Subjecting *Anopheles* to insane photoschedules to reveal the impact of vector rhythms on malaria development

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Understanding how biological rhythms shape infection outcomes is gaining traction because explaining the regulatory mechanisms and fitness consequences of rhythms exhibited by parasites, vectors and hosts offer new avenues for infection control. In mice, malaria parasites exhibit asexual development that is often synchronized with host feeding time and the development of transmission stages are also synchronized with the biting time of the mosquito vector. Disruption of parasites synchrony in the mammalian host leads to fewer growth & transmission stages, greatly reducing transmission potential.

Yet, while mammalian host rhythms significantly impact parasite fitness, the role of mosquito rhythms in parasite development during transmission remains uncertain. Moreover, field observations reveal the adaptability of mosquitoes' daily rhythms, such as adjusting their feeding times in response to interventions like bed nets and thriving amidst urban environments flooded with artificial light at night. However, the potential fitness repercussions for mosquitoes with altered rhythms remain unexplored.

Here we disrupted the rhythms of *An. stephensi* by subjecting mosquitoes to photoschedule durations (i.e hours of day plus night) that are longer or shorter than 24 hours and investigate the consequences for both mosquito life history traits such as egg lay, survival, nutrition and the timing of flight activity. Second, we explore the impacts of these conditions for malaria development within mosquitoes including the likelihood of infection, the duration of development, and overall parasite density.

By unraveling the intricate interplay between biological rhythms, parasite development, and vector behavior, our study offers insights into the complex landscape of infectious disease transmission.