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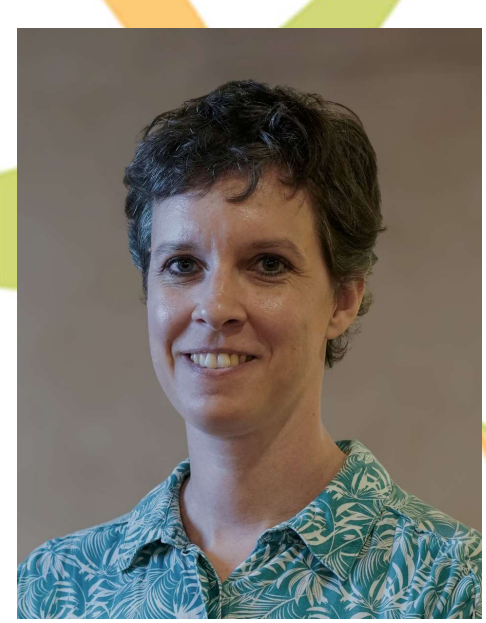
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3 May 2024 (Fri), 11am

The Auditorium (Level 1)

Engineering the mosquito *Anopheles gambiae* to impede malaria transmission

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Dr Astrid did her PhD at the Centre for Genomic Regulation in Barcelona, focusing on transcriptional regulation in the *Drosophila* embryo. As a postdoc at Imperial College London, she engineered population replacement gene drives in the malaria mosquito *Anopheles gambiae*. She is currently a research fellow at Nanyang Technological University, working on CRISPR/Cas in algae and Black soldier fly.

Synthetic gene drives designed to spread an anti-malarial trait through a wild-type population, are promising tools for disease control. Integral gene drive incorporates a minimal set of molecular components directly into endogenous genes without disrupting their function. The effector and the drive component are located at different genomic locations, with the Cas9 integrated into genes expressed in the germline, and the anti-malarial effector hosted by genes expressed in an infection relevant tissue. I augmented several midgut genes of *Anopheles gambiae* to secrete exogenous antimicrobial peptides from scorpion, frog, and bee. Magainin and Melittin inserted in tandem into the carboxypeptidase locus was the most potent combination resulting in arrested growth of *Plasmodium falciparum* oocysts. All transgenic effector lines achieved high non-autonomous homing, and the integral gene drive system was capable of spreading multiplexed transgenes through a caged population, even with a self-limiting Cas9 line.

3 Recent Publications:

1. **Hoermann A, Tapanelli S, Capriotti P, Del Corsano G, Masters EK, Habtewold T, Christophides GK, Windbichler N. "Converting endogenous genes of the malaria mosquito into simple non-autonomous gene drives for population replacement." Elife 10 (2021)**
2. **Hoermann A, Habtewold T, Selvaraj P, Del Corsano G, Capriotti G, Inghilterra MG, Kebede TM, Christophides GK, Windbichler N. "Gene drive mosquitoes can aid malaria elimination by retarding Plasmodium sporogonic development." Science Advances 8, no. 38 (2022)**
3. **Hoermann A, Capriotti G, Del Corsano G, Inghilterra MG, Habtewold T, Cai JA, Saini GS, Nguyen H, Windbichler N, Christophides GK. "REL2 overexpression in the Anopheles gambiae midgut causes major transcriptional changes but fails to induce an immune response." bioRxiv 2024.02.05.578852 (2024)**