



# WHAT WE KNOW, DON'T KNOW, AND THINK WE KNOW ABOUT THE PREDATORS OF MOSQUITOES

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## ***Studying ecological relationships and community perceptions of *Anopheles gambiae* (Diptera: Culicidae) and their predators***

**T**he malaria-transmitting mosquito *Anopheles gambiae* is eaten by species of bats, birds, damselflies, dragonflies, and spiders, although the mosquito likely accounts for only a small percentage of their total diet<sup>1</sup>. While there is limited data on the predation of adult *An. gambiae* at blood-feeding, nectar-feeding, and breeding sites, my research will use DNA metabarcoding techniques combined with ecological network analyses to determine the diet of predators and the community structure of predator-prey interactions.

Currently, we lack understanding of indigenous perceptions surrounding *An. gambiae*. While Ghana's local communities have expressed an interest in sharing their first-hand knowledge on various problems associated with mosquitoes, researchers often fail to consult them. Local

peoples' perceptions, knowledge, and experiences of the ecological relationship between predators and mosquitoes in the area where they live and farm provide important information to consider when addressing misconceptions that could impede malaria control interventions<sup>2</sup>.

My research will group mosquito activities into feeding (e.g., blood-feeding and nectar-feeding) and breeding (e.g., oviposition and eclosion) behaviours upon sampling specimens: (1) in homes both indoors and outdoors, (2) on vegetation and flowering plants closer to homes, and (3) around clear and shallow temporary water bodies.

I will sample invertebrates using both active and passive sampling traps including Malaise traps, pitfall traps, yellow pan traps, light traps, sweep nets, and aerial

nets. Insectivorous invertebrates will be sorted out from the total trap catch and their diet composition determined by DNA metabarcoding to identify mosquitoes as well as other prey. I will also ascertain whether the diet of a predator changes with the sampling site (i.e., where *An. gambiae* is feeding or depositing eggs). I will further determine how the predators are distributed across sampling sites, and in which of the sampling sites *An. gambiae* is most vulnerable to predation. I will analyze the invertebrate community coexisting with adult *An. gambiae* and the community structure of predator-prey interactions by using ecological network analysis, thus determining the role of *An. gambiae* in the food web.

To assess indigenous knowledge and local perceptions on the ecological role of *An. gambiae*, I plan to distribute questionnaires that will gather basic information on mosquito identification, biology, and ecology as well as observations on feeding interactions and locations, and the predators involved. Questionnaire results will be compared with those of the metabarcoding results to determine the presence and extent of misconceptions regarding predatory interactions.

My goal is to assess the extent of mosquito knowledge in the community so that I can design appropriate education measures to ensure that future vector control projects are successful. The local communities' knowledge and understanding of mosquito ecology is vital in these efforts.

This research will fill knowledge gaps regarding the role of *An. gambiae* in the local ecosystem and also help predict any possible ecological consequences of suppressing the malaria-transmitting mosquito as part of a vector control strategy.

## References:

1. Collins CM, Bonds JAS, Quinlan MM, Mumford JD (2019) Effects of the removal or reduction in density of the malaria mosquito, *Anopheles gambiae* s.l., on interacting predators and competitors in local ecosystems. *Medical and Veterinary Entomology*, **33**(1), 1-15.
2. Ahorlu CK, Dunyo SK, Afari EA, Koram KA & Nkrumah FK (1997) Malaria-related beliefs and behaviour in southern Ghana: implications for treatment, prevention and control. *Trop Med Int Health* **2**, 488-499.

**THIS RESEARCH IS PART OF A LARGER EFFORT BY TARGET MALARIA IN GHANA TO UNDERSTAND THE ROLE OF THE *AN. GAMBIAE* MOSQUITO IN THE BROADER ECOSYSTEM.**

For more information see:

*The important interactions behind the itch*

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