Studying Host-microbiota Interactions in *Drosophila Melanogaster*

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In this issue of Biomedical Journal, two reviews show the power of *Drosophila melanogaster* as an animal model to study the complex relationships between host and gut microbiota. The first review has been written by Dr. Jean-Marc Reihhart and colleagues on "The multilayered innate immune defense of the gut." The second one was contributed by Dr. François Leulier and his collaborators on "Studying host-microbiota mutualism in *Drosophila*: Harnessing the power of gnotobiotic flies."

The first review article by El-Chamy *et al.* describes and analyzes the *Drosophila* gut anatomy and the induction of antimicrobial peptides (AMP), as well as the production of reactive oxygen species (ROS).[1] The organization of the physical barrier in *Drosophila* gut is made of a single epithelial cell layer sealed tightly and protected by a peritrophic matrix (PM) which allows the transfer of digestive enzymes and nutrients but blocks bacteria. The role of PM in the struggle against bacteria is established clearly because mutations affecting some components of the PM increase the sensitivity of flies to infections. In addition, various mutants increasing the permeability of the epithelial barrier become highly sensitive to infections by pathogenic bacteria. In the second part of this review, the authors describe the biochemical pathways involved in AMP production and the regulation of ROS production in the *Drosophila* gut lumen.

The second review by Ma *et al.* presents the early scientific works leading to the production of gnotobiotic flies which are first rate models to analyze the relationships between the host genome and the microbiome.[2] Indeed, the infection of gnotobiotic flies with single bacterial strains or highly defined microbiota allows studies, which determine the impact of bacteria on host gene expression using this genetic model. Gut microbiota promotes host growth by increasing digestion of substrates by bacterial enzymes. In addition, gut bacteria produce vitamins, short-chain fatty acids and regulate glucose and triacylglycerol levels. Finally, the authors describe experiments showing that gut microbiota play an important role in the social behavior of flies.

These two excellent reviews come at a time when the role of microbiota in several human diseases is highly suspected and the focus of numerous studies. These articles show that the *Drosophila* model is likely to open new insights in the understanding of the molecular and physiological mechanisms involved in host-microbiota interactions, and their pathophysiological consequences.

REFERENCES

1. El Chamy L, Matt N, Ntwasa M, Reichhart JM. The multilayered innate immune defense of the gut. Biomed J 2015;38:276-84.
2. Ma D, Storelli G, Mitchell M, Leulier F. Studying host-microbiota mutualism in *Drosophila*: Harnessing the power of gnotobiotic flies. Biomed J 2015;38:285-93.

DOI: 10.4103/2319-4170.162482