

The melanization pathway in mosquitoes

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It has generally been accepted that three enzymes, phenoloxidase, dopa decarboxylase and dopachrome conversion enzyme, are directly involved in the melanization pathway in insects. The genetic sequences for these three enzymes are available in a number of insect species, including *Drosophila melanogaster*, *Anopheles gambiae* and *Aedes aegypti*. Although these three proteins are present in all insect species, the pace of the melanization process varies enormously in different insect species. For example, it takes just 20-30 min for a complete change of pupal cuticle from white to black in *A. aegypti*, while it takes many hours for a similar change to occur in the *Drosophila* pupal cuticle. The variation in the melanization process in different insect species can also be easily observed in vitro. After mosquito larvae or pupae were homogenized in a neutral buffer, the homogenates became black in 3-5 min. In contrast, after homogenization no apparent color change of the *Drosophila* larvae or pupae homogenates were observed for hours. Although the pace of melanization process could be influenced by the phenoloxidase activating system, our results suggest that the considerable variation in the speed of melanization reactions in different insect species is due to biochemical differences in their proteins that are directly involved in the melanization pathway. This study compares the biochemical characteristics between the mosquito enzymes and *Drosophila* enzymes involved in the melanization pathway with emphasis on both phenoloxidase and dopachrome conversion enzyme, and is aimed at elucidating why there is a significant difference in the speed of melanization reactions between these two Diptera species.