

## THE LACE BUG *Cochlochila bullita* (STÅL) (HETEROPTERA: TINGIDAE), AN IMPORTANT PEST OF CULTIVATED HERBS IN ASIA, INTERCEPTED AT U.S. PORTS OF ENTRY.

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### Abstract

The basil lace bug *Cochlochila bullita* (Stål) is an important pest of cultivated herbs in southern Asia and has been intercepted several times at ports of entry in the United States over the last 20 years. In this paper, we discuss the economic importance of this pest and its potential to be introduced into the Western Hemisphere.

**Key words:** tingid, introduced pest, basil, quarantine, taxonomy

### Resumen

El tingido *Cochlochila bullita* (Stål) es una plaga importante de hierbas cultivadas en el sur de Asia que ha sido interceptada varias veces en puertos de entrada de los EEUU en los últimos 20 años. En este artículo discutimos la importancia de esta plaga y el potencial de ser introducida en el hemisferio occidental.

**Palabras claves:** tingido, plaga introducida, albahaca, cuarentena, taxonomía

### Introduction

Adults of *Cochlochila bullita* are characterized by their general appearance as follows: black and dark brown in color with

hyaline wings and a characteristic hollow, globular outgrowth on the dorso-lateral of the thorax (figure 1). The hemelytra are distinctly divided by carina or prominent veins into subcostal, discoidal and sutural areas (figure 2). The bucculae generally converge anteriorly and form a closed groove, so that the attachment of the rostrum is not visible in anterior view, although sometimes the bucculae is not fully closed anteriorly (figure 3), but in which case the openings of scent glands have a canal.

According to Lehr (1988), the presence of an areolate paranota in the form of very large blackish shells that is highly raised above the pronotal disc and the marginal vein not approaching the surface of disc are diagnostic of the species. Lyengar (1924) described and illustrated the immature stages and the adult of *C. bullita* for the first time. Peng et al. (2013) provided an updated description that included morphological variation in the immature instars based on specimens reared in laboratory condition and fed on of *Orthosiphon aristatus*, the values found are presented in table 1.

Reported hosts for *C. bullita* include *Coleus* sp., *Coeus parvislorus* (Chinese potato) (Mohanasundaram & Rao 1973, Palaniswami & Pillai 1983), *Mentha* sp. (mint), *Ocimum sanctum* (holy basil), *Ocimum kilmandscharicum* (camphor basil), *Orthosiphon stamineus* (Java tea) (Sajap & Peng, 2010), *Orthosiphon aristatus* (Java tea, cat whiskers) (Peng et al. 2013), *Rosmarinus officinalis* L. (rosemary), *Salvia officinalis* L. (sage), and *Carthamus tinctorius* L. (safflower) (Stonedahl et al. 1992, Schaefer and Panizzi 2010).

According to several authors (Mohanasundaran & Rao 1973, Palaniswami & Pillai 1983, Schaefer and Panizzi 2010), crops heavily infested by *C. bullita* present curled and direr leaves as a result of feeding; this is followed by leaf dehiscence and lower production of flowers. According to Sajap and Peng (2010), adult *C. bullita* usually feed on tender shoots of the herbs causing them to wilt and eventually die (Figure 44). In many instances, nymphs and adults feed gregariously on the leaves and leave behind black spots of excrement on the upper surface of the leaves, which also renders the product useless (figure 5).

The life cycle of *C. bullita* starts with eggs that are generally laid in groups, which, depending of the host, can be located in different parts of the plant (for example, *O. kilmandscharicum*, eggs are inserted in the stems and shoots, whereas on mint and basil eggs are generally laid on the margins of leaves). According to Tigvattnanont (1989), the duration of each instar can vary depending on environmental conditions such as temperature and relative humidity as well as the kind of host. Eggs normally take six and a half days from oviposition to hatching. There are five immature stages (nymphs), which can each last as long as nine days. Adults can live between 40 to 58 days (males live longer than females) and fertilized females can lay approximately 250 eggs during their life.

*Cochlochila bullita* is widely distributed in the Paleotropics, particularly southeast Asia (including India, Sri Lanka, China, Philippines, Malaysia, and Thailand) and Africa (Botswana, Democratic Republic of Congo, Eritrea, Ethiopia, Kenya,

Malawi, Mozambique, Namibia, South Africa, Sudan, Tanzania, Uganda, and Yemen) (Deckert and Göllner-Scheiding 2006, Schaefer and Panizzi 2010, Guilbert 2013). This pest is not known to occur in the Western Hemisphere but it has been intercepted multiple times as a hitchhiker in baggage and cargo at various ports of entry of the USA (see results).

### Materials and methods

Information regarding interceptions of *C. bullita* was obtained using an ad-hoc query in the PestID database of the Agricultural Quarantine Activity System (AQAS) of the Department of Agriculture (USDA). The identification of most of the specimens intercepted was done by Dr. Thomas Henry of Systematic Entomology Laboratory of the Agricultural Research Service (SEL-ARS) of the USDA.

### Results and discussion

The search for interceptions of this pest in the PestID database yielded a total of seventeen interceptions United States ports of entry since the 1990s, when the system was first implemented (see table 2). Most of the interceptions corresponded to adult individuals (15); only two interceptions included immature stages.

Two interceptions (one in San Francisco, CA and one in Los Angeles, CA) included large numbers of individuals (10+), which would pose a greater potential threat of *C. bullita* becoming established. The interceptions of *C. bullita* were associated with wide variety of plants, among them some of the hosts referred

to in the literature (i.e. origanum, and basil). The interceptions also suggest previously unrecorded hosts, including: *Artemisia* sp., *Antirrhinum* sp., *Gardenia* sp., *Bergera koenigii*.

Some new potential distribution records found during this search include Tahiti, Nigeria, Morocco, and Saudi Arabia; the new distribution records need to be confirmed because the information on the site of origin can be deceiving; for example some of the *C. bullita* intercepted on passenger baggage may have originated in an area different from the passenger port of departure.

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**Table 1.** Morphological characteristics of *Cochlochila bullita* reared in laboratory conditions according to Peng et al. (2013)

Stage	Body length (mm)	Color	Description/ Comments
Egg	0.520±0.002	Dark brown	Shape oblong, slightly tapering towards opercula
Nymphs:			
1st instar	0.570±0.010	Pale brown, later becoming darker	Oval shape, body relatively smooth and without spines
2 <sup>nd</sup> instar	0.771±0.013	Dark brown, later becoming black	More rounded shape, margin bears spines that are especially prominent on the abdomen
3 <sup>rd</sup> instar	1.033±0.020	Black	Body more rounded compared to 2 <sup>nd</sup> instar. Cephalic spines present, but short.
4 <sup>th</sup> instar	1.416±0.028	Black	Paranotum larger and wider on the thorax compare to 3 <sup>rd</sup> instar. Cephalic spines are longer
5 <sup>th</sup> instar	1.923±0.026	Black	Body shape similar to 4 <sup>th</sup> instar except more elongated.
Adults:			
Males	2.051±0.018	See this paper's introduction	See this paper's introduction
Females	2.264±0.019	See this paper's description	See this paper's introduction

**Table 2.** Summary of interceptions of *Cochlochila bullita* at US ports of entry (AQAS, PestID search date: 14-8-2013).

U.S. Port of entry	Host	Origin (country)	Host part	# specimens intercepted Immature
Newark, NJ.	<i>Ocimum sanctum</i>	India	flower	
Newark, NJ.	N/A	India	N/A	
Los Angeles, CA.	<i>Mentha</i> sp.	India	leaf	
Houston, TX.	N/A	Nigeria	N/A	
Honolulu, HI.	<i>Gardenia</i> sp.	Tahiti	leaf	

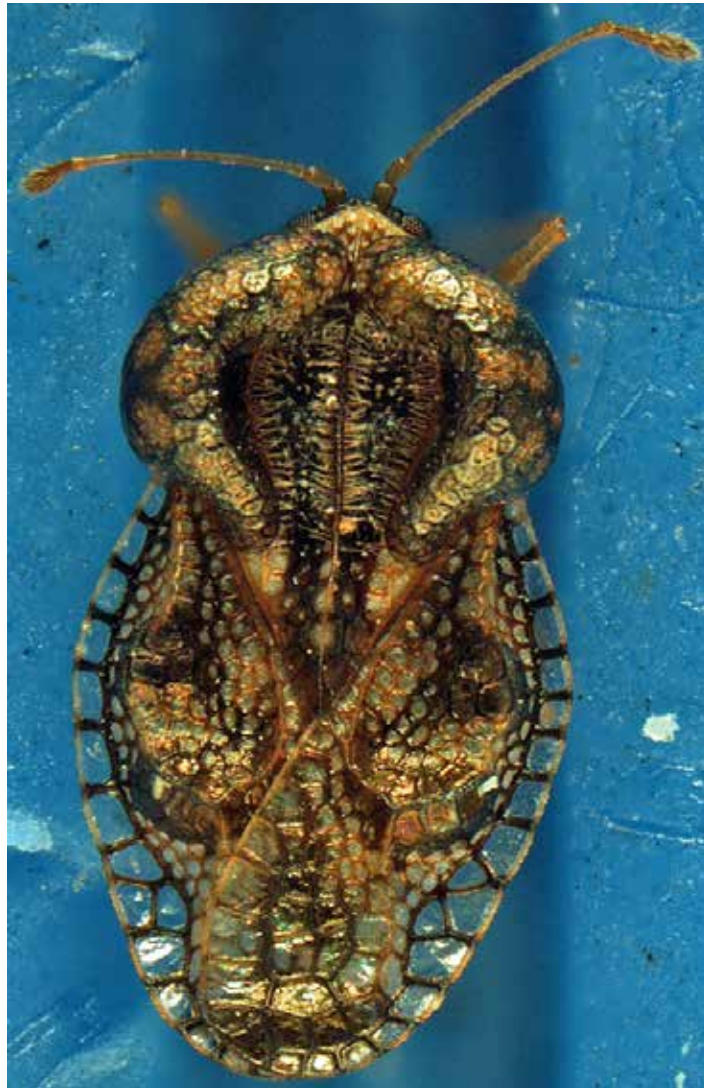


Houston, TX.	N/A	Saudi Arabia	leaf	
Erlanger, KY.	Lamiaceae	India	N/A	
Los Angeles, CA.	<i>Antirrhinum</i> sp.	Thailand	leaf	
San Francisco, CA.	<i>Origanum majorana</i>	India	N/A	
Newark, NJ.	unknown leaves	India	leaf	
Dallas/Ft. Worth, TX.	N/A	India	leaf	
Los Angeles, CA.	unknown leaves	Thailand	leaf	12
Portland, OR.	N/A	Thailand	leaf	
Romulus, MI.	<i>Artemisia</i> sp.	Morocco	cutting	1
San Francisco, CA.	<i>Bergera koenigii</i>	India	N/A	
San Francisco, CA.	N/A	India	N/A	
Portland, OR.	N/A	Thailand	leaf	

**Figure 1.** Adult of *Cochlochila bullita*, habitus: lateral view showing the globular outgrowth on the dorso-laterals margins of prothorax.



**Figure 2.** Adult of *Cochlochila bullita*, dorsal habitus view showing number and shape cells in the hemelytra.





**Figure 3.** Adult of *Cochlochila bullita*, ventral habitus view showing mouth parts





**Figure 4.** Damage produced by feeding of *Cochlochila bullita* on young leaves of host (modified from Sajap & Peng, 2010).



**Figure 5.** Nymphs *Cochlochila bullita* feeding gregariously, showing excrement (black spots) left behind by the feeding insects (modified from Sajap & Peng, 2010).



