



HAL
open science

Revisiting the representation of extrinsic incubation period: finding from modelling within-vector viral dynamics for major arboviruses: Dengue, Zika, and Chikungunya

Léa Loisel, Pauline Ezanno, Vincent Raquin, Maxime Ratinier, Gael Beaunée

► To cite this version:

Léa Loisel, Pauline Ezanno, Vincent Raquin, Maxime Ratinier, Gael Beaunée. Revisiting the representation of extrinsic incubation period: finding from modelling within-vector viral dynamics for major arboviruses: Dengue, Zika, and Chikungunya. 3. Modelling in Animal Health conference (ModAH), Aug 2024, Nantes, France. 2024, 3. Modelling in Animal Health conference (ModAH). hal-04684689

HAL Id: hal-04684689

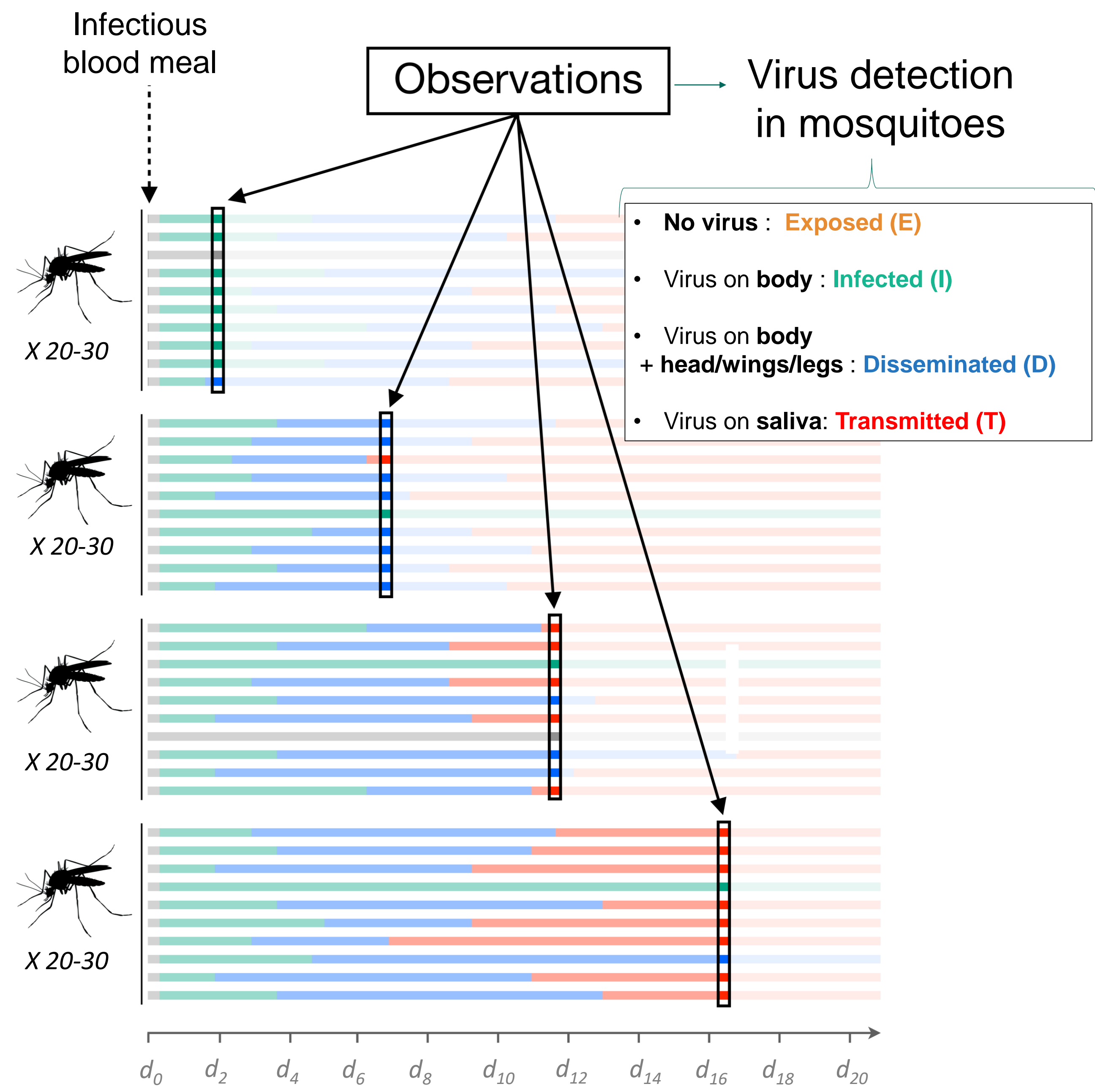
<https://hal.inrae.fr/hal-04684689v1>

Submitted on 3 Sep 2024

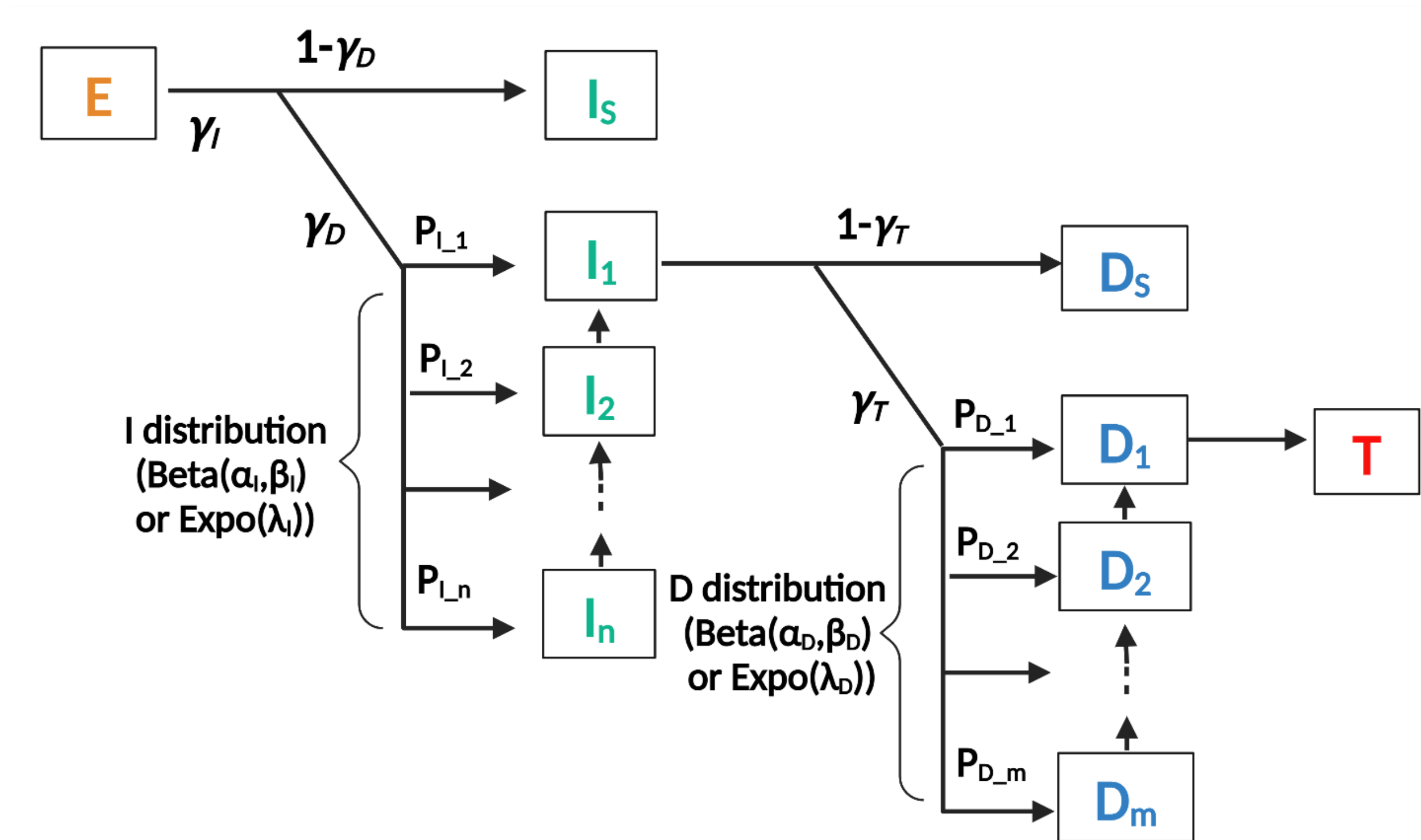
HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

Revisiting the representation of extrinsic incubation period: finding from modelling intra-vector viral dynamics for major arboviruses.



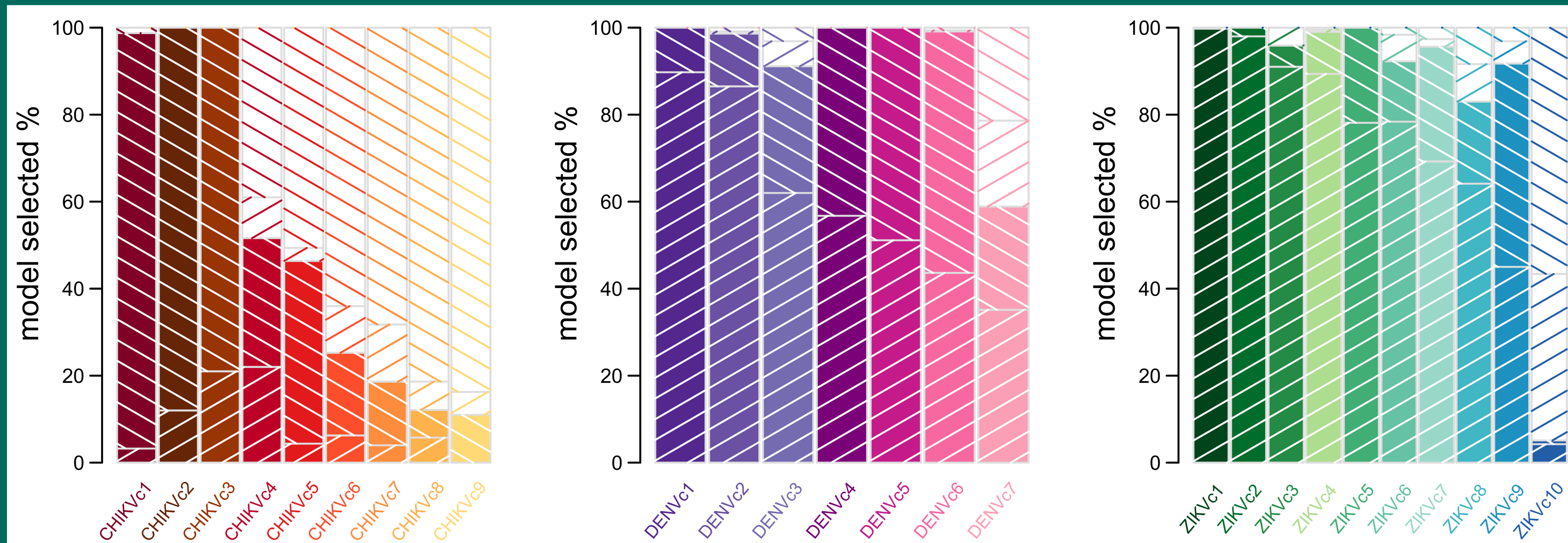
→ Systematic review to find vectorial competence experimental data.



→ Building a compartmental mechanistic model of intra-vector viral dynamics.

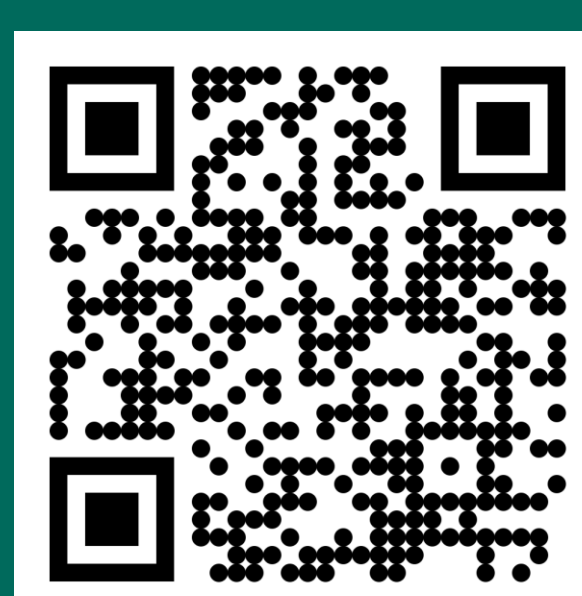
Inference and model selection with Approximate Bayesian Computation (ABC-SMC)

Extrinsic incubation period of mosquitoes is not always exponentially distributed

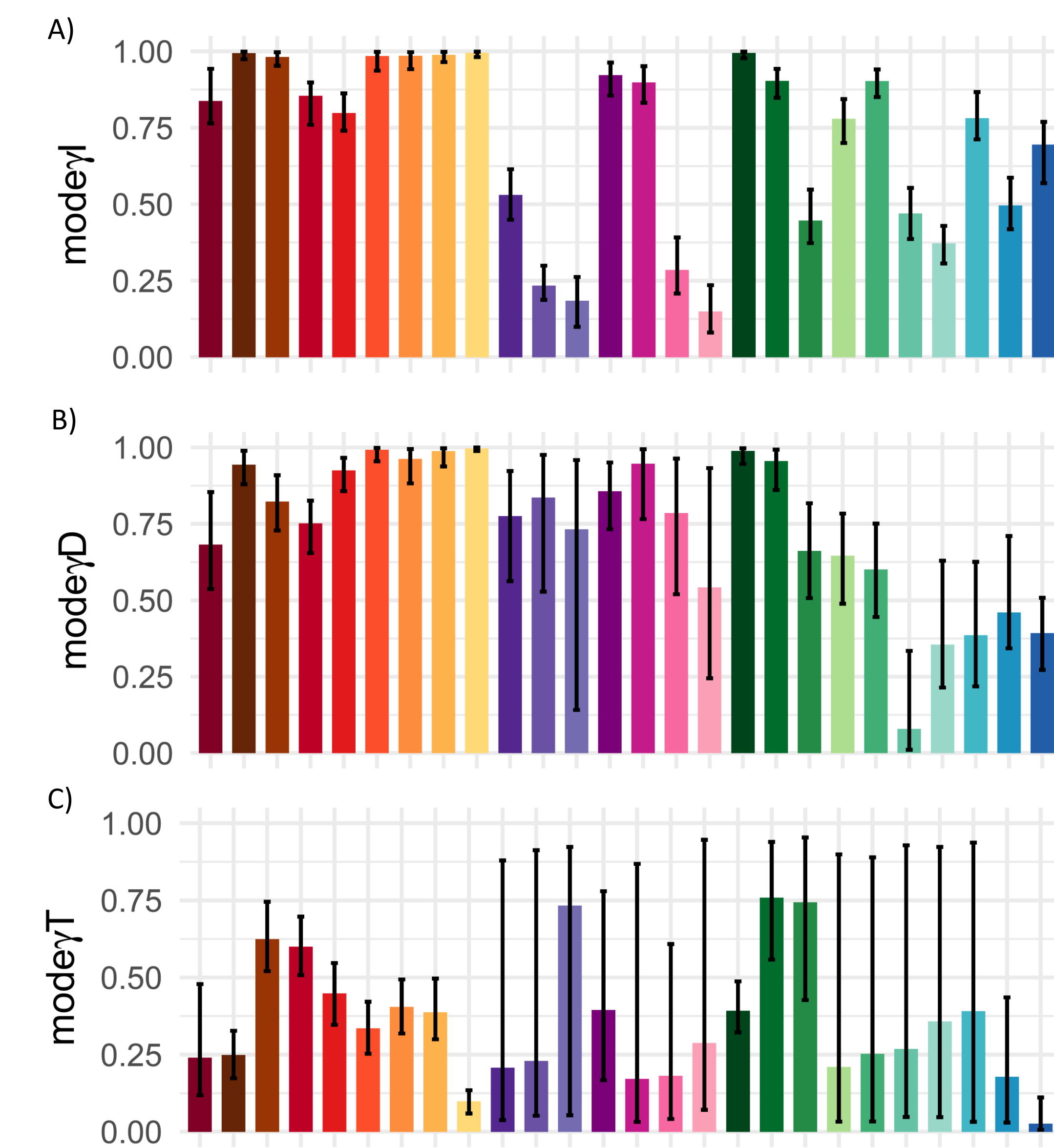
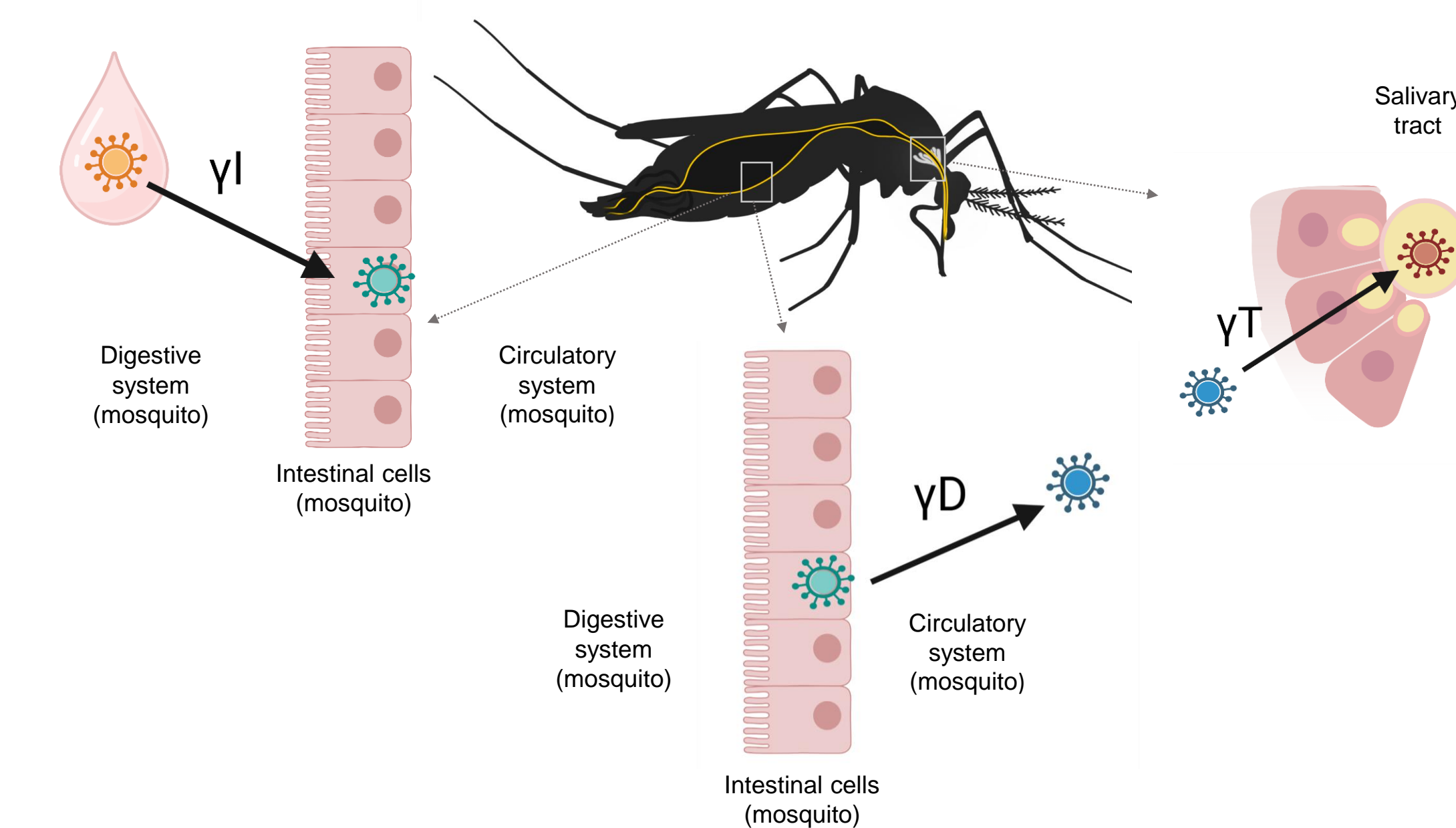


→ Selected proportion of each model (modBetaExpo, modBetaBeta, modExpoExpo, modExpoBeta) for chikungunya (CHIKV), dengue (DENV) and Zika (ZIKV) viruses in different experimental conditions.

$I_{betaDexpo}$ $I_{betaDbeta}$ $I_{expoDexpo}$ $I_{expoDbeta}$



→ Values of the crossing barrier parameters inferred for all scenarios tested for CHIKV, DENV and ZIKV. A) Infection barrier. B) Dissemination barrier. C) Transmission barrier. Each bar represents the parameter mode for a given scenario, with one colour per scenario and with the 90% credibility interval represented by the error bar.



Léa Loisel¹, Vincent Raquin², Maxime Ratinier², Pauline Ezanno¹, Gaël Beaunée¹

¹Oniris, INRAE, BIOEPAR, Nantes, France
²EPHE, Université PSL, INRAE, Université Claude Bernard Lyon 1, IVPC, UMR754, Lyon, F-69007, France

Corresponding author: lea.loisel@inrae.fr
Acknowledgements: this work was supported by INRAE Metaprogramme DIGIT-BIO (Digital biology to explore and predict living organisms in their environment), through the MIDIIVEC project.