Identification of Proteins Secreted by Microapocrine Vesicles from the Midgut of Spodoptera frugiperda

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In Lepidoptera digestive enzymes are secreted by microapocrine secretion from the anterior midgut. That secretion consists of small vesicles released into the ectoperitrophic fluid. Our goal is to identify the proteins involved in the microapocrine secretion in S. frugiperda. A midgut cDNA expression library was immunoscreened with antibodies raised against the particulate fraction of the ectoperitrophic fluid that contains the vesicles and 500 positive clones were sequenced, resulting in 241 ESTs. We also prepared transcriptomes by pyrosequencing and obtained 245,894 reads from the anterior and 253,998 reads from the whole midgut. In order to complete the sequence of the proteins present in the vesicles and to find the ones secreted by the anterior midgut, the 241 ESTs were blasted against the two libraries formed with pyrosequencing data. The resulting sequences were Blastx searched against the NCBI nonredundant protein database with an E-value cut-off of $10^{-10}$. We found 86 contigs: 20 more expressed in the anterior midgut, 9 more expressed in the posterior midgut and 57 equally expressed along the midgut. Among the proteins putatively present in the microapocrine vesicles, we found digestive enzymes (amylase, aminopeptidase, lipase and proteinase), proteins related to the peritrophic membrane (peritrophin and chitin deacetylase) and proteins probably involved in microapocrine secretion (secretory carrier associated membrane protein and protein disulfide isomerase).

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