# Viral Dynamics in Malagasy Fruit Bats

**Background:** Bats are known to harbor viruses without becoming sick. Understanding how viruses circulate and persist in bat populations is relevant for human health and bat conservation.

## Statistical Question

What are the seasonal dynamics of henipavirus seroprevalence in *Eidolon dupreanum* bats at Angavokely?

## Mechanistic Question

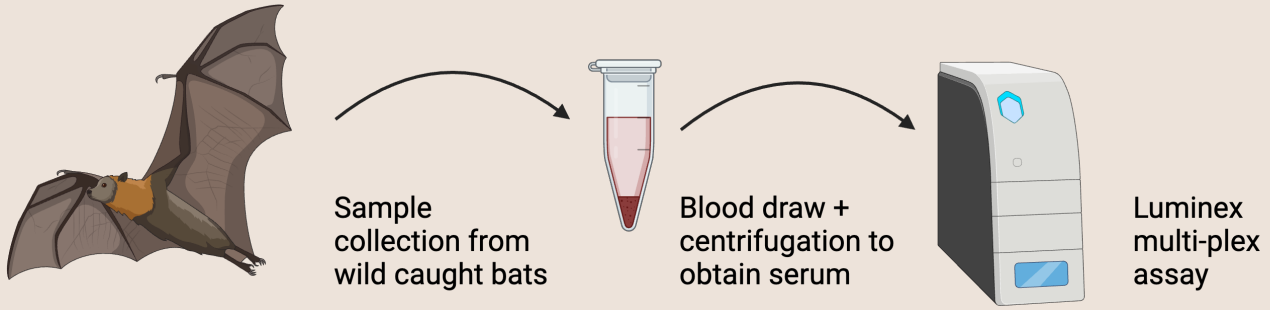
How does maternal immunity affect henipavirus seroprevalence in *Eidolon dupreanum bats* at Angavokely over time?



Katherine McFerrin E2M2 2024 ~ Thank you to Mars and Sandratra (model frameworks), and Martin (presentation)

# What are the **seasonal dynamics** of henipavirus seroprevalence in *Eidolon dupreanum* at Angavokely?

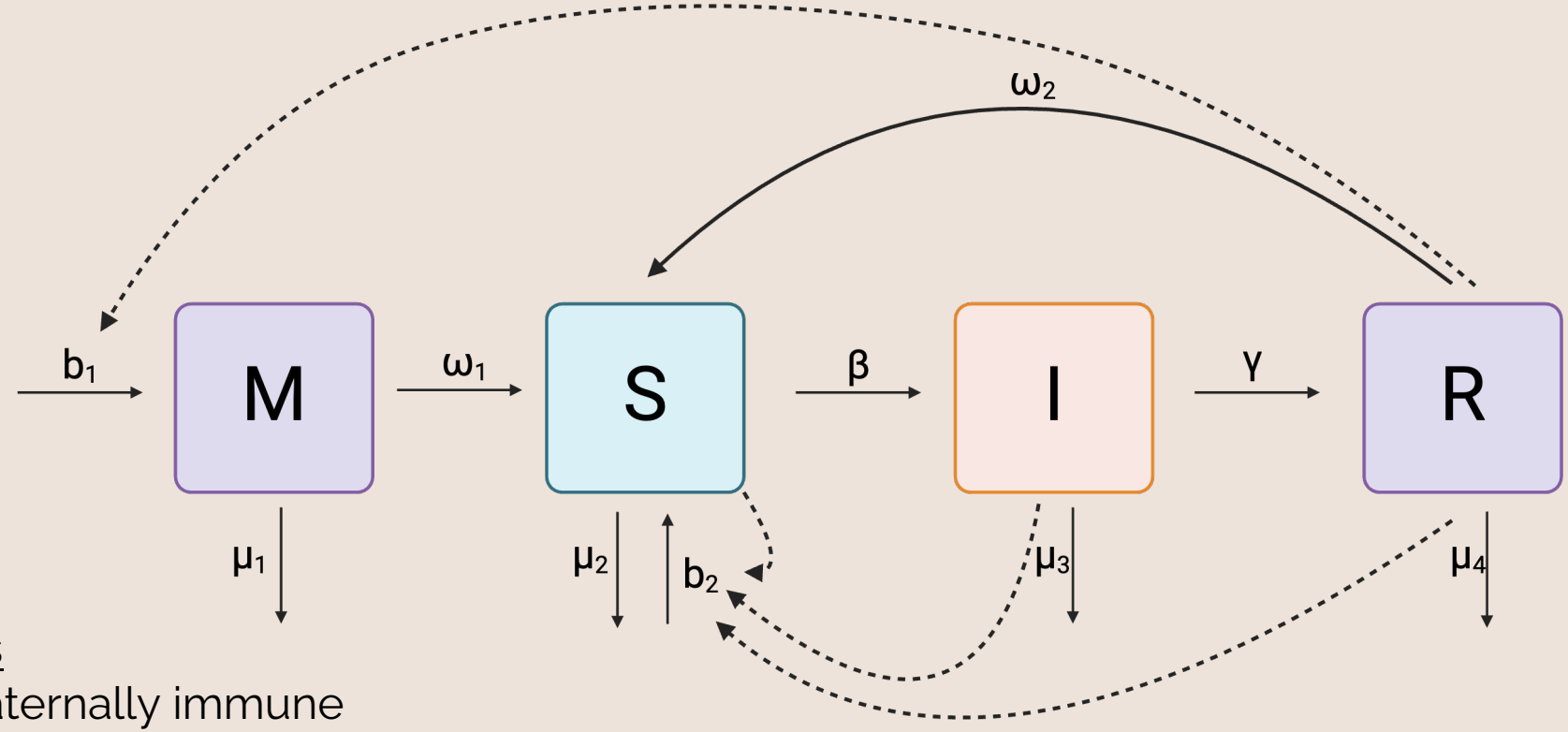
- **Response variable**
  - serostatus (seropositive | seronegative)
- **Family**
  - binomial
- **Link**
  - Logit
- **Predictor variables**
  - time (day of the year)
  - random predictors of age + sex + year




**Hypothesis:** Henipavirus seropositivity in *E. dupreanum* will be associated with the dry season in Madagascar because this period is when bats may experience more immune stress.

**R code:** gam <- gam(serostatus~ s(time, k=7, bs = "cs") + s(age, k=7, bs="re") + s(year, k=7, bs="re") + s(sex, k=7, bs="re"), data = bat.dat, family = "binomial")

# How does **maternal immunity** affect henipavirus seroprevalence in *Eidolon dupreanum* at Angavokely over time?




States

- Maternally immune
- Susceptible
- Infected
- Recovered/Immune

Processes

- b = birth rate
- μ = death rate
- β = transmission rate
- γ = recovery rate
- ω = waning rate

# Next Steps

- **Run additional GAMs** on henipavirus seroprevalence data using other predictor variables, such as mass:forearm residuals
- **Incorporate age data** into my mechanistic model, and consider alternative frameworks (MSEIR)
- **Apply the maternal immunity SIR model to other fruit bats in Madagascar**, *Rousettus madagascariensis* and *Pteropus rufus* using serological data from field sites visited monthly