

Love at First Sniff? Antennal Architecture and the Use of Olfaction in Host and Mate Location in the Magpie Moth, *Nyctemera annulata*

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Eligible for student prize

Insects rely on chemical information obtained from their surrounding environment when locating biologically important resources. Detection of these chemicals is mediated by the antennae, which are endowed with various sensory structures called sensilla. Sensilla type, distribution, and density may provide important information regarding an individual's ability to detect and process such external stimuli. Moreover, sexual dimorphism in these characteristics within a species may reflect a divergence in sensory functions and requirements relating to the procurement of different resources. We investigated the link between olfaction and antennal morphology in host and mate location in the endemic New Zealand magpie moth, *Nyctemera annulata*. The primary aims of this study were threefold: to investigate whether larvae and adults of this species are capable of detecting and responding to the chemical volatiles emitted from their host plant; to test if adult males can detect and respond to sex pheromones released from conspecific females; and to quantitatively investigate the sensory architecture of larval and adult antennae. We carried out behavioural trials using glass Y-maze olfactometers to examine the first two aims, and complemented these findings with scanning electron microscopy (SEM) to quantify their antennal architecture. Results obtained from the behavioural trials showed that *N. annulata* are capable of using olfactory stimuli in host and mate location, and SEM revealed that larvae and adults possess a range of different sensilla that would permit them to exploit such olfactory stimuli. Sexual dimorphism was also apparent in the overall antennal morphology as well as in the distribution, density, and morphology of particular types of sensilla in adult *N. annulata*, which likely represents a divergence in sensory functions based on the different resource requirements of males and females.

