



Three new species of *Fergusonina* Malloch gall-flies (Diptera: Fergusoninidae) from terminal leaf bud galls on *Eucalyptus* (Myrtaceae) in south-eastern Australia

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Abstract

Three new species of *Fergusonina* (Diptera: Fergusoninidae) flies are described from terminal leaf bud galls on *Eucalyptus* L'Hér. from south eastern Australia. *Fergusonina omlandi* Nelson and Yeates **sp. nov.** is the first species of fly from the genus *Fergusonina* to be described from the *Eucalyptus pauciflora* Sieb. ex Spreng. (Snow Gum) species complex; although another two species occur in sympatry on this host at higher elevations. *Fergusonina omlandi* **sp. nov.** can be distinguished from the latter by differences in adult size and markings on the mesonotum and morphology of the dorsal shield of the larva. The other new species, *Fergusonina williamensis* Nelson and Yeates **sp. nov.** and *Fergusonina thornhilli* Nelson and Yeates **sp. nov.** are the first flies to be described from *Eucalyptus baxteri* (Benth.) Maiden & Blakely and *Eucalyptus dalrympleana* Maiden, respectively. These two species can be distinguished from all other described *Fergusonina* by host specificity, adult colour and setation and morphology of the dorsal shield.

Key words: *Fergusonina*, Fergusoninidae, Diptera, mutualism, nematode, *Eucalyptus*

Introduction

Species of *Fergusonina* Malloch flies (Diptera: Fergusoninidae) form unique associations with nematodes of the genus *Fergusobia* Currie (Nematoda: Neotylenchidae), in the only known case of obligate mutualism between nematodes and insects (Giblin-Davis, 1993). First reported by Morgan (1933), the *Fergusonina-Fergusobia* mutualists together form galls on Myrtaceae mainly in Australia, though a few reports exist from India, New Guinea and New Zealand (Taylor *et al.*, 2007a). Galls have been reported predominantly from *Eucalyptus* species, although *Angophora*, *Corymbia*, *Melaleuca*, *Metrosideros* and *Syzygium* are also hosts (Currie, 1937; Tonnoir, 1937; Harris, 1982; Siddiqi, 1986, 1994; Giblin-Davis *et al.*, 2004c; Taylor, 2004; Taylor *et al.*, 2007a; Taylor & Davies, 2008; Davies *et al.*, 2010a; Davies *et al.*, 2010b). It is hypothesised that the nematodes initiate gall formation and that the flies facilitate transport to new host plants and possibly provide some nutritional benefits to the nematodes (e.g. Currie, 1937; Fisher & Nickle, 1968; Giblin-Davis *et al.*, 2001a; Giblin-Davis *et al.*, 2001b; Taylor *et al.*, 2005; Taylor & Davies, 2008). Within galls, individual fly larvae and their associated nematodes are contained within separate chambers known as locules (Giblin-Davis *et al.*, 2004a). The *Fergusonina-Fergusobia* together form several gall types ranging from unilocular (e.g. 'pea' galls) to multilocular (e.g. terminal leaf bud galls) (Currie, 1937; Tonnoir, 1937; Taylor *et al.*, 2005; Ye *et al.*, 2007). Morphological and molecular data from both *Fergusonina* and *Fergusobia* indicate that this galling association is species-specific, with each mutualism in turn displaying host specificity (Goolsby *et al.*, 2000; Davies & Giblin-Davis, 2004; Giblin-Davis *et al.*, 2004b; Scheffer *et al.*, 2004; Taylor, 2004; Ye *et al.*, 2007; Taylor & Davies, 2008). Therefore, the *Fergusonina-Fergusobia* gallers, together with their myrtaceous hosts, provide a unique study system for cospeciation and coevolution.

Although many more species of *Fergusonina* have been collected, only 31 have been described (Tonnoir, 1937; Taylor, 2004; Taylor *et al.*, 2007b; Taylor & Davies, 2008; Nelson *et al.*, 2011). The only key to the genus