

# 松阿扁叶蜂成虫触角感器超微结构研究

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**摘要:** 松阿扁叶蜂 *Acantholyda posticalis* (膜翅目: 扁叶蜂科) 是一种重要的松树害虫, 广泛分布于欧洲以及亚洲东部。为了探索松阿扁叶蜂的嗅觉感受机制, 本文采集两个不同地理种群的松阿扁叶蜂成虫, 利用扫描电镜和透射电镜对其触角及触角感器进行观察, 对触角和感器的外部形态、内部结构以及感器在触角表面的分布情况进行了描述。

电镜观察发现松阿扁叶蜂的触角为丝状, 由柄节、梗节和鞭节组成, 其中鞭节部分由 32~35 个亚节组成。松阿扁叶蜂触角表面共分布有 6 种感受器, 分别是刺形感器、毛形感器、锥形感器 I、锥形感器 II、腔锥形感器和钟形感器。刺形感器基部有臼状窝, 外形刚直如刺, 向顶部渐尖细, 厚壁表面有明显的斜螺旋纹; 毛形感器呈毛状突起, 顶端略弯曲, 顶部圆钝、有顶孔, 表面有纵向平行的沟槽; 锥形感器 I 呈拇指状突起, 基部着生于垫状凸起, 表面有纵向平行的沟槽, 顶部有多个裂缝状开口; 锥形感器 II 呈短圆锥状突起, 基部着生于触角表面较浅的圆形凹陷内, 壁上布满小孔, 顶端一侧有顶孔; 腔锥形感器表面光滑, 着生于触角表面较深的圆形凹陷内, 顶部中央有顶孔, 四周分布纵向开裂; 钟形感器着生于触角表面凹陷的圆形小穴内, 顶端与触角表皮基本持平, 顶部有一小孔。其中, 刺形感器和毛形感器是松阿扁叶蜂触角上数量最多、分布最广的两种感器, 而锥形感器 I、锥形感器 II、腔锥形感器和钟形感器仅集中分布于触角鞭节的腹侧。虽然松阿扁叶蜂雌、雄成虫之间触角的形状和结构无显著差异, 但是雌性叶蜂的触角长度明显大于雄性叶蜂, 而雄性叶蜂触角上锥形感器 I 的数量显著多于雌性叶蜂。另外, 两个不同地理种群之间松阿扁叶蜂触角感器的数量存在明显差异。将这 6 种感器与膜翅目中其它昆虫的触角感器从形态和结构方面进行了比较, 并结合外部形态、内部结构特点以及相关文献对这 6 种感器的功能进行了讨论。

**关键词:** 松阿扁叶蜂; 触角; 感器; 电子显微镜; 超微结构; 形态; 地理种群

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# Ultrastructure Studies on antennal sensilla of *Acantholyda posticalis*

## Matsumura (Hymenoptera: Pamphiliidae) Adult

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**Abstract:** *Acantholyda posticalis* (Hymenoptera: Pamphiliidae) is an important pine pest and widely distributed throughout the Europe and eastern of Asia. In this study, we describe the morphology, ultrastructure and distribution of sensilla on the antennae of both male and female adults from two different geographical populations using electron microscopy techniques. Observations determined that the antennae of *A. posticalis* were filiform and the flagella were composed of 32~35 sub-segments. Totally, there were six types of sensilla found on the antennae. They were identified as *Sensilla trichodea*, *sensilla basiconica I and II*, *Sensilla coeloconicum*, *Sensilla campaniformia* and *Sensilla chaetica*, respectively. The *S. chaetica* and *S. trichodea* were the most abundant sensilla and distributed over the entire antennae, while *S. basiconica I and II*, *S. coeloconicum*, and *S. campaniformia* were limited to the ventral sides of flagellum. The *S. chaetica* were straight ending setae with a sharply pointed tip; The *S. trichodea* were characterized by the parallel grooved wall and one terminal pore; The *S. basiconica I* have both the longitudinal grooved surface and multiple slit pores; The *S. basiconica II* possessed a clearly terminal pore on the tip and numerous tiny pores on the wall simultaneously; The *S. coeloconicum* were with deep longitudinal grooves, Single terminal pore and *S. campaniformia* were with thick-walled and a terminal opening. Though the shape and structure of antennae between male and female adults were not basically different, the length of the antennae on female sawflies was significantly longer than that of males. The number of *S. basiconica I* of the males was significantly greater than those of females. Also, There was a significantly differ in relation to the antenna sensilla number between the different geographical population. The morphology and structure of these sensilla were compared with that found in other Hymenoptera insect. Their possible functions are discussed in light of previously published literature.

**Keywords:** *Acantholyda posticalis*; Antenna; Sensilla; Electron microscope; Ultrastructure; Morphology; geographical population