

Department of Veterinary Medicine

Available PhD Project:

Supervisor: Dr Olivier Restif

Supervisor profile page: <https://www.vet.cam.ac.uk/directory/or226%40cam.ac.uk>

Project Title: Models for the circulation of zoonotic viruses in bats

Description: Bats are hosts to some of the deadliest zoonotic viruses that have emerged in the last 50 years. Yet little is known about the factors that allow those viruses to persist and circulate in bat populations without making them sick, or about the ecological drivers underlying spatiotemporal variations in spillover risk. Over the past 12 years, our group has pioneered the integration of field studies, laboratory assays and mathematical models to quantify the dynamics of zoonotic viruses in bat populations. In particular, we have been investigating the spread of henipaviruses, a group of paramyxoviruses found in fruit bats across Africa, South-East Asia and Australia, which include the zoonotic Hendra and Nipah viruses. We have collected extensive datasets, particularly in Ghana and Australia, that have revealed the extent of seasonal variations and the role of persistent infections. While our work to date has focused on small populations, the next challenge is to scale up our models to understand virus circulation and spillover across larger areas, taking bat migration and environmental changes into account.

This PhD project will build on previously developed models and recent datasets to explore the dynamics of henipaviruses in bats over larger spatiotemporal scales. In particular, it will consider the impact of seasonal and interannual variations in food and habitat availability on virus prevalence and shedding patterns. The models will be used to draw inference from diverse datasets, including antibody titration, viral RNA detection and viral sequence variations. Specific questions will be guided by the availability of new data from ongoing field studies.

This project will be inter-disciplinary with ample opportunities to learn new skills, particularly in scientific programming and data analysis. Funding permitting, there may be opportunities to take part in field work overseas. Prospective applicants may have degrees in biology, medical or veterinary sciences or in applied mathematics, should be familiar with basic epidemiological concepts and should have some experience of programming in R, Python or Matlab.

Suggested reading:

- Glennon, E.E., Becker, D.J., Peel, A.J., Garnier, R., Suu-Ire, R.D., Gibson, L., Hayman, D.T.S., Wood, J.L.N., Cunningham, A.A., Plowright, R.K., Restif, O., 2019. What is stirring in the reservoir? Modelling mechanisms of henipavirus circulation in fruit bat hosts. *Philosophical Transactions of the Royal Society B: Biological Sciences* 374, 20190021.

- Plowright, R.K., Peel, A.J., Streicker, D.G., Gilbert, A.T., McCallum, H., Wood, J., Baker, M.L., Restif, O., 2016. Transmission or Within-Host Dynamics Driving Pulses of Zoonotic Viruses in Reservoir–Host Populations. *PLOS Negl Trop Dis* 10, e0004796.
<https://doi.org/10.1371/journal.pntd.0004796>

For further information about the project, please contact Olivier Restif: or226@cam.ac.uk

Funding: This project is not funded - applicants are invited to apply before the Cambridge University Postgraduate Funding competition deadline in order to be nominated for suitable scholarships.

How to apply: Contact the Supervisor to discuss the project before submitting an official application. More details on the application process here:

[How to apply — Department of Veterinary Medicine \(cam.ac.uk\)](#)