SHORT COMMUNICATION

Host plant trichomes and the advantage of being big: progeny size variation of the pipevine swallowtail

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Abstract. 1. Plants possess numerous traits that confer resistance against insect herbivores, and herbivores, in turn, can evolve traits to ameliorate the effectiveness of these traits. The pipevine swallowtail, Battus philenor, is an extreme specialist on plants in the genus Aristolochia. The only host plant available to the California population of B. philenor is A. californica. Aristolochia californica is distinct from most other B. philenor host plants in that it is pubescent.

2. The progeny of B. philenor are larger in California compared with populations examined in Texas. Size differences persist throughout larval development.

3. Regardless of maternal host plant, population differences in progeny size persist, and crosses between California (large progeny) and Texas (small progeny) B. philenor populations resulted in offspring producing intermediate sized progeny, indicating a heritable component to progeny size variation.

4. California neonate caterpillars more easily overcame the trichomes of A. californica compared with Texas neonates. When trichomes were removed from A. californica, time to feeding establishment was reduced for caterpillars from both populations. Texas caterpillars established feeding sites on A. californica with trichomes removed, in the same time required to establish feeding on their non-pubescent host plant, A. erecta.

5. This study shows that plant trichomes might impose selection pressure on progeny size.

Key words. Adaptation, Battus philenor, caterpillar. egg size. trichomes. variation.

Introduction

Plant traits that confer resistance against herbivores can serve as strong selective agents on herbivore physiology, life history, behaviour, and morphology. Variation in plant resistance traits can lead to locally adapted herbivore phenotypes. A majority of the work on local adaptation of insect herbivores has emphasised the physiological mechanisms by which insects cope with plant chemical defences (e.g. Broadway, 1995; Berenbaum et al., 1996; Feyereisen, 1999; Glendinning, 2002). However, plant structural defences, such as trichomes or leaf toughness, can also affect the evolution of insect traits (Levin, 1973; Bernays, 1991; Hanley et al., 2007). One trait associated with leaf toughness is egg size and, in particular, the resulting size of neonates. For example, geographical variation in egg size of the pine processionary moth, Thaumetopoea pityocampa Denis & Schiffermüir, is positively correlated with the toughness of its host plant’s needles (Zovi et al., 2008), and the skipper Parnara guttata Bremer & Grey manipulates egg size in response to host plant leaf toughness (Mizumoto & Nakasuji, 2007). Although larval size has been identified as an important trait associated with leaf toughness, less attention has been paid to the role that plant trichomes might play in the evolution of egg size.

The pipevine swallowtail, Battus philenor L., is an extreme specialist on plants in the genus Aristolochia L. (Aristolochiaceae). There exists striking geographical variation in egg size and hatching weight of caterpillars, with California populations...