

Character analysis of adaptations for tarsal pollen collection in the Bombyliidae (Insecta: Diptera): the benefits of putting your foot in your mouth

JOHN L. NEFF¹, BERYL B. SIMPSON^{1,2}, NEAL L. EVENHUIS³ & GREGG DIERINGER⁴

¹ *Central Texas Melittological Institute, 7307 Running Rope, Austin, Texas 78731, USA*

² *Section of Integrative Biology, The University of Texas at Austin, Austin, Texas 78712, USA*

³ *J. Linsley Gressitt Center for Entomological Research, Bishop Museum, 1525 Bernice Street, Honolulu, Hawai'i 96817-2704, USA; email: neale@bishopmuseum.org*

⁴ *Department of Biological Sciences, Northwest Missouri State University, Maryville, Missouri, USA*

Abstract

Using direct observations and analyses of gut contents, we document that pollen feeding is widespread among female bombyliid flies. Pollen feeding is typically indirect with the initial pollen acquisition accomplished by foretarsal stroking of the anthers. Observations of the foretarsi using light and scanning electron microscopy showed that the foretarsi bear modified setae that play a role in pollen collection. Across the family, we found considerable variation in the morphology and distribution of the foretarsal setae that appear to be more related to phylogeny than pollen host. The major patterns of foretarsal setal specialization are illustrated and discussed.

Key words: Bombyliidae, pollen feeding, tarsal setae

Introduction

Bee flies have generally been considered to be primarily nectarivorous although it has been known for some time that at least some bombyliids consume pollen (Robertson 1892; Williston 1908; Knoll 1921). However, neither the extent nor mechanics of pollen feeding within the Bombyliidae have received much attention. The process of pollen gathering is of particular interest because several authors have noted that the elongate mouthparts of many bombyliids appear to be ill-adapted for pollen feeding (Müller 1883; Barth 1985). A number of ecological studies have mentioned, without further comment, that some bee flies consume pollen (Robertson 1892; Motten *et al.* 1981; Toft 1983) or have inferred it