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The nematode genus *Fergusobia* (Nematoda: Neotylenchidae): molecular phylogeny, descriptions of clades and associated galls, host plants and *Fergusonina* fly larvae

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Abstract

Collection data and biological information is presented on the genus *Fergusobia* (Nematoda: Neotylenchidae) from Australasia, India and The Philippines, an emended diagnosis of the genus is presented, and its putative phylogeny is discussed based on molecular and morphological evidence. About 20 clades have been found, and are outlined, including information on nematode and fly morphology; plant host species and distribution. Fly morphology, particularly the structure of the dorsal shield of third stage larvae, is congruent with the clades of nematodes, suggesting coevolution. However, little evidence of coevolution between the fly/nematode association and their host plants is apparent: host-switching appears to have been common, although host-specificity is stringent among most clades. A key to the species and morphospecies of nematodes collected from *Corymbia*, *Angophora*, *Metrosideros*, *Syzygium*, narrow-leaved *Melaleuca*, and *Eucalyptus* is presented.

Key words: Flies, galls, Myrtaceae, phylogeny, taxonomy, clades, dorsal shields, morphology, key, diagnosis

Introduction

Nematodes of the genus *Fergusobia* Currie 1937 (Tylenchida: Neotylenchidae) occur in a mutualistic association with flies of the genus *Fergusonina* Malloch 1924 (Diptera: Fergusoninidae). Evidence from molecular sequencing of flies and nematodes suggests that each genus is monophyletic, and each species of *Fergusonina* is associated with a particular species of *Fergusobia* (Goolsby *et al.* 2000; Giblin-Davis *et al.* 2001; Taylor 2004; Ye *et al.* 2007b). The nematodes are thought to induce galls on host plants via oesophageal secretions produced during feeding (Currie 1937; Giblin-Davis *et al.* 2001). Thus, the flies probably rely on the nematodes for gall induction, and the nematodes rely on the flies for transport from plant to plant and for nutrition of the parasitic female. *Fergusobia* is dicyclic, with a parthenogenetic generation in a plant, followed by an amphimictic generation that begins in a plant and ends with a parasitic, fertilised female in the haemolymph of (female only) flies. Host fly resistance and nematode virulence must be modified in some way in female flies, because they always carry nematodes (Giblin-Davis *et al.* 2003). The parasitic female deposits hundreds of eggs into the haemolymph of the fly, where they hatch and the juveniles move to the fly's oviducts. When the fly deposits her eggs in fresh meristematic tissue, she also deposits juvenile nematodes. The life cycles of the flies and nematodes are described in more detail in Giblin-Davis *et al.* (2004b) and Taylor *et al.* (2005).