Biological control of *Gonipterus*: Uncovering the associations between eucalypts, weevils and parasitoids in their native range

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Abstract

The study was initiated by the relative failure of the parasitoid *Anaphes nitens* in controlling the eucalypt weevil *Gonipterus platensis* on the Iberian Peninsula. Our aim was to gain insight into the community of *Gonipterus* egg parasitoids occurring in Tasmania. During surveys in 2016 and 2017, adult weevils and egg pods were collected from *Eucalyptus* trees in Tasmania. The weevils were identified using male genital structure and DNA extracted from hatched larvae. Parasitoids that emerged from the egg pods were identified, and trophic associations of egg parasitoids, weevils and host plants were analyzed. Five species of the *Gonipterus scutellatus* complex, to which *G. platensis* belongs, were found, including *Gonipterus* sp. 2, which is reported for the first time from Tasmania. Molecular analysis corroborated previous phylogenetic studies of this group of species. A sixth species, *G. notographus*, was also collected. Most species were found to overlap in distribution in Tasmania and, despite being oligophagous, to display selectivity among Eucalyptus species used as hosts: *G. platensis* and *G. pulverulentus* were mainly found on *E. ovata*, *Gonipterus* sp. 1 on *E. nitens* and *E. globulus* and *G. notographus* on 'peppermint' species (*E. amygdalina* and *E. pulchella*). Five egg parasitoid species were found associated with these *Gonipterus* species: *Anaphes inexpectatus*, *A. nitens*, *A. tasmaniae*, *Cirrospilus* sp. and *Euderus* sp., with no apparent host specialization. *Anaphes nitens*, *Cirrospilus* sp. and *Euderus* sp. were more frequently found on *E. ovata*, possibly associated with *G. platensis* and

G. pulverulentus, which were dominant on this host species. Conversely, *A. inexpectatus* was dominantly found on peppermints (43%), suggesting a main association with *G. notographus*. *Anaphes nitens* was found at 23 locations out of 117 and in 2017 was the most abundant parasitoid obtained, with an average 20% parasitism rate, indicating that this species is undergoing a geographical and population expansion since its first report from Tasmania in 2012. These findings contribute to the understanding of the parasitoid-*Gonipterus*-*Eucalyptus* trophic relationship and stand to improve future classical biological control programs against *G. platensis* and other invasive *Gonipterus* species.