

GEA, FLORA ET FAUNA

First record of the invasive tingid species *Corythauma ayyari* (Drake, 1933) in the Iberian Peninsula (Insecta: Hemiptera: Heteroptera: Tingidae)

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Abstract

Corythauma ayyari (Drake, 1933) (Heteroptera: Tingidae) is reported for the first time in the Iberian Peninsula. Four specimens were collected in Puigmoltó (Sant Pere de Ribes, Barcelona, Spain), 45 km southwest of Barcelona city. This Oriental invasive species may become pest causing necrosis on the leaves of its host plant species, usually ornamental plants, among which jasmine (*Jasminum* sp.) is the most common.

Key words: invasive species, allochthonous species, lace bug, jasmin, pest, Tingidae, Hemiptera, Heteroptera.

Resum

Primera cita per l'espècie invasora *Corythauma ayyari* (Drake, 1933) a la península Ibèrica (Insecta, Hemiptera, Heteroptera, Tingidae)

Corythauma ayyari (Drake, 1933) (Heteroptera: Tingidae) ha estat trobat per primer cop a la península Ibèrica. Es van recol·lectar quatre individus a la localitat de Puigmoltó (Sant Pere de Ribes, Barcelona) a 45 km al sud-oest de la ciutat de Barcelona. Aquesta espècie invasora oriental pot convertir-se en plaga, ocasionant necrosis a les fulles. Amb freqüència les seves plantes hostes són plantes ornamentals, entre les quals el gessamí (*Jasminum* sp.) és la més comuna.

Paraules clau: Espècie invasora, espècie ahlòctona, tigre del gesamí, gesamí, plaga, Tingidae, Hemiptera, Heteroptera.

Introduction

The history of species introductions in Europe is not new, though the phenomenon has grown faster in the last century as a result of increasing globalization, climate change, the worldwide exchange of goods and tourists affecting the abundance and dispersion of invasive allochthonous species and the vulnerability of ecosystems to invasions. Often referred to as «aliens» these invasive allochthonous species may have significant environmental, economic and public health impact as they represent a significant risk for the wholesale homogenization of ecosystems (Genovesi & Shine, 2004).

About 50 % of recently invading species belong to the Hemiptera order. Among true bugs (suborder Heteroptera), from 2005 onwards the alien species reported in the Iberian Peninsula are as follows: the broad-headed bug *Heegeria tangirica* Saunders, 1877 (Alydidae) (Burger, 2011), the Western conifer seed bug *Leptoglossus occidentalis* Heidemann, 1910

(Coreidae) (Ribes & Escolà, 2005), the plant bugs *Deraeocoris flavilinea* (A. Costa, 1862) (Miridae) (Gessé, 2011) and *Fulvius borgesii* Chérot, J. Ribes & Gorczyca 2006 (Miridae) (Chérot & Pagola-Carte, 2012), the plane tree bug *Arocatus longiceps* Stål, 1872 (Lygaeidae) (Ribes & Pagola-Carte, 2008), the sycamore seed bug *Belonochilus numenius* Say, 1832 (Lygaeidae) (Gessé *et al.*, 2009), the dirt-colored seed bug *Tempyra biguttula* Stål (Lygaeidae) (Baena & Torres, 2012), 1874 (Baena & Torres, 2012), the leafhopper assassin bug *Zelus renardii* Kolenati, 1856 (Reduviidae) (Vivas, 2012), and the andromeda lace bug *Stephanitis takeyai* (Drake & Maa, 1955) (Tingidae) (Pérez-Otero & Mansilla, 2012).

Taxonomic composition of the allochthonous Heteroptera of Europe is mainly built up by Miridae (17 species, 40 %), Tingidae (9 species, 21 %), and Anthocoridae (5 species, 12 %), all of which are overrepresented compared to the native European Heteroptera fauna. More than half of the species are phytophagous (24 species, 57 %) and the advantage of

trophic specialization in invasion success was discussed by Rabitsch (2008).

The main objective of the present work is to report the first Iberian collection of the jasmine lace bug *Corythauma ayyari* (Drake, 1933). In addition, we summarize its biology and current distribution in the Mediterranean Basin, and aim at facilitating its identification by means of a short description including pictures, and emendations to the identification key of Euromediterranean Tingidae (Péricart, 1983) to include genus *Corythauma* Drake & Poor, 1939.

Description, biology and distribution of *C. ayyari*

Corythauma ayyari is a tiny unhairly Tinginae (♀: 2.46–2.71 mm; ♂: 2.57–2.75 mm; Novoselsky & Freidberg 2013; our female specimens: 2.9 mm both; our male specimens: 3.1 mm both). Dorsal general coloration is whitish, with darker areas or stripes scattered on the pronotum, the scutellum and the hemelytra (Fig. 1a, b). Body is brownish, while antennae and legs are light brown colored, darker at the last antennal joint. Bucculae joint anteriorly, hiding labrum in a frontal view (Fig. 1c, d). The most catching-eye feature of *C. ayyari* is the almost spheric dome in the pronotum, truncate anteriorly (Fig. 1b). Thus, head is visible from eyes forwards. Also, pronotum presents three very prominent longitudinal carinae. Pronotal margins show very tiny, setigerous tubercles, poorly seen even at high magnification (160x). Metasternal scent glands canals are discernible. Sexual dimorphism only concerns the apex of abdomen, as may be seen in figure 1c (female) and figure 1d (male). Left male paramer is sickle shaped with a concave interior margin (Fig. 2).

Adults merge at night and are short-lived. Males live up to 10 days while females last up to 12.3 days. Mating occurs at the first day of postemergence and is followed by a 2.7 day preoviposition, 8.2 days of oviposition and 1.7 days of postoviposition. The eggs require incubation between 9 and 11 days (Schaefer & Panizzi, 2000). Preliminary observations suggest that this species has overlapping generations and has the potential to establish reproductive colonies in the Mediterranean Basin (Pedata *et al.*, 2013). *Corythauma ayyari* has been found in several ornamental plants, a list from different authors being compiled by Pedata *et al.* (2013): *Althea officinalis* (marshmallow), *Daedalacanthus nervosus* (blue sage), *Hedychium* sp. (cardamon), *Jasminum officinalis*, *J. sambac* (= *Jasminum pubescens*) (jasmin), *Lantana* sp. (verbane), *Musa* sp. (banana), *Ocimum* sp. (basilicum), *Trachelospermum* sp. (star jasmine) and *Volkameria inermis* (= *Clerodendrum inermis*) (wild jasmine). Although highly polyphagous, *C. ayyari* is to be considered as a pest of jasmin in Southern India (Schaefer & Panizzi 2000). However, not all *Jasminum* species are infested. For example, Pedata *et al.* (2013) report that *Jasminum polyanthum*, *J. multiflorum*, *J. nudiflorum*, *J. humile* and *Trachelospermum* sp. were unsuccessfully prospected in the vicinity of the *J. sambac* occupied by *C. ayyari*. Both adults and nymphs feed on sap from leaves of the host plants. The infected leaves show small yellow chlorate spots on the upper surface, desiccate and eventually drop (Buntin

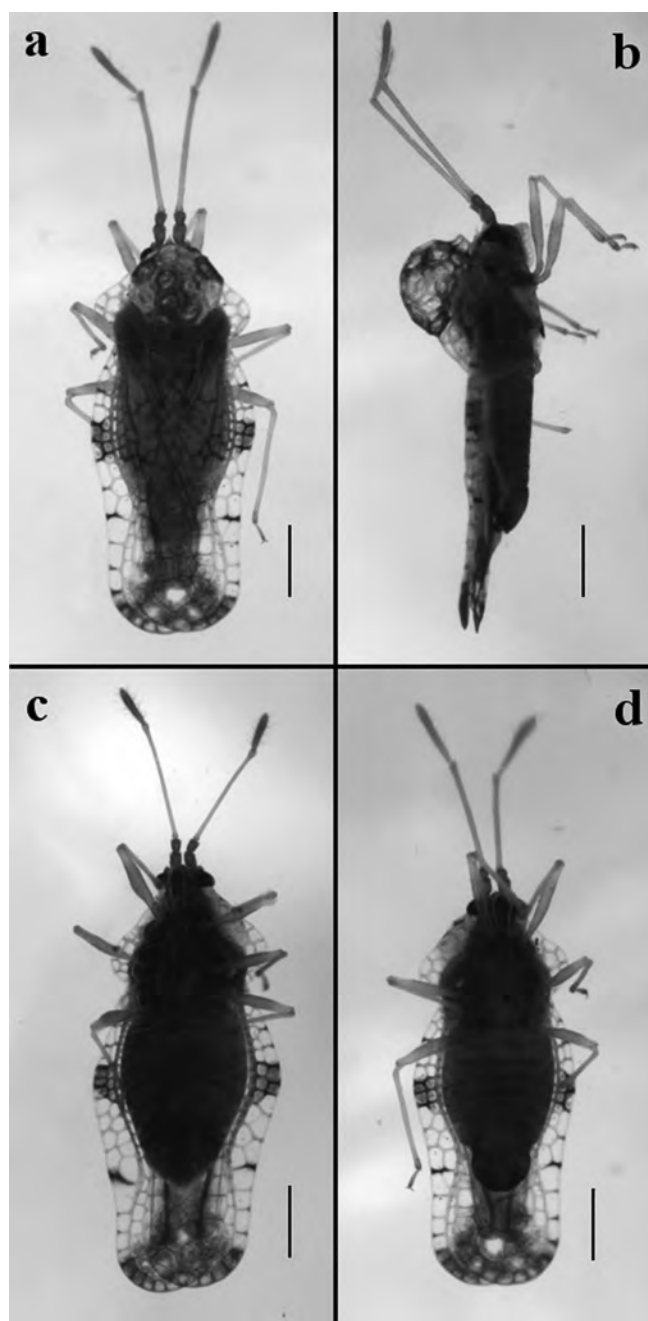


Figure 1. Habitus of *Corythauma ayyari*: (a) dorsal view, (b) lateral view, (c) female in ventral view, and (d) male in ventral view. Scale: 0.1 mm.

et al., 1996; Schaefer & Panizzi, 2000). The leaf undersides become black or dark brown and become spotted as an effect of the excrements and the photosynthesis is reduced as a direct effect of the palisade parenchyma damage (Novoselsky & Freidberg, 2013). This ensemble of symptoms may be easily confused with those caused by other lace bugs. Manual collection of infected leaves may be a successful method to manage *C. ayyari* (Nair & Nair, 1974; Singh & Satyanarayana, 1996).

Corythauma ayyari is an Oriental tingid bug species that is found originally in Pakistan (Drake & Man 1964), India,

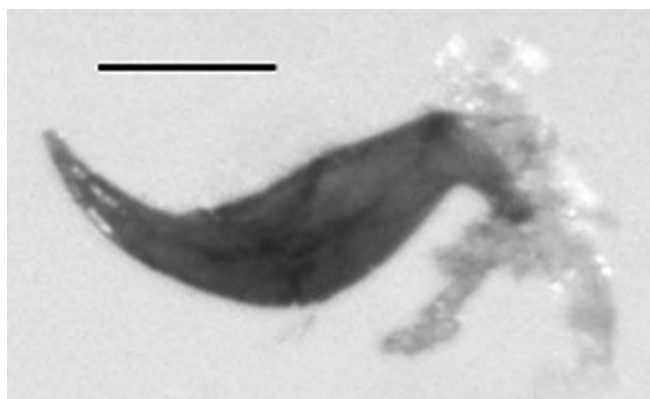


Figure 2. Left male paramere of *Corythauma ayyari*. Scale 0.1 mm.

Laos, Malaysia, Thailand and Singapore (Nair & Nair, 1974; Guilbert, 2007). *C. ayyari* has recently been reported from France (Streito *et al.*, 2010, samples collected in Puget-sur-Argens, Var, 12 September 2009), Israel (Novoselsky & Freidberg, 2013, samples collected in Tel-Aviv area, August-October 2004-2011) and Italy (Pedata *et al.*, 2013, samples collected in Caserta, Campania, November and December 2013), as first records in the Euromediterranean region (Fig. 3).

Material and methods

Samples were collected by hand, preserved in 70% ethanol and identified using a Leica MZ125 binocular microscope. Pictures were taken with a Leica DFC450 camera coupled to a Leica MZ160A binocular microscope using alcoholic based hand cleaning gel. The physical properties of this gel provide an ideal medium to manipulate tiny specimens for photography. The specimens have been dry mounted and are kept in Roca-Cusachs personal collection.

Results and discussion

Material studied

2 MM, 2 FF, 27.IX.2014 (M. Roca-Cusachs leg. et det.) and 11 MM, 13 FF on *Jasminum grandiflorum* 06.XII.2014 (M. Roca-Cusachs leg. et det.) Puigmoltó, Sant Pere de Ribes, Barcelona, Spain, +41.2484, -1.7674. The specimens have been dry mounted, four individuals have been donated to the «Centre de Recursos de Biodiversitat Animal» (CRBA Universitat de Barcelona), four to the «Museu de Ciències Naturals de Barcelona» and 16 have been kept in the authors' personal collections. Specimens were collected in a private 10 square meters backyard (Fig. 4). The backyard is found in a periurban residential area, next to natural woods and uncultivated lands. Cultivated species in the backyard were planted around ten years ago, and belong to *Vitis vinifera* (grape wine), *Citrus* sp. (lemon tree), *Yuca filamentosa*, *Bougainvillea* sp., *Gardenia* ssp. and *Jasminum grandiflorum*. The first four individuals were found in a white wall nearby, while the last collections were made on *J. grandiflorum*, adding this species in the list of host plants of *C. ayyari*.

The circumstances of our *C. ayyari* collections fit those in Italy (a single plant of *J. sambac* in a balcony) or France (small green area in a highway resting area).

Identification

Two Palearctic Tingidae show a spheric pronotal dome: *Sphaerista paradoxa* (Jakovlev, 1880) and *Galeatus scrophicus* Saunders, 1876. However, in those two species bucculae do not joint anteriorly, thus labrum is visible from a frontal view, and their habitus clearly does not fit with our specimens characteristics. The specimens might also erroneously be attributed either to *Stephanitis pyri* (Fabricius, 1775) or *S. pyrioides* (Scott, 1874), but in *Stephanitis* spp. pronotum projects all over the head, which is thus invisible from dorsal view.

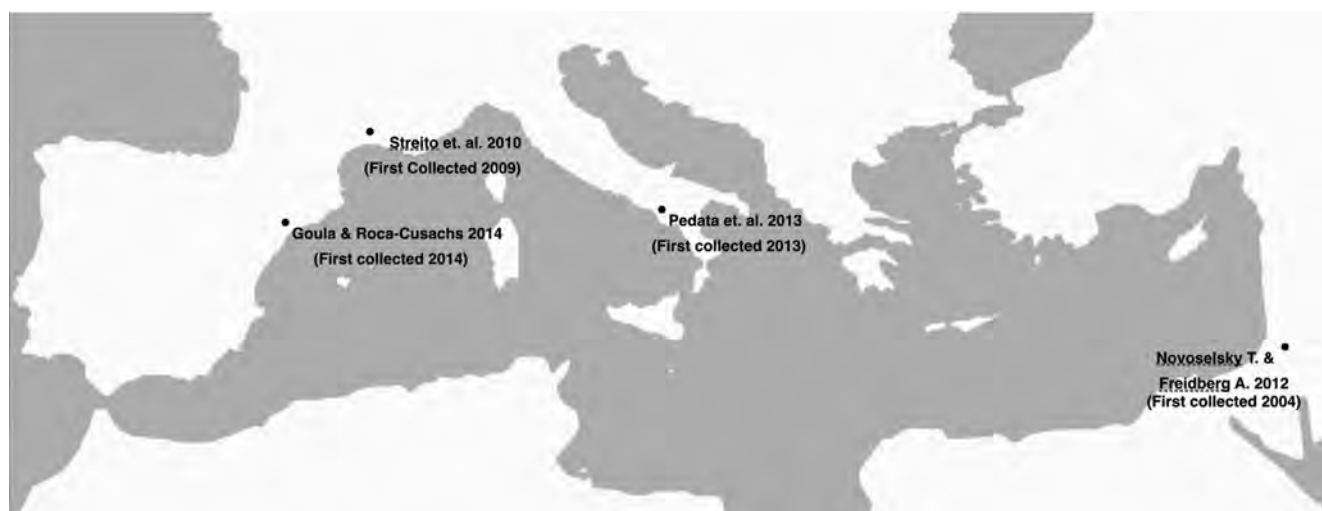


Figure 3. Map of the current Mediterranean distribution of *Corythauma ayyari*.



Figure 4. View of the backyard where *Corythauma ayyari* was found (Puigmoltó, Sant Pere de Ribes, Barcelona).

Using the key to Euromediterranean Tingidae (Péricart, 1983), the collected specimens may be run into *Lasiacantha* Stål. However, general habitus and much longer and abundant pilosity in *Lasiacantha* clearly show that the specimens do not belong to it. As *C. ayyari* is now being reported from different Euromediterranean countries, and Péricart’s work is the most widespread identifying work, we propose an accommodation of that key to include this allochthonous genus, affecting dichotomic points 23 to 26 (Péricart, 1983. P. 74-75).

- 23 (26) Anterior margin of pronotum swollen. Scent gland canals discernible.....23a, 23b
- 23a (23b) Anterior margin of pronotum spherically swollen and only slightly projecting over the posterior head margin; most of the head, eyes included, is dorsally visible..... *Corythauma* Stål
- 23b (23b) Anterior margin of pronotum otherwise swollen, and conspicuously projecting forwards, completely hiding the head ally24
- 24 (25) As in Péricart (1983).....*Corythuca* Stål
- 25 (24) As in Péricart (1983)*Stephanitis* Stål
- 26 (23) Genera not presenting simultaneously the margin of pronotum swollen and the scent gland canals discernible.....27

Entry way

Some authors state Italy as to be the most common door of entrance to Europe, due to its location in the middle of the Mediterranean Basin (Jucker *et al.*, 2008). South France could be also a very important entry door of alien species to Europe, particularly through Marseille, which is the most important Mediterranean harbour. Streito *et al.* (2010) report that an specimen of the also invasive lace bug species *Stephanitis typica* (Distant, 1903) was collected in Marseille harbor in September 2009 when a lot of *Musa* sp. coming from

Thailand was inspected. In fact, this South France route of entrance has recently been modelled for *Drosophyla suzukii* (Matsumura, 1931) (Cini *et al.*, 2014). Israelian collections of *C. ayyari* in Tel-Aviv area also might suggest the role of Tel-Aviv harbor in the introduction of alien species through the Lessepsian trading route (along the Red Sea through the Suez Canal), but further evidences need to be gathered.

Conclusions

In a globalized world, invasions are expected to occur more often and at greater scale than ever. Within the European Union-funded Framework Programme, three-years Research Project DAISIE (Delivering Alien Invasive Species Inventories for Europe) (2005–2007), an inventory of the alien (non-native, non-indigenous, exotic) species of Europe was completed and made available via the Internet (www.europe-aliens.org). More than 12,122 invading species were reported, and 2,740 were terrestrial invertebrates, which were mainly introduced by transportation associated to horticultural activities (DAISIE, S. A.).

Increasing demand to live in residential areas, and changing trends in the market to cover the demand to have access to new, different, until now unknown ornamental plant species from everywhere in the world, foster intense intercontinental live plant commerce. As an example, in Spain importation of live plant goods grew 9,17 % comparing the first semester of 2013 with first semester of 2014. However, to trace the origin of imported plants is not easy, as trading may occur with major retailers which in turn provides in further countries all over the world (Pol López *com. pers.*, Catalan Federation of Plant Nurseries).

Thus, chances for insect species associated to live ornamental plants to expand with international trading are greatly increasing. However, invasive is not necessarily synonym of noxious (pest) species. The European and Mediterranean Plant Protection Organization has already reported *C. ayyari* in its area of influence (EPPO, 2013), but the species is not in the list of alert or menacing species. Only more observations and reports may give the clues for *C. ayyari* future history out of its original distribution area.

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