

FIRST RECORD OF *STRONGYGASTER TRIANGULIFERA* (LOEW) (DIPTERA: TACHINIDAE) AS A PARASITOID OF *HARMONIA AXYRIDIS* (PALLAS) (COLEOPTERA: COCCINELLIDAE) IN WESTERN NORTH AMERICA

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The parasitic tachinid fly *Strongygaster triangulifera* (Loew) is widely distributed in North America (Stone et al. 1965). It parasitizes several Coleoptera and sometimes species of other orders such as Lepidoptera, Dermaptera, and Hemiptera (Sabrosky and Braun 1970). Existing records of *S. triangulifera* found in coccinellid hosts are from eastern North America. One describes low parasitization levels (<1%) in two indigenous species, *Coccinella trifasciata perplexa* Mulsant and *Coleomegilla maculata lengi* Timberlake, in Ontario, Canada (Smith 1960). The other existing record describes fluctuating parasitization levels (3.0–31.1% in 1993 and 0–6.5% in 1994) in the exotic species *Harmonia axyridis* (Pallas) in North Carolina and Virginia (Nalepa et al. 1996).

During the late 1970s and early 1980s, the United States Department of Agriculture sponsored the release of large numbers of *H. axyridis* in many states (Chapin and Brou 1991). This action resulted in the establishment and wide distribution of *H. axyridis*, reported first in the eastern United States and Canada (McClure 1987; Chapin and Brou 1991; Coderre et al. 1995). Mass releases of *H. axyridis* in the state of Washington in 1981–1982 resulted in its establishment and distribution in the northwestern United States, with first recoveries recorded in 1991 in both Washington and Oregon (Dreistadt et al. 1995; LaMana and Miller 1996).

Dinocampus coccinellae (Schrank) (Hymenoptera: Braconidae) is the only parasitoid previously reported as parasitizing adults of *H. axyridis* at low levels (<1%) in western North America (LaMana and Miller 1996). This paper provides the first record of *S. triangulifera* parasitizing *H. axyridis* in the region.

Adults of *H. axyridis* were collected from their hibernation sites in buildings at two localities in rural Lane County, Oregon, one near Fall Creek at about 200 m elevation (26 January 1997) and the other about 3 miles (5 km) away near Jasper at about 140 m elevation (5 March, 17 March, and 14 April). The day after collection they were examined under stereoscope in the laboratory. The beetles were sorted according to sex and color morph (*succinea* = nonmelanized form, with black-spotted orange elytra; *conspicua* = melanized form, with black elytra displaying two red spots). They were then dissected in tap water and examined for parasitoids. Larvae of parasitoids found during the dissections were preserved in 65% ethanol pending identification.

Emergence of parasitoids was monitored on 42 adults collected from the Fall Creek locality and transferred to the laboratory on 27 January 1997, under 25 ±1°C constant temperature, 10L:14D photoperiod, and about 50% RH. Twenty-one male–female pairs of beetles were placed in separate transparent plastic containers (8.8 cm in diameter, 6.3 cm in height) for rearing. They were fed with *Aphis fabae* Scopoli (Homoptera; Aphididae) reared on seedlings of *Vicia faba* L. (Leguminosae).

Parasitoids' pupae found at the bottom of the plastic containers were collected and placed in separate vials until the adult flies emerged. The emerged flies were preserved in 65% ethanol, and the puparia were saved, pending identification.

Adults of *H. axyridis* from Oregon were found parasitized by *S. triangulifera* during their hibernation (Table 1). This indicates that parasitic larvae of *S. triangulifera* overwinter in the bodies of *H. axyridis*, agreeing with reports on its hibernation in other beetles (Lampyridae) (Sabrosky and Braun 1970). Nalepa et al. (1996), from samples

TABLE 1. Percent parasitism in *Harmonia axyridis* adults collected from two localities in Lane County, Oregon, in 1997 and dissected on the following day

Collection site	Date	Sex ratio ♂/♀ (%)	Total no. of beetles dissected	Parasitism (%)	
				<i>Strongygaster triangulifera</i>	<i>Dinocampus coccinellae</i>
Fall Creek	26 January	31:69	13	15.4	0
Jasper	5 March	35:55	23	17.4	0
Jasper	17 March	20:80	30	6.7	0
Jasper	14 April	43:57	35	11.4	2.8

taken before hibernation, concluded that *H. axyridis* were parasitized by *S. triangulifera* at their feeding sites in eastern North America before forming aggregations.

In all samples dissected, parasitism by *S. triangulifera* was much more frequent than that by *D. coccinellae* (Table 1). *Strongygaster triangulifera* appeared to show no sex preference; our numbers, however, were too small to draw a definite conclusion. Nalepa et al. (1996) reporting from the eastern United States also found no significant differences in rates of parasitism in males and females.

In all cases of parasitism by *S. triangulifera*, only one larva was found in the abdomen of the dissected host. Cases of parasitism with more than one larval *S. triangulifera* present are reported from the eastern United States (Nalepa et al. 1996).

In adults of *H. axyridis* collected from their Fall Creek hibernation site and transferred to laboratory conditions for rearing, the rate of parasitism by *S. triangulifera* was 4.8%. No *D. coccinellae* were found.

Two fully grown larvae of *S. triangulifera* left the bodies of their hosts and pupated at the bottom of the plastic containers in which the beetles were being reared. This agrees with the description by Thompson (1954) of larvae leaving the bodies of their hosts to pupate. The first larva pupated on 1 February 1997, and the second on 9 February. Two adult flies emerged, the first on 17 February and the second on 22 February. These adults were subsequently identified as *S. triangulifera* by the Systematic Entomology Laboratory, Beltsville, Maryland.

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