

FIRST RECORD OF *LILIOCERIS LILII* (COLEOPTERA: CHRYSOMELIDAE) EGGS IN A WILD POPULATION OF *STREPTOPUS AMPLEXIFOLIUS* (LILIACEAE)

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Scientific Note

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Lilioceris lilii (Scopoli) (Coleoptera: Chrysomelidae), the Lily Leaf Beetle, is an invasive European species first found at Montreal, Canada, in the 1940s (Gold et al. 2001). It is a serious pest of cultivated *Lilium* spp. and *Fritillaria* spp. (Liliaceae) and has spread across southern Canada and northeastern United States (LeSage 1983; Gold et al. 2001). The beetle also poses a threat to native lilies in Ontario and Quebec, including Canada Lily, *Lilium canadense* L., and Wood Lily, *Lilium philadelphicum* L. (Ernst et al. 2007; Bouchard et al. 2008). In fact, in Ontario and Quebec eight out of 20 wild populations of *L. canadense* were infested with *L. lilii* (Bouchard et al. 2008). There are also records of *L. lilii* adults feeding on plants in other liliaceous genera, e.g., *Polygonatum* (Temperé 1926; Fox Wilson 1942), *Streptopus* (Ernst 2007), as well as genera in other families, e.g., *Solanum* (Solanaceae) (Temperé 1926).

Kealey (2013) investigated Claspleaf Twistedstalk, *Streptopus amplexifolius* (L.) DC. (Liliaceae), as a potential novel host of *L. lilii*. *Streptopus amplexifolius* occurs in rich moist coniferous and deciduous woods in all provinces and territories in Canada and all adjacent states of the USA (Anonymous 2013). This native plant flowers from late spring until mid-summer. *Streptopus amplexifolius* leaves were offered to *L. lilii* larvae to determine survivorship and development time. Leaves of *S. amplexifolius* were collected from a wild population growing in Gatineau Park, Quebec, Canada (45.491°N 75.863°W). Infestations of *L. lilii* were recently reported in urban areas south of Gatineau Park, but no known *L. lilii* populations are established within the Park nor on any wild populations of *S. amplexifolius* (Cappuccino 2013).

During a routine collection of *S. amplexifolius* plants for laboratory tests on June 25, 2013, a row of three *L. lilii* eggs (Fig. 1) was discovered on the underside of a wild *S. amplexifolius* leaf. Surrounding plants were searched for more eggs, though none were discovered, nor was any obvious feeding damage by adults or larvae observed. The *S. amplexifolius* leaf with the *L. lilii* egg mass was carefully removed from the stem and transported to the laboratory. The eggs were left undisturbed, and the leaf was placed on

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moist filter paper in a 60 x 15 mm Petri dish maintained at 23°C, 70% relative humidity and 16:8 L:D, and monitored for larval hatch. The three eggs hatched on June 30th or July 1st. Two first instar larvae were still alive on July 2nd and feeding damage was observed on the leaf whereas the third larva was dead and had not fed. Subsequently both surviving larvae died. The cause of death is unclear.

The eggs (Fig. 1), and hatched larvae (Fig. 2), found in Gatineau Park shared all of the characteristics of *L. lili*. *Lilioceris lili* egg masses are distinct: they are laid parallel to leaf veins, in a linear arrangement of 2–16 eggs on the underside of host leaves (Salisbury 2008); eggs are bright red or orange in color, though darken when near hatching, and are covered in a sticky orange layer; individual eggs are 1.0 x 0.5 mm, and masses are laid from March–September (Haye and Kenis 2004); and *Lilioceris lili* larvae are dirty-orange in color, with a dark head and legs. First instar larvae (Fig. 2) have head capsule widths between 0.36–0.55 mm, and a distinct egg bursting spine is located on the first abdominal segment (Livingston 1996; Cox 1994). Larvae also carry a viscous fecal shield of their own excrement on their backs.

Eggs of other genera within the Criocerinae subfamily may be confused with *L. lili* eggs. Hosts of *Lema* spp. belong to the distantly related plant families *Solanaceae* and *Asteraceae*, and *Oulema* spp. are on species of *Asteraceae*, *Commelinaceae* and *Poaceae*. The only species of *Neolema* that occurs in Canada, *N. cordata* White, occurs on *Commelinaceae* spp. Two species of *Crioceris* closely resemble *L. lili* in the larval stage; however, both are closely associated with Asparagales and have distinctly different egg placement and color (White 1993).

This observation marks the first record of *L. lili* ovipositing on *S. amplexifolius* in nature and this is the first plant species outside the genera *Lilium*, *Fritillaria*, and *Cardocrinum* (the known host genera for this beetle) where both oviposition in nature and successful larval development in the lab have been observed (see Salisbury 2008). Although Ernst et al. (2007) found that larval performance was poor on *S. amplexifolius* leaves in laboratory tests, Kealey (2013) confirmed that almost half (42%) of *L. lili* larvae can successfully develop to adults on *S. amplexifolius*. This record is also only the second oviposition record for *L. lili* in North America on a host plant in nature outside of urban areas where development might also be occasionally possible. The observation reported here is likely the result of an adult that emigrated from an urban area. However, it is unknown what the potential is for colonization by *L. lili* of novel host plants, such as *S. amplexifolius*, in non-urban areas. Among the factors that might encourage a more permanent move to *S. amplexifolius* by *L. lili* is the enemy-free-space hypothesis in which the herbivore escapes its specialized parasitoid by feeding on a novel host plant (Brown et al. 1995; Rossbach et al. 2006). Further study would help to establish if such events are rare or the first step in adaptation by an invasive alien species to a novel host.



FIGURE 1. *Liliocercis lilii* eggs on *Streptopus amplexifolius* leaf from Gatineau Park, Quebec.



FIGURE 2. *Liliocercis lilii* first instar larva on a *Streptopus amplexifolius* leaf collected from Gatineau Park, Quebec. This picture was taken soon after larval death and shows A) feeding damage B) egg bursters and C) fecal shield characteristic of the species.

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