

Structural Organization of Posterior Midgut Muscles in Mosquitoes, *Aedes Aegypti* and *Anopheles Gambiae*

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To adapt to diverse feeding behavior, animal intestines have evolved with distinct differences. Such adaptation may include the structure of the longitudinal and circular muscles that maintain the integrity and the tensile strength of the gut tissue in higher metazoans. Here we examined the structural organization of the posterior midgut muscles of two insects, *Aedes aegypti* and *Anopheles gambiae*. We found the estimated number of longitudinal muscles in a cross-section to be 168 in *Ae. aegypti* and 37 in *An. gambiae*. Within the region, the estimated numbers of circular muscles is 77 in *Ae. aegypti* and 57 in *An. gambiae*. In *An. gambiae*, longitudinal muscles appear as sets of parallel bundles. Each set overlaps its neighbor to form a continuous tube. We found that this novel mode of muscle fiber sharing makes all circular muscles interconnected. Both types of muscle lie orthogonally to form a grid that holds the epithelium of the posterior midgut. In *Ae. aegypti*, the muscle fibers between the bundles are shared extensively, making the organization more intricate. This study implies that, because of its simple structure, the insect midgut may provide a powerful tool with which to study the structural evolution and function of animal intestines.