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Resolving the conflict of mating versus blood feeding: exploring role of *quick-to-court* gene in the mosquito *Anopheles culicifacies*

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Abstract

Mosquitoes are the deadliest animal in the world. Mosquitoes transmit several vector borne disease (VBDs) such as malaria, dengue, chikungunya, zika fever, yellow fever and responsible for a loss of millions of lives annually. Though, suppression of mosquito population by means of chemical insecticides plays a crucial role in controlling vector population. However, fast emergence of insecticide resistance limits the efforts and demanding to design alternative molecular tools to fight against these VBDs. One of the potential strategies may include interfering complex feeding and/or mating behavioural properties. Compared to female mosquito male mosquito have an indirect effect in disease transmission and thus least studied. Males induce several post-mating behavioural changes in females, including the induction of host seeking and blood feeding behavior. Although, a successful mating events are guided by non-genetic circadian rhythm, but how genetic factors manages the sequential events of swarm formation, suitable mate finding and aerial coupling remains poorly investigated. While understanding the complex feeding behaviour of adult *An. culicifacies* female mosquito, we identified and analyzed a unique transcript (383 bp) from the olfactory system of the blood-fed mosquito, encoding the '*quick to court'* (QTC) protein. It is a homolog of *Drosophila* coiled-coil QTC **(**Q9VMU5**)** protein and shown to play an important role in driving the male courtship behaviour. A comprehensive *in silico* analysis predicted a 1536 bp long transcript encoding 511 AA long protein in the mosquito genome. Age dependent and sex specific transcriptional profiling revealed that both male female mosquitoes attain the specific age of adulteration on 5-7 days. Circadian clock dependent *Ac-qtc* profiling indicated that late evening natural dysregulation of *Ac-qtc* by unknown mechanism may promote the successful insemination event during active copulation. Together, our findings provide first molecular evidence that Ac-QTC proteins may have dual mode of action in the regulation of cluster of mosquito olfactory genes that are linked to mating success and/or blood feeding in adult female mosquitoes. A sex specific and circadian rhythm dependent comparative RNAseq analysis of neuro-olfactory and reproductive organs may facilitate to identify key molecular factors, regulating complex events of mating behavior in the mosquitoes.

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