

First report on egg-parasitoids of the Asian planthopper *Ricania speculum*

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Abstract

The first findings of egg-parasitoids of the invasive planthopper *Ricania speculum* (Walker) (Hemiptera Ricaniidae) are presented. *Aprostocetus* (*Ootetrastichus*) *crino* (Walker) (Hymenoptera Eulophidae), a native species until now only associated with *Oecanthus* spp. (Orthoptera Oecanthidae) eggs, was the most common. *Chaetostricha similis* (Silvestri) (Hymenoptera Trichogrammatidae) and *Polynema* sp. (Hymenoptera Mymaridae), which also emerged from *R. speculum* egg clusters, should be confirmed as parasitoids of this planthopper.

Key words: *Aprostocetus crino*, *Chaetostricha similis*, *Polynema* sp., native species, Italy.

Introduction

The first European records of the Asian planthopper *Ricania speculum* (Walker) were reported by Mazza *et al.* (2014) in the province of Genoa and by Rossi and Lucchi (2015) in the province of La Spezia. The other congeneric species occurring in Europe are *Ricania hedenborgi* Stal and *Ricania japonica* Melichar, invasive in Greece and Ukraine, respectively (Gjonov, 2011; Gjonov and Shishiniova, 2014; Gnezdilov, 1999; Hoch, 2002; Holzinger *et al.*, 2003; Nast, 1987). *Ricania simulans* (Walker) has been recently recorded only in Turkey (Ak *et al.*, 2015). The family Ricaniidae (Hemiptera Fulgoromorpha) includes species distributed mainly in Asia, Australia, and tropical Africa.

R. speculum has been recorded in China, Indonesia, Japan, Korea, the Philippines, Taiwan, and Vietnam (Bourgoin, 2016), and is broadly polyphagous (Mazza *et al.*, 2014; Rossi and Lucchi, 2015; Rossi *et al.*, 2015). Females insert eggs into the woody twigs of many host plants on which nymphs feed and develop (Rossi and Lucchi, 2015; Rossi *et al.*, 2015). Egg, egg-burster, and male and female genitalia morphologies were recently described and illustrated (Lucchi and Rossi, 2016; Rossi and Lucchi, 2015; Wilson *et al.*, 2016).

Few natural enemies of Ricaniidae have been recorded to date. Among the known parasitoids is listed *Centrodora scolypopae* Valentine (Hymenoptera Aphelinidae), which parasitizes the eggs of *Scolypopa australis* (Walker) (Valentine, 1966). With regard to the genus *Ricania*, only two Dryinidae (Hymenoptera Chrysidoidea) and one Salticidae (Araneae) of the genus *Phidippus* sp. are recorded as natural enemies (Guglielmino *et al.*, 2013; Swaminathan and Ananthakrishnan, 1982).

Tetrastichus sp. (Hymenoptera Eulophidae) and *Proleurocerus fulgoridis* Ferriere (Hymenoptera Encyrtidae) have been reported as parasitoids of *Ricania fenestrata* (F.) (Noyes, 2017), but in the original paper the records were associated with *Eurybrachys tomentosa* F. (Hemiptera Eurybrachidae) (Swaminathan and Ananthakrishnan, 1982).

Based on observations from an eight-month period between 2014 and 2015, we consider *R. speculum* an important threat to European crops. Taking into consideration the current diffusion and the first unofficial record of this species (entomological forum Natura Mediterraneo: <http://www.naturamediterraneo.com/>), we presume that the accidental introduction of *R. speculum* can be dated to at least six-seven years ago. As a consequence of the lack of natural enemy regulation in new areas (Keane and Crawley, 2002) this planthopper could become invasive.

Here, we report the first record of some native parasitoids that emerged from *R. speculum* eggs collected in Liguria (Northern Italy) in the spring of 2016.

Materials and methods

R. speculum egg clusters were collected in some localities of Genoa and La Spezia provinces (Liguria, Italy), in March-April 2016 (table 1).

The small twigs and stalks containing the eggs were maintained in cylindrical glass vials (length 100 mm, diameter 10 mm), under laboratory conditions (24 ± 1 °C, 60 ± 10% RH, and L:D 16:8), in order to obtain possible parasitoids. All emerging adult parasitoids were kept with the numerical code given to the preserved egg and host plant data. Emerged parasitoids were individually preserved in 70% ethanol. Some specimens used for taxonomic identification were mounted on slides using balsam-phenol as a permanent medium; others were mounted on cards.

Results and discussion

In April 2016, 9 adult parasitoids emerged from egg clusters: 4♀ and 3♂ of an *Aprostocetus* sp., 1♀ of *Polynema* sp. and 1♀ of a *Chaetostricha* sp. They were identified by G. Viggiani and S. Laudonia and reported as follows.

Table 1. Localities of collection of the egg-cluster of *R. speculum* in Liguria.

Collection date (2016)	Collection site	GPS Coordinates	N. of egg-clusters collected	Host plants	N. of eggs	Parasitoid emerged
13 March	Arcola - Boscalino (La Spezia)	44.108751N 9.890320E	79	<i>Clematis vitalba</i>	1894	-
13 March	Arcola - Piano (La Spezia)	44.11758N 9.92363E	70	<i>Clematis vitalba</i> , <i>Rubus</i> spp.	1335	-
27 March	Sestri Levante - Gromolo (Genoa)	44.27509N 9.41551E	80	<i>Clematis vitalba</i> , <i>Eupatorium cannabinum</i>	2242	4♀ <i>A. crino</i> ; 2♂ <i>A. crino</i> ; 1♀ <i>C. similis</i> ; 1♀ <i>Polynema</i> sp.
27 March	Sestri Levante - Battilana (Genoa)	44.2731N 9.48004E	56	<i>Clematis vitalba</i>	1154	-
09 April	Pitelli (La Spezia)	44.09718N 9.88031E	28	<i>Clematis vitalba</i>	532	-
10 April	Piani di Follo (La Spezia)	44.15794N 9.86452E	70	<i>Clematis vitalba</i>	1578	1♂ <i>A. crino</i>
10 April	Arcola - Pianazze (La Spezia)	44.11219N 9.88972E	28	Several garden plants	807	-
10 April	Arcola - Soggiano (La Spezia)	44.11244N 9.89113E	69	<i>Clematis vitalba</i>	1680	-
11 April	Ceparana (La Spezia)	44.16235N 9.88447E	8	<i>Clematis vitalba</i>	379	-
Total n.			488		11601	

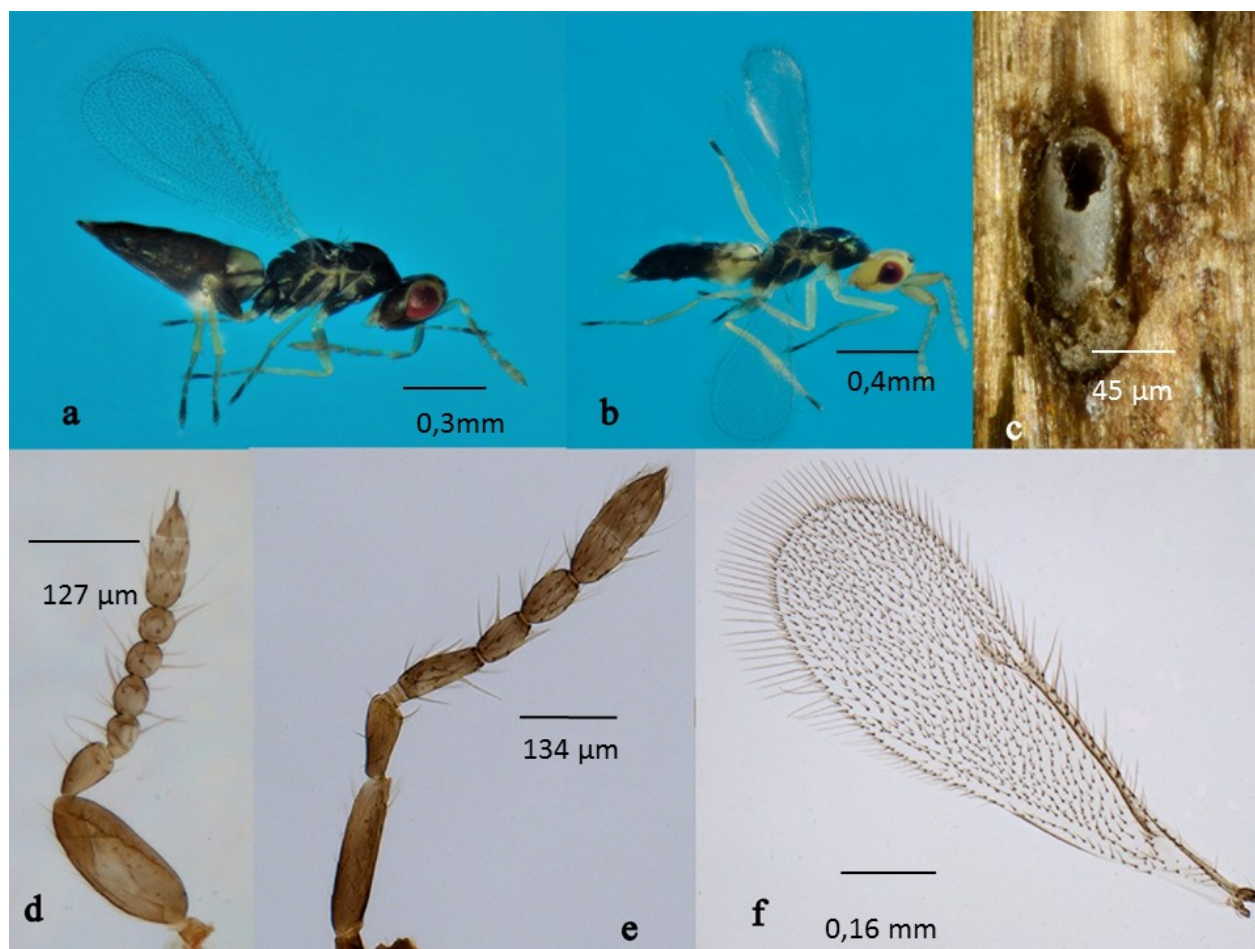


Figure 1. *A. crino*: a) ♀; b) ♂; c) emergence hole; d) ♂ antenna; e) ♀ antenna; f) ♂ fore wing. (In colour at www.bulletinofinsectology.org)

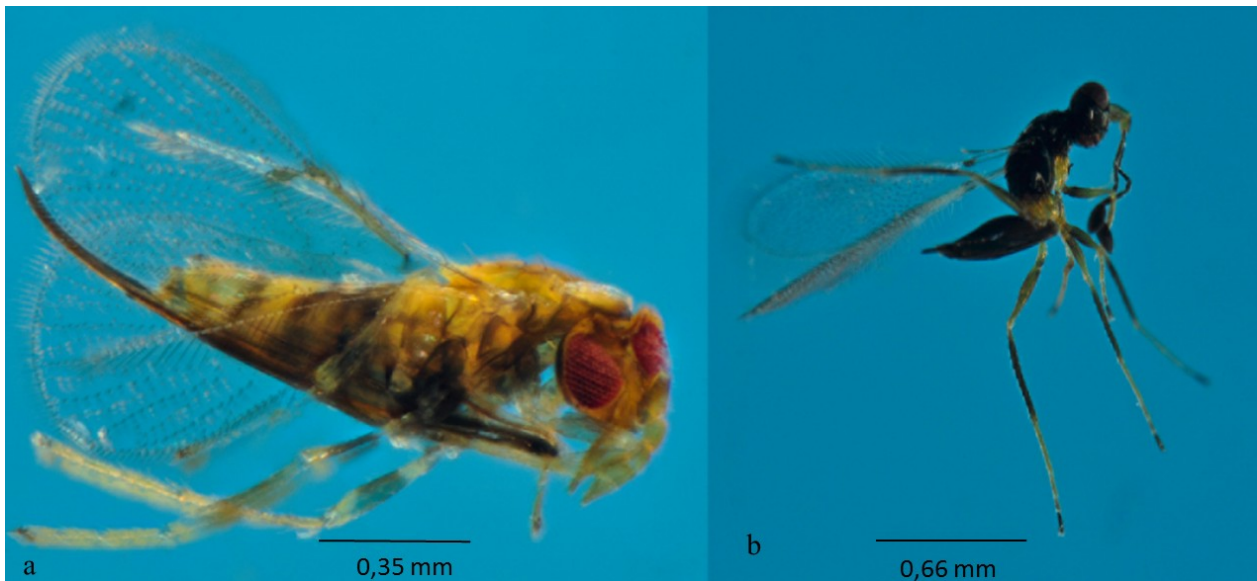


Figure 2. a) *C. similis* ♀; **b)** *Polynema* sp. ♀.
(In colour at www.bulletinofinsectology.org)

Aprostocetus (*Ootetrastichus*) *crino* (Walker) (Hymenoptera Eulophidae) (figure 1), which is widespread in Europe and is also recorded in China and North America, is an egg parasitoid of *Oecanthus* spp. (Orthoptera Oecanthidae). Graham (1987) redescribed this species in detail, as it exhibits variability in colour and morphological characteristics. Our specimens were compared with the type material of *Tetrastichus* (*Geniocerus*) *dispar* Silvestri a prior synonym of *A. crino* (Silvestri, 1920). While this species may include variation, additional limiting parameters beyond those given by Graham (1987) have been recorded, namely for the male antennae and the length/width ratios of the funicular segments (up to 1.2 times as long as wide) and the club (up to 2.6-3.0 times long as wide). Our specimens emerged from *R. speculum* eggs laid on *Clematis vitalba* L. and *Eupatorium cannabinum* L.

Regarding the hosts of *A. crino*, Graham (1987) noted, “none of these hosts occurs in northern Europe so that *crino* must have other hosts in that region”. Our record supports Graham’s view. This species has strangely been reported as a parasitoid of a prepupa of *Yponomeuta padella* (L.) (Lepidoptera Yponomeutidae) (Noyes, 2017; Yegorenkova *et al.*, 2007).

Chaetostricha similis (Silvestri) (Hymenoptera Trichogrammatidae) (figure 2a). This species is known only from the original description in Campania, Italy (Silvestri, 1918). Species of the genus *Chaetostricha* are recorded as egg parasitoids of Membracidae and Miridae (Pinto, 2006).

Polynema sp. (Hymenoptera Mymaridae) (figure 2b). The present taxonomy within this genus, particularly for the Palearctic species, suggests avoiding uncertain species identification.

C. similis and *Polynema* sp., which also emerged from *R. speculum* egg clusters, both with only one specimen, should be confirmed as new associate with this planthopper.

The first findings of egg-parasitoids of *R. speculum* support the hypothesis of a shift of some native species to a new host, as in the Ecological Sorting Hypothesis (Weiher and Keddy, 1999). Research in progress will clarify the population dynamics of *Ricania* and the relationship among the entomophagous *Ricania* species.

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