18-months postdoc position in Mathematical/Computational modeling applied to theoretical evolutionary epidemiology.

A 18-months postdoc position in applied mathematics is available at IRD in Montpellier (www.mivegec.ird.fr). The successful candidate will be involved in a multidisciplinary project funded by the ANR. The position will start as soon as possible. Support is for 18 months with a basic gross salary from 2150 to 2500 €/month, depending on experience. The project is aiming to develop Mathematical/Computational models to evaluate how genetic and environmental influences on mosquito-Plasmodium transmission strategies can shape disease dynamic and how control programs can influence the evolution of mosquito-Plasmodium transmission strategies.

Background: The successful candidate will collaborate with a team of applied mathematicians with a strong experience in Mathematical/Computational modeling of infectious diseases and a team of biologists with a strong background in epidemiology and evolutionary biology, both at the research unit MIVEGEC (CNRS, IRD) Montpellier.

Assessing the relative importance of environmental and genetic determinants in shaping parasite development duration within their insect hosts using Plasmodium falciparum and its major mosquito vectors Anopheles coluzzii and An. Gambiae is a key factor to evaluate the risk of emergence and the transmission of malaria (Lefèvre et al., Evolutionary Application, 2018). In turn, this implies to model both the spread of mosquito vectors in a heterogeneous environment (heterogeneity= hosts diversity + insecticide exposure, ….) and the dynamics of its adaptation to this heterogeneous environment. The model developed will help to understand (i) the consequences for the disease dynamic and (ii) the evolutionary consequences for the disease control. The candidate will first review the existing literature and then devise a mathematical model describing the evolutionary dynamics of mosquito vectors in a heterogeneous environment. This model will be fitted to field and experimental data currently collected in Burkina Faso by biologists of the team. Simulations of this model, coupled with an optimal control or viability approach, will yield practical insights on the disease control in the host population.

Required skills:
- Strong experience in numerical simulations of models.
- Experience in mathematical modeling (including ODE and PDE).
-Additional knowledge in optimal control (or viability) theory as well as an experience in epidemiology or evolutionary modeling are not necessary but will be considered positively.
- Ability to work in an interdisciplinary project involving mathematicians and biologists.

Contact:
Ramsès Djidjou-Demasse (ramses.djidjoudemasse@ird.fr) and Marc Choisy (marc.chosiy@ird.fr). The position is available from now and will remain open until a successful candidate is found.