



## The systematics and biology of *Cotesia nonagriæ* (Olliff) stat. rev. (Hymenoptera: Braconidae: Microgastrinae), a newly recognized member of the *Cotesia flavipes* species complex

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### Abstract

The Australian species *Cotesia nonagriæ* Olliff stat. rev. (Hymenoptera: Braconidae) is redescribed and formally removed from synonymy with *C. flavipes* based on molecular, morphological and biological differences. The taxonomic history and phylogenetic relationships of *C. nonagriæ* with other members of the *C. flavipes* complex are presented and underscore the importance of molecular-based identification within this group. The biology of *C. nonagriæ* on the native noctuid stemborer host, *Bathytricha truncata* (Walker), is compared with previously recorded *C. flavipes* life history traits. The implications of this taxonomic study relative to biological control and importation of stemborer parasitoids into Australia are discussed.

**Key words:** parasitoid, taxonomy, biology, stemborer, Australia, biological control

### Introduction

The *Cotesia flavipes* complex of parasitoid wasps are natural enemies of lepidopterous stemborers associated with sugarcane and cereal crops (Walker 1994). Since these are staple crops in many countries, the complex is economically important worldwide as biological control agents. The complex currently consists of three species, *Cotesia flavipes* Cameron, *C. sesamiae* (Cameron) and *C. chilonis* (Matsumura), of uncertain taxonomic validity and relationships. Identifying the various species within the *flavipes* complex has been problematic in the past and has been usefully summarized by Kimani-Njogu and Overholt (1997).

The monophyly of the complex is well supported by molecular (Smith & Kambhampati 1999; Michel-Salzat & Whitfield 2004; Muirhead *et al.* 2006) and morphological characters, such as a dorsoventrally compressed mesosoma (Watanabe 1965; Walker 1994). However, the species within the complex are morphologically similar, and many of the characters that have been used to separate species have proven unreliable due to intraspecific variation (Polaszek & Walker 1991; Smith & Kambhampati 1999). As a result, their use in biological control has been confounded by inaccurate identification, as well as the existence of host specific populations (Kimani-Njogu & Overholt 1997).

The species of the *C. flavipes* complex are thought to be endemic to the following areas: *C. flavipes* to the Indo-Australian region; *C. sesamiae* to central and southern Africa; and *C. chilonis* to eastern Asia, including Japan (Polaszek & Walker 1991; Kimani-Njogu & Overholt 1997). However, all three species have been utilized for classical biological control of stemborers, resulting in their much broader inter-continental distribution (Polaszek & Walker 1991). In some cases, a species of the complex has been introduced into an area indigenous to one of the other two species (Smith & Kambhampati 1999). For example, *C. flavipes* has been