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研究论文

20-羟基蜕皮甾酮处理后舞毒蛾外部形态和幼虫体壁超微结构的变化

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Changes in external morphology and integument ultrastructure of the 5th instar larvae of *Lymantria dispar* (Lepidoptera: Lymantridae) treated by 20 hydroxyecdysone

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全文: PDF (14893 KB) HTML (1 KB) 输出: BibTeX | EndNote (RIS) 背景资料

摘要 为了探明20-羟基蜕皮甾酮对昆虫蜕皮过程中体壁的表皮层、 皮细胞及其细胞器的具体影响过程， 本研究利用透射电镜技术研究了20-羟基蜕皮甾酮对舞毒蛾*Lymantria dispar* （Linnaeus）5龄幼虫体壁超微结构的变化。结果表明， 用高浓度20-羟基蜕皮甾酮溶液浸过的白桦叶片饲喂幼虫， 处理6 h， 摄入约400 μg 20-羟基蜕皮甾酮后， 幼虫停止取食； 处理12 h时表皮细胞顶膜上的微绒毛减少， 在皮细胞与旧表皮之间形成蜕皮间隙， 旧头壳从幼虫头部脱离； 处理24 h时蜕皮间隙继续增大， 旧表皮与皮细胞进一步分离， 新表皮质层开始形成； 处理36 h时皮细胞顶膜形成较短的微绒毛， 胞质区域出现数量较多的电子疏松泡，新表皮由上表皮、 外表皮及8层左右内表皮片层组成； 处理48 h时顶膜与内表皮界限模糊， 内表皮继续合成至16层左右； 72 h时细胞内出现大面积电子疏松泡， 内表皮合成至20层左右。 处理96 h时， 与对照组相比， 皮细胞细胞器较少， 核仁周围出现小部分空白区域， 胞质区域内含物减少； 虫体发黑缩小， 即将死亡； 内表皮层数仍旧保持20层左右。对照组幼虫6-96 h虫体活跃， 正常取食， 外部观察及透射电镜结果均未显现蜕皮现象； 表皮层由上表皮、 外表皮及内表皮组成； 皮细胞顶膜微绒毛密度高； 表皮细胞分泌活动旺盛， 胞质区域细胞界限明显， 内含物丰富； 细胞器典型而且活跃； 内表皮片层随时间不断增加至50层左右。结果提示， 外源20-羟基蜕皮甾酮能够导致舞毒蛾5龄幼虫的致死性蜕皮。

关键词： 舞毒蛾 20-羟基蜕皮甾酮 外部形态 体壁 超微结构 透射电镜

Abstract: To ascertain the definite influence process of 20-hydroxyecdysone (20E) on cuticle, epidermic cells and cell organelle of integument in the molting process, transmission electron microscope was used to determine the influence of 20E on the integument ultrastructure of newly moulted 5th instar larvae of *Lymantria dispar* (Linnaeus). The results showed that larvae fed with white birch leaves soaked in high concentration of 20E ingested about 400 μg 20E when they stopped feeding within 6 h after treatment. At around 12 h post treatment, the microvilli on apical plasma membrane of epidermal cells reduced, and the ecdysial space started to form between the old cuticle and epidermal cells. The old head capsule started to break away from the larval head. At 24 h post treatment, the ecdysial space increased continually. The old cuticle separated further with epidermal cells and new cuticulin layer began to form. At around 36 h after treatment, short microvilli were formed at the apical plasma membrane, and a lot of electron lucent vesicles appeared at the cytoplasmic region. Epicuticle, exocuticle and about 8 layers of endocuticular lamellae were synthesized in the new cuticle. At 48 h after treatment, the bounds between apical plasma membrane and epidermal cells became obscure. Endocuticular lamellae were continuously synthesized to 16 layers. At 72 h post treatment, a large number of electron lucent vesicles appeared in the epidermal cells, and endocuticular lamellae were synthesized to about 20 layers. At 96 h after treatment, there were fewer organelles in epidermal cells of the treatment groups than in the control group. A small percentage of blank space occurred around nucleolus, and the contents in cytoplasm were reduced. The bodies of treated insects became nigrescence and shrinking, and they were close to death. The number of endocuticular lamellae maintained to be about 20 layers.In the control groups, however, at 6-96 h after treatment the larvae were active and fed normally, and no molting phenomenon was observed by external observation and transmission electron microscope experiments in these larvae. The cuticle of the larvae was composed of epicuticle, exocuticles and normal layers of endocuticular lamellae. The microvilli density was high. Those organelles were typical and active. The cell boundaries were visible in the cytoplasm area, where the inclusions are rich. The secretion activity of epidermal cell was vigorous, and the endocuticular lamellae

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increased continuously to 50 layers with increase of the treatment time. It is so inferred that 20E could lead to lethal moulting of 5th instar larvae of *L. dispar*.

Key words: *Lymantria dispar* 20-hydroxyecdysone external morphology integument ultrastructure transmission electron microscopy

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