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Taxonomic history and invasion biology of two *Phyllonorycter* leaf miners (Lepidoptera: Gracillariidae) with links to taxonomic and molecular datasets

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Abstract

This paper deals with two European species, *Phyllonorycter mespilella* (Hübner, 1805) and *P. trifasciella* (Haworth, 1828), that have colonized the subtropical Canary Islands. The Rosaceae leaf miner, *P. mespilella*, is recorded for the first time from Lanzarote and La Palma, while the Caprifoliaceae leaf miner, *P. trifasciella*, is recorded from Tenerife. We present the diagnoses of these species based on morphology, a preliminary DNA barcode (COI) library of congeneric and confamilial species, and discuss the taxonomic position of the colonizers within the *blancardella* and *trifasciella* species groups. The recent intensification of anthropogenic disturbance likely accounts for their range expansion, an event that may impact the relict flora present on the Canary Islands.

Key words: Canary Islands, leaf-miner, *Lonicera*, invasive species, *Malus*, new distribution records, *Phyllonorycter,* pest species

Introduction

In the last decade there has been a massive increase in research on invasive insects (Tsutsui *et al*. 2000; Mooney & Cleland 2001; Lockwood *et al*. 2007; Davis 2009; Roques *et al*. 2010; Blackburn *et al*. 2011). The dramatic growth of data and its importance to conservation issues has led the entomological community to question what is a native species (Pyšek *et al*. 2004; Roques *et al*. 2010), and what to call populations established in an area where the species was formerly unknown (Lockwood *et al*. 2007; Richardson *et al*. 2011). Most prior studies on alien species within Europe have investigated taxa from another continent or of unknown origin (Blackburn 2011; van Nieukerken *et al*. 2012a, b). However, few investigators have examined colonization events from continental Europe to subtropical areas.

Species of the gracillariid subfamily Lithocolletinae provide some of the best examples of how alien species can rapidly spread across vast areas (Gilbert & Grégoire 2003; Gilbert *et al*. 2004, 2005; Šefrová 1999, 2001, 2002a, b; Šefrová & Laštůvka 2001; Valade *et al*. 2009; Lopez-Vaamonde *et al*. 2010; Péré *et al*. 2010a; Davis & De Prins 2011), even colonizing new host plants (Gregor *et al*. 1998; Péré *et al*. 2010b). *Phyllonorycter* leaf-miners, due to their small size and life history (Vári 1961; Emmet *et al*. 1985; Davis & Deschka 2001; Bengtsson & Johansson 2011; De Prins & Kawahara 2012), disperse readily with their host plants. When conditions are favourable, these moths are multi-voltine, sometimes creating outbreaks on native plants (Carter 1984; Sarto i Monteys & Vives de Quadras 1991; Blommers & Vaal 1996; Kuznetzov 1999; Kuznetzov & Baryshnikova 2004). This paper reports the establishment of two species of European leaf miners in the Canary Islands—*Phyllonorycter mespilella* (Hübner, 1805) and *Phyllonorycter trifasciella* (Haworth, 1828). The Rosaceae feeding species, *P. mespilella,* shows wide ecological plasticity and now has a range that spans Europe, North Africa (Morocco,

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