

## How adult female mosquito manages vegetarian vs. non-vegetarian food taste

Mosquitoes are one of the most deadliest animals on earth which not only cause nuisance, irritation and pain at the biting sites, but also take millions of lives worldwide each year by transmitting many infectious diseases like malaria, dengue etc. In nature, both adult male and female mosquitoes survive on nectar sugar for regular energy, but the adult female requires blood meal from vertebrate hosts for its egg maturation. This little creature takes just two minutes for biting and sucking blood once its suitable host is located. These crucial two minutes have puzzled scientists worldwide with the powerful and untraceable events which are enough for disease transmission. Unraveling mechanisms behind food choice and dual feeding behavior in mosquitoes remains unanswered and questionable till date.

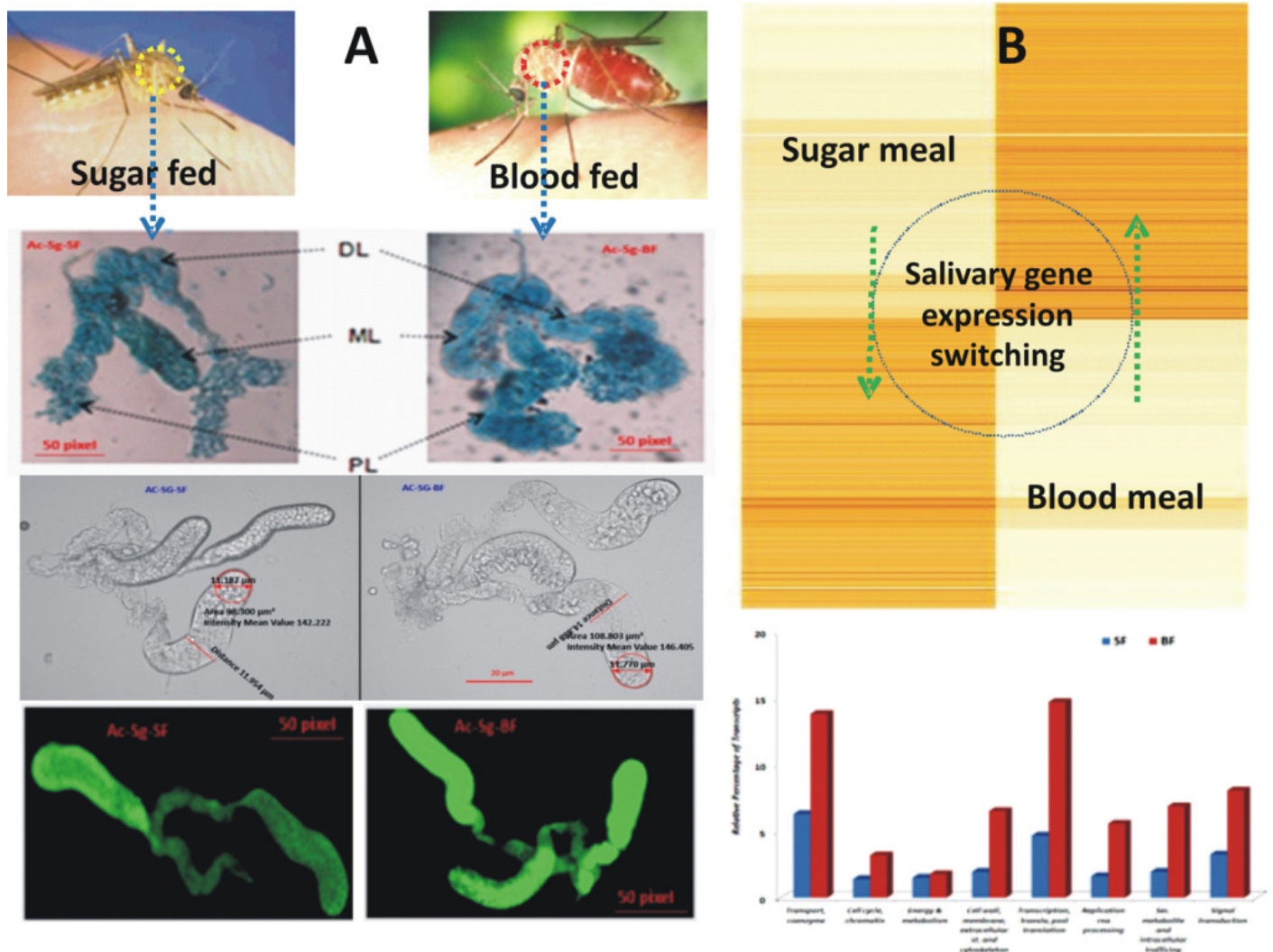


Fig. 1. Morphological and cellular (A); Molecular (B) changes of mosquito salivary glands in dual

## feeding status

Mosquito salivary glands are the specialized feeding machinery organs committed to facilitate desired meal acquisition. Till now, it has been shown that during blood meal uptake salivary glands release many biological factors, but how salivary glands facilitate and manage conflicting demand of dual meal acquisition i.e. nectar sugar (plant host) vs. blood meal (vertebrate host) is not known. Initially, to test the food choice decision, we kept both sugar (crystal cubes) and blood meal (rabbit) in the vicinity of a set of adult mosquitoes at the same time. Surprisingly, all the mosquitoes did not prefer to take blood meal which concluded that decision making is not a specific, but a random process and it varies from one individual mosquito to the other. Next, to know how salivary glands manage this dual feeding associated conflicting demand, we offered either of the meals to the mosquitoes separately and followed their response to sugar or blood meal uptake in the salivary glands of adult female mosquitoes.

We found that mosquito salivary glands encode diverse nature of meal specific proteins. To trace the morphological, cellular and molecular events occurring during a blood meal uptake, a comparative microscopic examination was done which revealed that first blood meal uptake results in the stretching, swelling and distention of the salivary glands (Fig.1A). We also diagnosed that how cold blooded mosquitoes ( $26\pm 2^{\circ}\text{C}$ ) overcome the challenge of possible damages occurring in response to the blood meal uptake from warm blooded animal (e.g. human  $37^{\circ}\text{C}$ ). Tracking cellular events with a fluorescent labeling marker (molecular light bulb), revealed the activation of a cell repair system which help to minimize and control the salivary specific cell damage (Fig.1A). Lastly, to infer the molecular strategy behind the meal specific choices and decision, we examined the salivary gene expression profile in response to dual meal, which clarified that adult female mosquitoes are evolved with a unique ability of meal specific gene expression switching (Fig.1B), enabling them to successfully meet and manage the uptake of food of its choice and taste.

Our future challenge remains to uncover the mechanisms which may interfere with the meal specific gene expression switching and hence disrupting mosquito feeding behavior. This work highlights the unique nature of mosquitoes and the various strategies for its survival which may ultimately help the scientific community to disable mosquitoes from biting humans.

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## Publication

[Unraveling dual feeding associated molecular complexity of salivary glands in the mosquito](#)

[Anopheles culicifacies.](#)

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