Fujimoto, T., Shimizu, H., van Doorn, H.R., Van, T.L., Chan, Y.-F., Farrar, J.J., Oishi, K., Grenfell, B.T. 2018. Epidemic dynamics and predictability of enteroviruses associated with hand, foot, and mouth disease in Japan *Journal of the Royal Society Interface* **15**: 20180507 [link]
- Prada, J., **Metcalf, C.J.E.**, Ferrari, M. 2018. Improving measles incidence inference using age-structured serological data. *Epidemiology and Infection* **146**: 1699-1706 [link]
- Winter, A., Wesolowski, A., Mensah, K., Ramamonjiharisoa, M.B., Randriamanantena, A.H., Razafindratsimandresy, R., Cauchemez, S., Lessler, J., Ferrari, M., **Metcalf, C.J.E.**, Heraud, J-M. 2018. Revealing Measles Outbreak Risk with a Nested IgG Serosurvey in Madagascar *American Journal of Epidemiology* **187**: 2219-2226 [link]
- Weslowksi, A., Winter, A.K., Tatem, A.J., Qureshi, T., Engo-Monsen, K., Buckee C.O., Cummings, D.A.T. & **Metcalf, C.J.E.** 2018. Measles outbreak risk in Pakistan: exploring the potential of combining health system data with novel data-streams to strengthen control *Epidemiology and Infection* **146**: 1575-1583 [link]

- Baker, R., Mahmud, A., **Metcalf, C.J.E.** 2018. Dynamic response of airborne infections to climate change: predictions for varicella. *Climatic Change* **148**: 547-560 [link]
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- Graham, M. Suk, J.E., Takahashi, S., **Metcalf, C.J.E.**, Jimenez, A.P., Prikazsky, V., Ferrari, M.J., Lessler, J. 2018. Challenges and Opportunities in Disease Forecasting in Outbreak Settings: a Case Study of Measles in Lola Prefecture, Guinea *American Journal of Tropical Medicine and Hygiene* **98**: 1489 - 1497 [link]
- Buckee, C.O., Cardenas, M.I.E, Corpuz, J., Ghosh, A., Haque, F. Karim, Md. J., Mahmud, A., Maude R.J., Mensah, K., Motaze, V., Nabaggala, M., **Metcalf, C.J.E.** , Mioramalala, S.A., Mubiru, F., Peak, C., Pramanik, S., Rakotondramanga, J-M., Remera, E., Sinha, I., Sovannaroth, S., Tatem, A.J., Zaw, W. Productive disruption: opportunities and challenges for innovation in infectious disease surveillance 2018 *BMJ Public Health* **3**: e000538 [link]
- Utazi, C.E., Thorley, J., Alegana, V.A., Ferrari, M.J., Takahashi, S. **Metcalf, C.J.E.**, Lessler, J., Tatem, A.J. 2018. High resolution age-structured mapping of childhood vaccination coverage in low and middle income countries. *Vaccine* **36**: 1583-1591 [link]
- Ihantamalala, F.A., Rakotoarimanana, F.M.J., Ramiadantsoa, T., Rakotondramanga, J-M., Pennober, G., Rakotomanana, F., Cauchemez, S., **Metcalf, C.J.E.**, Herbreteau, V., Wesolowski, A. Spatial and temporal dynamics of malaria in Madagascar. *Malaria Journal* **17**: 58 [link]
- Winter, A.K., Prahamanik, S., Lessler, J., Ferrari, M., Grenfell, B.T., **Metcalf, C.J.E.** 2018. Rubella vaccination in India: identifying broad consequences of vaccination introduction, key knowledge gaps, and recommendations for addressing them *Epidemiology and Infection* **146**: 65-77 [link]

## 2017

- Wesolowski, A., zu Erbach-Schoenberg, E., Tatem, A.J., Lourenco, C., Viboud, C. Charu, V., Eagle, N., Engo-Monsen, K., Qureshi, T., Buckee, C.O., & **Metcalf, C.J.E.** 2017. Multinational patterns of seasonal asymmetry in human movement influence infectious disease dynamics *Nature Communications* **2069** [link]
- Mahmud, A.S., Alam, N. & **Metcalf, C.J.E.** 2017. Drivers of measles mortality: the historic fatality burden of famine in Bangladesh *Epidemiology and Infection* **145**: 3361-3369 [link]
- Koskella, B., Hall, L. **Metcalf, C.J.E.** 2017. The microbiome beyond the horizon of ecological and evolutionary theory *Nature Ecology and Evolution* **1**: 1606 [link]
- **Metcalf, C.J.E.**, Tate, A.T., Graham, A.L. 2017. Demographically framing tradeoffs between sensitivity and specificity illuminates selection on immunity. *Nature Ecology and Evolution* **1**: 1766 [link]
- Brook, C.E., Bai, Y., Yu, E.O., Ranaivoson, H.C., Shin, H. Dobson, A.P., **Metcalf, C.J.E.**, Kosoy, M.Y., Dittmar, K. 2017 Elucidating transmission dynamics and host-parasite-vector relationships for rodent-borne *Bartonella spp.* in Madagascar *Epidemics* **20**: 56-66 [link]
- **Metcalf, C.J.E.**, Walter, K.S., Wesolowski, A., Buckee, C.O., Shevliakova, E., Tatem, A., Boos, W.R., Weinberger, D., Pitzer, V.E. 2017. Identifying climate drivers of infectious disease dynamics: recent advances, and challenges ahead. *Proceedings of the Royal Society Series B*. **284**: 20170901.[link]
- **Metcalf, C.J.E.** & Lessler, J. 2017. Opportunities and challenges in modeling emerging infectious diseases. *Science* **357**: 149-152 [link]
- Takahashi, S., **Metcalf, C.J.E.** , Ferrari, M.J., Tatem, A.J., Lessler, J. 2017 The geography of measles vaccination in the African Great Lakes region. *Nature Communications* **8**: 15585. [link]

- **Metcalf, C.J.E.** , Mensah, K., Wesolowski, A.P., Winter, A.K., Ramamonjiharisoa, B., Takahashi, S., Randriamanantena, A., Razafindratsimandresy, R., Heraud, J-M. 2017 Seasonal determinants of access to care: implications for measles outbreak risk in Madagascar *The Lancet* **389**: S14 [link]
- Koskella, B.T., Crowther, W.S., Meaden, S., Leimu, R., **Metcalf, C.J.E.** 2017 A signature of tree health? Shifts in the microbiome and the ecological drivers of horse chestnut bleeding canker disease *New Phytologist* **215**: 737-746 [link]
- Prada, J., **Metcalf, C.J.E.**, Takahashi, S., Lessler, J., Tatem, A. Ferrari, M. 2017. Demographics, epidemiology and the impact of vaccination campaigns in a measles free world - can elimination be maintained? *Vaccine* **35**: 1488-1493 [link]
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## 2016

- Wesolowski, A, Buckee, C.O., Engo-Monsen, K., **Metcalf, C.J.E.** 2016. Connecting mobility to infectious diseases: the promise and limits of mobile phone data *The Journal of Infectious Diseases* **214**: S414-S420 [link]
- Lessler, J., **Metcalf, C.J.E.**, Cutts, F.T. & Grenfell, B.T. 2016. Impact on Epidemic Measles of Vaccination Campaigns Triggered by Disease Outbreaks or Serosurveys: A Modeling Study. *PloS Medicine* **13**: e1002144 [link]
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- **Metcalf, C.J.E.** & Barrett, A. 2016. Invasion Dynamics of Teratogenic Infections in Light of Rubella Control: Implications for Zika Virus *PloS Currents* **8** [link]
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- **Metcalf, C.J.E.**, Farrar, J., Cutts, F.T., Basta, N., Graham, A.L., Lessler, J., Ferguson, N., Burke, D., Grenfell, B.T. 2016. Serological surveys: Generating key insight into the changing global landscape of infectious disease. *Lancet* **16**: 30164-7 [link]
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## 2015

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- **Metcalf, C.J.E.**, Tatem, A.J., Bjornstad, O.N., Lessler, J., Reilly, K., Takahashi, S., Cutts, F., & Grenfell, B.T. 2014. Transport networks and inequities in vaccination: remoteness shapes measles vaccine coverage and prospects for elimination across Africa. *Epidemiology and Infection*: 1-10
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- **Metcalf, C.J.E.**, Hampson, K., Tatem, A., Grenfell, B.T., & Bjornstad, O.N. 2013 Persistence in epidemic metapopulations: quantifying the rescue effects for measles, mumps, rubella and whooping cough. *PLoS ONE* **10**: e1371
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- **Metcalf, C.J.E.**, Lessler, J., Klepac, P., Morice, A., Grenfell, B.T., Bjørnstad, O.N. 2012 Structured models of infectious disease: inference with discrete data *Theoretical Population Biology* **82**: 275-282

## 2011

- Lessler, J., **Metcalf, C.J.E.**, Grais, R.F., Luquero, F.J., Cummings, D.A.T., Grenfell, B.T. 2011. Measuring the performance of vaccination programs using cross-sectional surveys *PloS Medicine* **8**, e1001110
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## 2010

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- **Metcalf, C.J.E.**, Klepac, P., Ferrari, M., Grais, R.F., Djibo, A. & Grenfell, B.T. 2010. Modeling the first dose of measles vaccination: the role of maternal immunity, demographic factors, and delivery systems *Epidemiology and Infection* **139**: 265-274
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## 2009

- **Metcalf, C.J.E.**, Bjørnstad, O.N., Grenfell, B.T., & Andreasen, V. 2009 Seasonality and comparative dynamics of six childhood infections in pre-vaccination Copenhagen. *Proc. Roy. Soc. B.* **276**, 4111-4118
- **Metcalf, C.J.E.**, Horvitz, C.C., Tuljapurkar, S. & Clark, D.A. 2009 A time to grow and a time to die: a new way to analyze the dynamics of size, light, age and death of tropical trees. *Ecology* **90**, 2766-2778
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- **Metcalf, C.J.E.**, Stephens, D., Rees, M., Louda, S.M. & Keeler, K.H. 2009 Understanding allocation of resources between vegetative and sexual reproduction: Using Bayesian inference to capture interdependent demography with incomplete observations. *J. Appl. Stat.* **58**, 143-170.
- **Metcalf, C.J.E.**, Clark, J.S., & McMahon, S.M. 2009 Modeling tree mortality as a non-parametric function of diameter and growth, with prior weights on mortality of large trees. *Canad. J. Forest. Res.* **39**, 1677-1687

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- **Metcalf, C.J.E.**, Rees, M., Buckley, Y.M., & Sheppard, A.W. 2009. Seed predators determine the evolutionarily stable flowering strategy in the invasive plant *Carduus nutans*. *Evol. Ecol.* **23**, 893-906

**2008**

- Koons, D.N., **Metcalf, C.J.E.**, & Tuljapurkar, S. 2008. Evolution of delayed reproduction in uncertain environments: a life history perspective. *Am. Nat.* **172**, 797-805
- **Metcalf, C.J.E.**, Rees, M., Rose, K.E., Sheppard, A., & Grubb, P.J. 2008. Evolution of flowering decisions in a stochastic, density-dependent environment. *PNAS* **105**, 10466-10470.
- Pavard, S., **Metcalf, C.J.E.**, & Heyer, E. 2008. Senescence of Reproduction may explain Adaptive Menopause in Humans: a Test of the "Mother" Hypothesis *Am. J. Phys. Anth.* **136**, 194-203.
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**2007**

- Pavard, S., & **Metcalf, C.J.E.** 2007. Negative selection on *BRCA1* susceptibility alleles sheds light on the population genetics of late-onset diseases and aging theory *PloS-One* **11**, e1206.
- **Metcalf, C.J.E.**, & Pavard, S. 2007. All paths to fitness lead through demography *Trends Ecol. Evol.* **22**, 563-564.
- **Metcalf, C.J.E.**, & Koons, D.N. 2007. Environmental Autocorrelation and the Evolution of Survival *Proc. Roy. Soc. B.* **1622**, 2153-2160.
- **Metcalf, C.J.E.**, & Pavard, S. 2007. Why evolutionary biologists should be demographers *Trends Ecol. Evol.* **22**, 205-212.
- **Metcalf, C.J.E.**, Hampson, K., Gray, A., & Andrianirina, R. 2007. Herpetofaunal assemblages on seven offshore islands of Northwestern Madagascar. *Trop. Zool.* **20**, 151-161.
- **Metcalf, C.J.E.**, Hampson, K., & Koons, D.N. 2007. What happens when density increases? Sudden and gradual influx into refuges and implications for conservation. *Animal Cons.* **10**, 478-486.
- **Metcalf, C.J.E.**, Hampson, K., Andriamizava, A., Andrianirina, R., Cairnes, T., Gray, A. Ramiarisoa, C., & Sondotra, H. 2007. The beaches of Northwest Madagascar: an important nesting habitat for green (*Chelonia mydas*) and hawksbill (*Eretmochelys imbricata*) turtles. *Oryx* **41**, 232-238.

**2006**

- Rees, M., Childs, D.Z., **Metcalf, C.J.E.**, Rose, K.E., Sheppard, A., Grubb, P.J., & Ellner, S.P. 2006. Evolution of seed dormancy and delayed flowering in monocarpic plants: selective interactions in a stochastic environment *Am. Nat.* **168**, E53-E71.
- **Metcalf, C.J.E.**, Rees, M., Alexander, J.M., & Rose, K.E. 2006. Growth-survival trade-offs and allometries in rosette-forming perennials. *Funct. Ecol.* **20**, 217-225.

**2005**

- **Metcalf, C.J.E.**, Bayly, N., Bisoa, M., Rabearivony, J., & Stewart-Jones, A. 2005. Edge effect from paths on two chameleon species in Madagascar *African J. Herp.* **54**, 99-102.
- **Metcalf, C.J.E.**, Bayly, N., Bisoa, M., Rabearivony, J., & Stewart-Jones, A. 2005. *Furcifer oustaleti, Furcifer rhinoceratus* (NCN) Density. *Herp. Rev.* **36**, 447.
- **Metcalf, C.J.E.**, Bayly, N., Bisoa, M., Rabearivony, J., & Stewart-Jones, A. 2005. *Furcifer oustaleti, Furcifer rhinoceratus* (NCN) Predation. *Herp. Rev.* **36**, 447-448.

**2003**

- **Metcalf, J.C.**, Rose, K., & Rees, M. 2003. Evolutionary demography of monocarpic perennials. *Trends Ecol. Evol.* **18**, 471-480.

## BOOK CHAPTERS

- **Metcalf, C.J.E.** and Ayroles JF. (2016). Chapter: Why does intragenotypic variance persist? In book titled: Unsolved Problems in Ecology. Princeton University Press.
- Rajeev, M., **Metcalf, C.J.E.** and Hampson, K., 2020. Modeling canine rabies virus transmission dynamics. In Rabies: 4th Edition: Scientific Basis of the Disease and Its Management.
- Pavard, S. **Metcalf, C.J.E.** Trade-offs between causes of mortality in life history evolution: the case of cancers. Oskar Burger; Ronald Lee; Rebecca Sear. Human Evolutionary Demography., Open Book Publishers, In press. [link]
- Winter, A.K., **Metcalf, C.J.E.** Characterizing Seroprofiles of Immunity *Chapter XIV, Handbook of Infectious Disease Dynamics.* Chapman & Hall. Editors: Leonhard Held; Niel Hens; Philip O'Neill; Jacco Wallinga. [link]
- Thomson, M.C., **Metcalf, C.J.E.**, Mason, S.J. 2018. Connecting climate information with Health Outcomes *Chapter 3, Climate Information for Public Health Action* Routledge. Editors: Thomson, M.C. Mason, S.J. [link]
- Bughardt, L. **Metcalf, C.J.E.**. 2017. The evolution of environment-dependent senescence in semelparous plants: insights into the genetic and physiological basis from a model organism. *Chapter in: The Evolution of Senescence in the Tree of Life*
- **Metcalf, C.J.E.** 2016 Life History Evolution in Plants. In Kliman, R. (ed.) Encyclopaedia of Evolutionary Biology. vol2 p359-360. [link] Oxford: Academic press.
- Arinaminpathy, N. **Metcalf, C.J.E.** & Grenfell, B.T. 2013. Viral dynamics and mathematical models in *'Viral Infections in Humans: Epidemiology and Control (5th Ed)'* Eds. Springer. Editors: RA Kaslow, LR Stanberry, JW LeDuc
- Clark, J.S., Bell, D., Dietze, M., Hersh, M. Ibanez, I., LaDeau, S., McMahon, S.M., **Metcalf, C.J.E.**, Moran, E., Pangle, L. & Wolosin, M. 2008. Models for demography of plant populations in *Handbook of Bayesian Analysis* Eds. A. O'Hagan & M. West.
- Buckley, Y.M., & **Metcalf, C.J.E.** 2006. Density dependence in invasive plants: demography, herbivory, spread and evolution in *Conceptual Ecology and Invasions Biology: Reciprocal Approaches to Nature.* Eds. Cadotte, McMahon & Fukami. Springer-Verlag. Dordrecht, The Netherlands.

## PRESENTATIONS

- Jan 2019 Disease in motion in Madagascar. Harvard School of Public Health, invited seminar.
- Jan 2019 Sex differences in immune function University of Florida
- Dec 2019 Protective microbiomes can limit the evolution of host pathogen defense. British Ecological Society conference, Belfast.
- Dec 2019 Invited Talk.Sex differences in immune function: probing ultimate drivers, and exploring consequences. Keynote Speaker, Epidemics conference, Charleston.
- Nov 2019 Invited Talk. Living together on short and long time-scales: hosts and their microbes. Centre for the Ecology of Infectious Diseases, University of Georgia, Athens.

- Sept 2019 Rubella dynamics and control: across scales and generations. Invited Talk. Emory, Atlanta
- March 2019 Evolution of sex differences when immunity is dangerous. Invited Talk. Dept of Ecology and Evolutionary Biology. University of Tennessee.
- Jan 2019 Evolution of sex differences when immunity is dangerous. Invited Talk. Dept of Integrative Biology, Oregon State University.
- Jan 2019 Epidemiological dark matter: probing the landscape of susceptibility in global health using serology. Invited Talk. Meeting of the Japanese Funding Body, Workshop on Big Data Applications. Tokyo, Japan
- Jan 2019 Modeling Mobility. Invited Talk. Innovative Mathematical Modeling for the Analysis of Infectious Disease Data (IMMAID). Hokade, Japan.
- Nov 2018. Living together on short and long time-scales: plants and their microbes. Invited Seminar, University of Virginia, Charlottesville, USA
- Aug 2018. Modeling within host dynamics: semi-mechanistic models to Integral Projection Models. Invited talk, Organized Oral Session on Novel Modeling Approaches in Disease Ecology. Ecological Society of America Annual Meeting, New Orleans, USA
- April 2018. Evolution of immune discrimination under divergent demographic schedules and male-female immune differences. Invited Seminar, Centre for Infectious Disease Dynamics, the Pennsylvania State University, USA
- Feb 2018. Evolving immunity, across fast to slow life-cycles. Invited Seminar, Darwin Day Celebrations, University of Oslo, Norway
- Feb 2018. Meeting the challenge of malaria from biology to geography, Oslo Life Sciences Event, Oslo, Norway
- Nov 2017. Epidemiological dark matter: using serology to probe the landscape of susceptibility in global health, Organized session. ASTMH Annual Meeting, Baltimore, USA
- Oct 2017. Connecting mobility to infectious diseases: the promise and limits of mobile phone data, Invited talk. Radcliffe Institute for Advanced Studies, Boston, USA
- Oct 2017. Epidemics in a changing world: population drivers of childhood infections, Invited talk. Special Session on the New Era of Epidemics, Harvard School of Public Health, USA
- Oct 2017. Evolution of timing across scales: from demographic data to prediction of life history outcomes, Invited talk. UC Davis, USA
- Oct 2017. Climate drivers of infectious disease: disentangling direct and indirect effects Invited Talk. Earth Systems Science Center, Stanford University, USA
- July 2017. Modeling Rubella dynamics for public health. Invited Talk. University of Tokyo, Japan.
- May 2017. Infectious disease dynamics: networks and adaptive systems. Meeting of the Adaptive Networks Group UCSB/Princeton, Princeton, NJ, USA
- April 2017. The Seasonal and Climatic Determinants of Access to Care: Implications for Measles Outbreak Risk in Madagascar. Meeting of the Planetary Health Alliance, Boston, USA
- Oct 2016. Trade-offs, and the causes of mortality: a neglected driver of life history evolution. Meeting of the Evolutionary Demography Society, University of Virginia, Charlottesville, VA, USA
- August 2016. From population to landscape: cross scale dynamics of immunising childhood infections. Invited talk, Organized Oral Session on Landscape Demography. Ecological Society of America Annual Meeting, Fort Lauderdale, USA

- July 2016. Modélisation de maladies inféctieuses et leur contrôl à Madagascar. Invited Seminar. Institut Pasteur de Madagascar, Antananarivo, Madagascar
- July 2016. Modeling to inform introduction of rubella-containing vaccine, Invited Seminar. SACEMA, Stellenbosch University, South Africa
- July 2016. Seasonality and Infectious disease dynamics. Invited talk at the Applied Center for Climate and Earth ScienceS, Capetown, South Africa, meeting on " The Present and Past Seasonal Cycles"
- June 2016. Demography: the engine of evolution. Invited Seminar. Paris Fitness Workshop, with the Ecole Normale Supérieure.
- April 2016. Disease in motion. Invited Seminar. Department of Ecology and Evolutionary Biology, University of Arizona, Tucson, USA.
- Feb 2016. Challenges of measles control and elimination in resource poor settings. Invited panel. AAAS Annual Meeting, Washington DC, USA.
- Jan 2016. Disease in motion: childhood infections in a changing world. Invited Seminar. Department of Ecology and Evolutionary Biology, University of Toronto, Canada.

## FUNDING SOURCES

- 2018-2021: National Science Foundation ($29,549): Ecological and evolutionary impacts of disrupted transmission on host-microbiome associations. co-PI
- 2017-2022: National Institute of Health ($674,495): Investigating seasonal drivers of viral zoonoses from Madagascar fruit-bats. co-PI.
- 2017-2018: Wellcome Trust ($180,000). Extension: Seasonal drivers of human movement and aggregation in a changing climate: consequences for infectious disease dynamics and control. PI
- 2015-2017: The Wellcome Trust ($ 619,618). Seasonal drivers of human movement and aggregation in a changing climate: consequences for infectious disease dynamics and control. PI.
- 2016-2018: Bill & Melinda Gates Foundation ($677,195). Renewal: Use of novel modelling approaches to improve measles and rubella vaccination strategies. co-PI.
- 2013-2015: Bill & Melinda Gates Foundation ($ 1,024,809). Use of novel modelling approaches to improve measles and rubella vaccination strategies. co-PI.
- 2013-2014: Royal Society Research Grant (£13,000) for research into microbial communities of oak trees
- 2010-2015: University Research Fellowship from the Royal Society. PI
- 2012-2103: John Fell Oxford University Press Research Fund (£68,122) award for research into the horse chestnut bleeding canker pathogen PI.
- 2013: Max Planck society grant "Demography in a continuous world: new advances in integral projection models II" (€30,000). co-PI

## TEACHING

### Courses

- 2016, 2017, 2019, 2020 (spring) *Epidemiology: an ecological and evolutionary perspective*, undergraduate level course, Princeton; WWS598/GHP351
- 2014, 2015, 2016 (fall) *Disease Ecology, Economics, and Policy*, undergraduate course, co-taught With B. Grenfell, Princeton

- November 2016, 2017 *E2M2: Ecological and Epidemiological Modeling in Madagascar*, Centre ValBio, Ranomafana National Park, Madagascar; week long course for masters level and higher
- 2015 (spring) *Epidemiology*, graduate level course, Woodrow Wilson School, Princeton; WWS598/GHP350

**Guest Lectures**

- 2011, 2012, 2016, 2017 (April) *Introduction of rubella-containing vaccine*, at Johns Hopkins Bloomberg School of Public Health, Guest Lecture, as part of the Master of Public Health course
- July 2016 *Climate drivers and health*, at ACCESS, Capetown, South Africa, as part of the Habitable Planet Workshop
- Nov 2015 *Evolutionary Medicine*, contributed seminar, with Stephen Stearns, Yale University
- 2015 (spring) lecture on *Evolutionary demography with monocarpic perennials*, as part of the International Max Planck Training School for Demography, Rostock.
- 2012 *Demography In a Continuous World: New Advances In Integral Projection Models* at the Ecological Society of America meeting
- *Integrating demography with life history evolution and evolutionary theory* as part of the Stanford Workshop on Biodemography, May 2013.

**Other**

- Sept 2017, McGraw Center, Princeton University: Panel on Teaching with Case Studies

## INTERNATIONAL RESEARCH MEETINGS / SPECIAL SESSIONS ORGANIZED

British Ecological Society Meeting, Edinburgh, $14^{th}$ Dec 2015.

Special Session: *Using Ecology to Guide Public Health Policy* [with Golding]

British Ecological Society Special Meeting, Sheffield, $24^{th}$ -$26^{th}$ March 2015.

*Demography beyond the population* [with Griffiths, Jongejans, Merow, McMahon, Salguero-Gomez]

PIIRS Workshop, Princeton, US, $23^{rd}$ -$24^{th}$ Feb 2015.

*Globalization and the spatial spread of infectious disease: opportunities and challenges of novel and existing data-sets.* RAPIDD Workshop, Princeton, US, $14^{th}$ -$15^{th}$ May 2014.

*The impact of co-infection on antimicrobial chemotherapy and drug resistance part II.*

RAPIDD Workshop, Princeton, US, $29^{th}$ April-$2^{nd}$ May 2012.

*The impact of co-infection on antimicrobial chemotherapy and drug resistance.*

## POSTDOCS

Sam Huberman: 2018 - present
Fidisoa Rasambainarivo: 2018 - present
Ben Rice: 2018 - present
Marjolein Bruining: 2019-present
Rachel Baker: 2018-present

Brooke Bozick: 2016-2018
Current position: AAAS Science Policy Fellow
Amy Winter: 2016-2018
Current position: Postdoctoral Research Fellow, Johns Hopkins Bloomberg School of Public Health

Joaquin de Prada: 2014-2016
Current position: Lecturer in Veterinary Epidemiology, University of Surrey
Ben Daziel: 2014-2015
Current position: Assistant Professor, Dept of Integrative Biology, Oregon State University

## GRADUATE STUDENTS

**Advisor**
Ian Miller: 2017-current
Malavika Rajeev: 2015-current
Saki Takahashi: 2014-2018
Current position: Schmidt Science Fellow, Postdoctoral Scholar, University of California, San Francisco
Ayesha Mahmud: 2014-2017
Current position: Assistant Professor, Dept of Demography, University of California, Berkeley
Amy Winter: 2013-2016
Current position: Postdoctoral Research Fellow, Johns Hopkins Bloomberg School of Public Health

**Committee member**
Esther Shyu (Woods Hole Oceanographic Institute): 2013-2015
Matthew Aardema (Princeton): 2014-2015
Ruthie Birger (Princeton): 2014-2016
Cara Brook (Princeton): 2014-2017
Sinead Morris (Princeton): 2014-current
Elizabeth Heppenheimer (Princeton): 2015-current
Alex Becker (Princeton): 2016-current
Ed Schrom (Princeton): 2016-current
Allie DeCandia (Princeton): 2015-current Celeste Marin (Princeton, WWS): 2016-current
Wenying Liao (Princeton): 2015-current
Liana Wait (Princeton): 2016-current

**Membre du Jury**
Keitly Mensah (Faculté de Médecine, Lyon): 2015. Thèse pour le Grade de 'Docteur en Médecine'

## SERVICE

**Editing**
Since 2017, I have been **Associate Editor** for *Ecology Letters*, and on the **Editorial Board** of *Philosophical Transactions of the Royal Society* since 2014. From 2014-2016 I was **Associate Editor** for *Methods in Ecology and Evolution* and *American Naturalist*. I have been a **Guest Editor** at *PNAS* (in 2016); and **Guest Edited** a Special Issue of *Epidemics* on Current Challenges in Infectious Disease Modelling (in 2014), and a Special Issue of *Philosophical Transactions of the Royal Society* on the subject of Infectious Disease Eradication (in 2013).

**Reviewing**
Since 2016, I have **reviewed papers** for: *American Journal of Epidemiology, American Naturalist, Current Biology, Ecology, Ecology Letters, Epidemics, the Journal of Animal Ecology, the Journal of Applied Ecology, the Journal of Ecology, the Journal of Evolutionary Biology, the Journal of the Royal Society Interface, Lancet Infectious Diseases, the New England Journal of Medicine, PloS Biology, PloS Currents, PloS Computational Biology, PloS Medicine, PloS Pathogens, Proceedings of the National Academy of Sciences, Proceedings of the Royal Society of London Series B, Science, Scientific Reports, Trends in Ecology and Evolution, Vaccine*. I have **reviewed**

**grant proposals** for the *National Science Foundation, USA*, the *British Ecological Society*, the *Medical Research Council, UK* and the *Royal Society, UK*.

**Technical Advising**
In 2011, I was **Technical Advisor** to the *World Health Organization Strategic Advisory Group of Experts* on the topic of the introduction of rubella vaccination; and in 2015, to the *World Health Organization Strategic Advisory Group of Experts* on the topic of serosurveillance for rubella and measles elimination. In 2017 I contributed an **External Review** for the World Bank on "MADAGASCAR CLIMATE CHANGE AND HEALTH DIAGNOSTIC: An assessment of risks and opportunities for climate-smart health (and nutrition) investment."

**Advisory Boards**
From 2014 - 2019, I was member of the **Advisory Science Committee** of two data-bases of demographic information on plants and animals (COMPADRE and COMADRE) hosted at the Max Planck Institute of Demographic Research. From 2013 - 2019, I was a board member of the **Society for Evolutionary Demography**. Since 2018, I have been on the **Scientific Advisory Board** for SACEMA, Stellenbosch University, South Africa.