ANALYSIS OF THE PROLIFERATION AND DIFFERENTIATION OF INTESTINAL STEM CELLS IN THE MIDGUT of *Tribolium castaneum* (Coleoptera: Tenebrionidae) DURING DIGESTION

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**Introduction:** The study of intestinal stem cells (ISCs) in insects gained major interest since the discovery that insects and mammals share many common processes involving cell proliferation and differentiation. In *Drosophila*, ISCs are located in the basement membrane of the epithelium just above the muscle layer. ISCs are also involved in cell renewal of the intestinal epithelium during molting in different larval stages of the flour *T. castaneum*. **Objective:** Our study aims to elucidate the molecular and histological events involved in cell proliferation and differentiation of the midgut epithelium of *T. castaneum* during digestion, particularly the role of Wingless (Wg) and Hedgehog (Hh) pathways during cell renewal. **Material and methods:** Midgut of the *T. castaneum* larvae (strain GA-2) was dissected and fixed in 4% paraformaldehyde (PFA), dehydrated in alcohol, embedded in Paraplast and sections were stained with Hematoxilin and Eosin (HE). For in situ hybridization experiments, specific RNA probes were designed for Wg and Hh. For transmission electron microscopy (TEM) analysis, midguts were fixed in 4% PFA, 2.5% glutaraldehyde (GA) in 0.1 M cacodylate buffer, pH 7.2. After fixation the samples were post-fixed in osmium tetroxide, dehydrated in acetone and embedded in epon. **Results and discussion:** Light microscopy showed that the midgut epithelium of *T. castaneum* consists of an outer layer of muscle cells, lined by simple cylindrical epithelial cells and the extracellular peritrophic matrix. Cells containing secretory vesicles were observed very close to surface by TEM, but other cells not exposed to the lumen, but display microvilli. Initial expression analysis suggests that Wg and Hh are observed at the muscle layer just beneath the epithelial cells in the midgut of *T. castaneum*. **Conclusions:** Our results suggest that muscle cells may act as a source population of niche factor for cell proliferation and differentiation.

Keywords: Cell proliferation, *Tribolium castaneum*, digestion

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