Two newly introduced Heteroptera (Insecta: Hemiptera) species in Colombia: Brachyplatys subaenus (Plataspidae) and Thaumastocoris peregrinus (Thaumastocoridae)

Article *in* Papéis Avulsos de Zoologia (São Paulo) · October 2021

DOI: 10.11606/1807-0205/2021.61.96

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ARTICLE

Two newly introduced Heteroptera (Insecta: Hemiptera) species in Colombia: *Brachyplatys subaenus* (Plataspidae) and *Thaumastocoris peregrinus* (Thaumastocoridae)

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Abstract. The introduction of alien species can carry negative consequences to the areas in which they appear. Early detection of introduced species is key if management practices are to be effectively implemented. Here, based on specimens from collections and citizen science observations, we document the recent introduction of two alien Heteroptera (Insecta: Hemiptera) species in Colombia: *Brachyplatys subaenus* (Westwood, 1837) (Plataspidae) and *Thaumastocoris peregrinus* Carpintero & Dellapé, 2006 (Thaumastocoridae). *Brachyplatys subaenus* was found in two localities (Bolívar and Valle del Cauca), whereas *T. peregrinus* was found in a single locality (Bogotá) so far. Future research activities should establish the geographic range of these species, as well as document their host plant associations, in Colombia.

Keywords. Exotic species; Neotropical region; Black bean bug; Bronze bug; South America.

INTRODUCTION

Exotic invasive species are costly to society (Simberloff *et al.,* 2013), and among these, insect species are considered the most expensive (Diagne *et al.,* 2021). Among all living organisms insects constitute about 40% of all known species (Adler & Foottit, 2017; Stork, 2018), thus it is not surprising that the most common group of introduced animals found worldwide are insects (Liebhold *et al.,* 2018). Because of the ample negative societal impacts of alien species, ranging from ecosystem function to human well-being (Pyšek *et al.,* 2020), early detection is key to implement appropriate management practices (Pyšek & Richardson, 2010; Simberloff *et al.,* 2013).

Hemiptera is the fifth most diverse order of insects, with Heteroptera containing the largest proportion of its diversity (Henry, 2017). Several species of Heteroptera are considered of economic importance, mostly in agricultural settings (Schaefer & Panizzi, 2000), and many are now exotic elements of the fauna of several regions of the world (*e.g.,* Scudder & Foottit, 2006; Rabitsch, 2008, 2010; Henry *et al.,* 2013), in many cases causing economic losses (Lee, 2015; McPherson, 2018). Economically important alien invasive Heteroptera include phytophagous species such as *Bagrada hilaris* (Burmeister, 1835) (Palumbo *et al.,* 2016; Carvajal *et al.,* 2019), *Halyomorpha halys* (Stål, 1855) (Nielsen & Hamilton, 2009; Lee *et al.,* 2013), *Leptoglossus occidentalis* Heidemann, 1910 (Lesieur *et al.,* 2019), and *Nezara viridula* (Linnaeus, 1758) (McPherson & McPherson, 2000; Esquivel *et al.,* 2018). Other introduced Heteroptera may include predatory species, such as *Zelus renardii* Kolenati, 1857, which is now widely distributed in the world (Weirauch *et al.,* 2012; Zhang *et al.,* 2016).

Several Neotropical Heteroptera species, specially within Pentatomoidea, have been identified as potential invasives for other regions (Panizzi, 2015), but little research has been carried out to identify introduced Heteroptera within the Neotropics. In South America, just a few species have been identified as alien, for instance, *B. hilaris* and *H. halys* have been recorded from Argentina and Chile (Faúndez *et al.,* 2016; Faúndez & Rider, 2017; Carpintero *et al.,* 2021b); *L. occidentalis* from Chile, Argentina, and Brazil (Kun & Masciocchi, 2019; van der Heyden & Faúndez, 2020); *Boisea trivittata* (Say, 1825) from Chile (Faúndez *et al.,* 2020); *Holcocranum saturejae* (Kolenati, 1845) (Carpintero *et al.,* 2021a) from Argentina; *Z. renardii* from Chile and Argentina (Curkovic *et al.,* 2004; D'Hervé *et al.,* 2018); and *Amphibolus venator* (Klug, 1830) from

Pap. Avulsos Zool., 2021; v.61: e20216196
http://doi.org/10.11606/1807-0205/2021.61.96
http://www.revistas.usp.br/paz
http://www.scielo.br/paz
Edited by: Cristiano Feldens Schwertner
Received: 06/07/2021
Accepted: 27/09/2021
Published: 27/10/2021

ISSN On-Line: 1807-0205
ISSN Printed: 0031-1049
ISNI: 0000-0004-0384-1825

Venezuela (Forero *et al.,* 2004). In Colombia, the checklist of introduced and invasive species (Baptiste *et al.,* 2020), only list seven Hemiptera species, of which just one is a Heteroptera (Miridae, *Tropidosteptes chapingoensis* Carvalho & Rosas, 1965). Nonetheless, there are other recently introduced species, such as *Spilostethus pandurus* (Scopoli, 1763) (Rengifo-Correa & González, 2011) now common in Colombia (see iNaturalist records: https://bit.ly/3qaqAbe), which are not listed yet, therefore, it is likely that additional species might be discovered with the study of biological collections, more fieldwork, and the involvement of research taxonomists.

Here, I document two introduced species in Colombia that possess the potential to become invasive in agricultural settings, highlighting the importance of an early detection to better implement management strategies.

MATERIAL AND METHODS

Examined specimens are deposited at the Colección Entomológica, Museo Javeriano de Historia Natural, Pontificia Universidad Javeriana, Bogotá, Colombia (MPUJ_ENT). In addition, some observations uploaded to the citizen science initiative iNaturalist (https://www.inaturalist.org), were used to complement the distribution documented from specimens. In this case, the observations were all identified or corroborated by me. Images of specimens were carried out using a dissecting scope Nikon SMZ1270 equipped with a Nikon D5300 digital camera.

RESULTS

Brachyplatys subaenus (Westwood, 1837) (Fig. 1)

Remarks: The highest diversity of Plataspidae is found in tropical and subtropical regions of the Eastern Hemisphere, with a few species widely distributed in the temperate Palearctic (Schuh & Weirauch, 2020). The first species of Plataspidae recorded from the Western Hemisphere was *Megacopta cribraria* (Fabricius, 1798), discovered in the USA in 2009 (Eger *et al.,* 2010). This species is found from China (temperate and tropical) to tropical Asia and Australia, and it is associated mainly with kudzu *Pueraria montana* var. *lobata* (Willd.) Maesen & Almeida, and which has been considered recently a pest of soybeans *Glycine max* (L.) (Ruberson *et al.,* 2013). A second plataspid found in the Western Hemisphere is *B. subaenus,* which was first discovered in Panama in 2012, being also the first record from the Neotropical region (Aiello *et al.,* 2016). This species was initially misidentified in Panama as *B. vahlii* (Fabricius, 1787) but later correctly identified as *B. subaenus* by Rédei (2016). Rédei (2016) provided diagnostic characters that help identify this species and differentiate it from *B. vahlii*.

Plataspidae species feed primarily on legumes (Schaefer, 1988), being *B. subaenus* no exception, which is known to feed on a variety of legumes species in its native range in Indomalaya, although other plant species in various families have also been recorded as host plants (Rédei, 2016). In the Neotropical countries in which *B. subaenus* has been found, it has been recorded on the following Fabaceae host plants: the cultivated *Cajanus cajan* (L.) Mill sp., *Glycine max,* and *Mucuna pruriens* (L.) DC (Aiello *et al.,* 2016; Añino *et al.,* 2018, 2020; Carmona-Ríos, 2019; Perez-Gelabert *et al.,* 2019); the endemic and cultivated *Phaseolus vulgaris* L. (Perez-Gelabert *et al.,* 2019), *Gliricidia sepium* (Jacq.) Kunth ex Walp. (Añino *et al.,* 2018; Carmona-Ríos, 2019); and the endemic *Leptolobium panamense* (Benth.) Sch.Rodr. & A.M.G.Azevedo (Aiello *et al.,* 2016). It has also been found on the following non-Fabaceae host species: *Bactris gasipaes* Kunth, *Schefflera actinophylla* (Endl.) Harms (Aiello *et al.,* 2016), and *Zea mays* L. (Añino *et al.,* 2020). In Colombia, *B. subaenus* has no recorded host plant species.

Distribution: Known in the Neotropical region from Costa Rica (Carmona-Ríos, 2019), Panama (Añino *et al.,* 2018), Dominican Republic (Perez-Gelabert *et al.,* 2019), Guadeloupe (Anonymous, 2020), and Ecuador (Añino *et al.,* 2020). Additional localities can be found on iNaturalist (http://www.inaturalist.org) for some of these countries. Newly recorded from Colombia from two localities, in Cali (Valle del Cauca) and Isla Grande (Bolívar).

Examined material: COLOMBIA. Valle del Cauca, 1 female, Cali, calle 5 con carrera 39, 03.4265°N, 76.5454°W, 974 m, 11 Abr 2019, D. Forero, dentro de edificio, en vuelo [within building, flying], MPUJ_ENT0063186 (MPUJ_ENT).

iNaturalist observations: COLOMBIA. Bolívar, 1 adult, sex not determined, Isla Grande, 10.1807°N, 75.7249°W, 16 Mar 2019, C.M. Rangel, https://www.inaturalist.org/observations/21342531. **Valle del Cauca,** 1 adult, sex not determined, Cali, Villa Fatima, 03.3519°N, 76.5097°W, 02 Jan 2021, L. Rubio, https://www.inaturalist.org/observations/68191884; nymphs, Cali, Mariposario Andoke, km 6, Parcelación La Reforma, vía a Cristo Rey, 03.4261°N, 76.5719°W, 01 May 2021, https://www.inaturalist.org/observations/76232278.

Thaumastocoris peregrinus Carpintero & Dellapé, 2006 (Fig. 2)

Remarks: *Thaumastocoris peregrinus* was described based on specimens collected in Argentina but acknowledging its Australian origin (Carpintero & Dellapé, 2006). Noack & Coviella (2006) simultaneously reported a *Thaumastocoris* species from Buenos Aires (Argentina) but misidentified it as *T. australicus* Kirkaldy, which was later identified as *T. peregrinus* (Noack *et al.,* 2011). Carpintero & Dellapé (2006) also assigned to *T. peregrinus* specimens found in South Africa but also misidentified as *T. australicus*. The taxonomy of this Australian endemic genus *Thaumastocoris* was clarified by Noack *et al.* (2011),

in which they provide a revised diagnosis and comparative notes for *T. peregrinus*.

Most of the host plant associations of *Thaumastocoris* are with species of Myrtaceae, in which nearly all species are associated with species of *Eucalyptus* L'Hér. (Noack *et al.,* 2011). *Thaumastocoris peregrinus* has been documented to feed on one species of *Corymbia* K.D. Hill & L.A.S. Johnson and at least 13 species of *Eucalyptus* (Jacobs & Neser, 2005; Noack & Coviella, 2006; Noack *et al.,* 2011; Nascimento-Machado *et al.,* 2019). The Colombian examined specimens were collected in an unidentified species of *Eucalyptus.* In all places in which *T. peregrinus* has been accidentally introduced, it has caused damages to ornamental or cultivated *Eucalyptus* species (Machado *et al.,* 2020), and it is likely that biological control might be the best management option (Nadel & Noack, 2012; Souza *et al.,* 2012). Pinzón-Florián (2020) reviewed the pest species of *Eucalyptus* in Colombia, for which the only Heteroptera listed as pest was the mirid *Monalonion velezangeli* Carvalho & Costa. *Thaumastocoris peregrinus* is the only other Heteroptera pest species associated with *Eucalyptus* in Colombia.

Distribution: Originally from Australia, but accidentally introduced in South America (Brazil, Argentina, Uruguay, Paraguay, Chile), North America (Mexico, USA), Africa (South Africa, Kenya, Zimbabwe), Reunion Islands, Israel, New Zealand, and more recently in Europe (Italy,

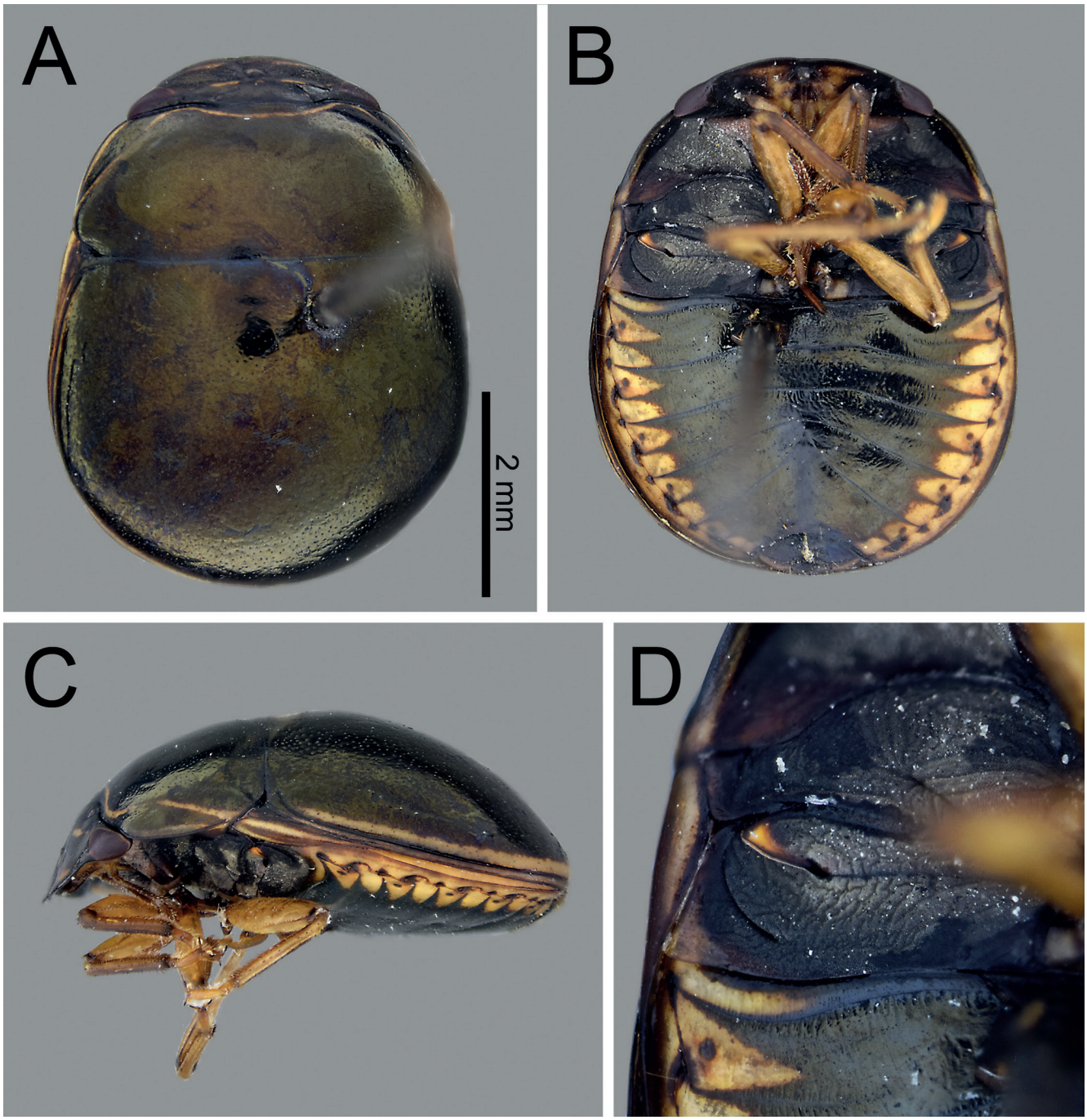

Figure 1. *Brachyplatys subaenus,* female specimen from Cali (Valle del Cauca, Colombia) [MPUJ_ENT0063186]. (A) Dorsal view; (B) ventral view; (C) lateral view; (D) detail of scent gland apparatus in ventral view.

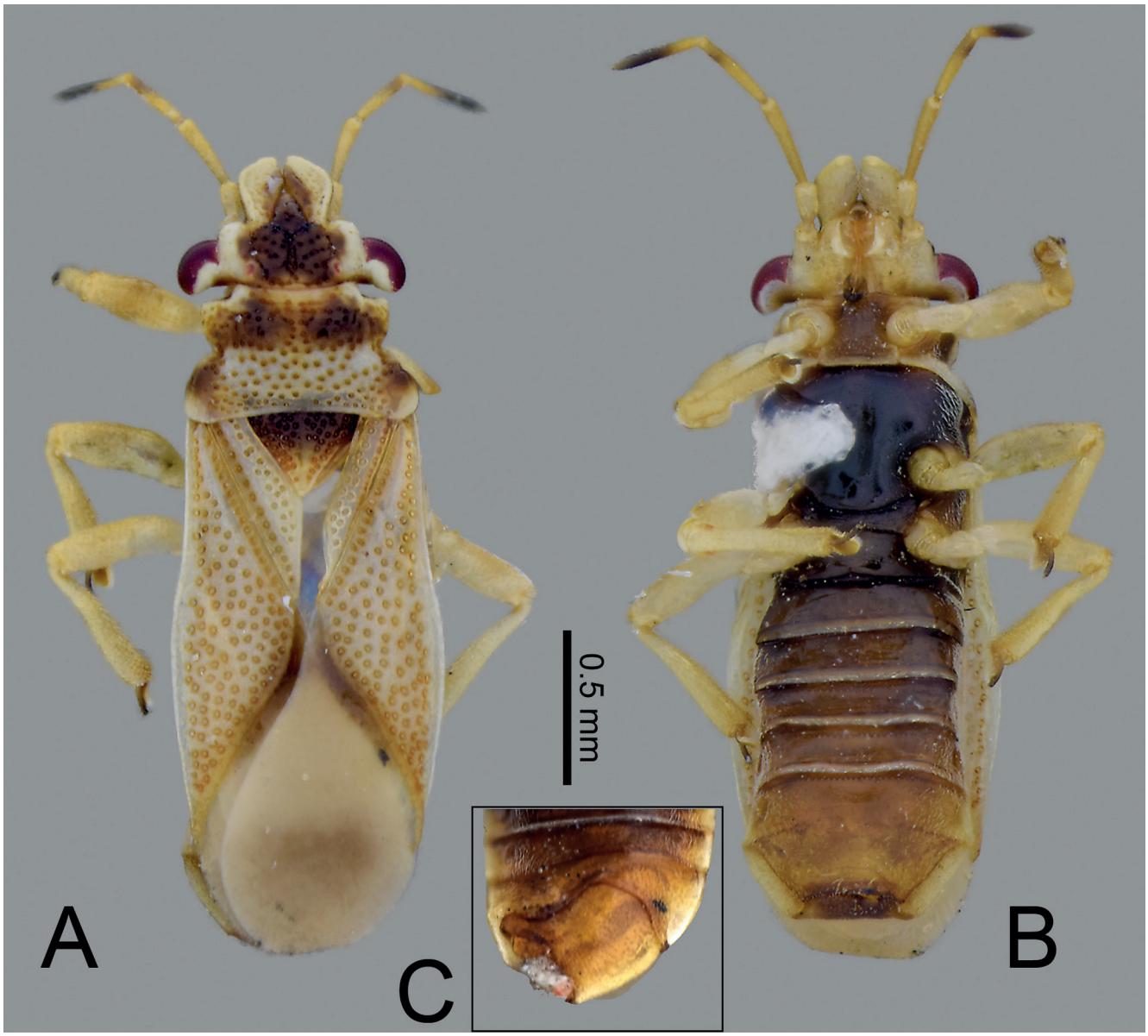

Figure 2. *Thaumastocoris peregrinus,* female specimen from Bogotá (Bogotá, D.C., Colombia). (A) Dorsal view; (B) ventral view [MPUJ_ENT0065778]; (C) detail of the male pygophore in ventral view [MPUJ_ENT0065773].

Portugal, Spain, Albania, Greece) (Carpintero & Dellapé, 2006; Noack *et al.,* 2011; Nascimento-Machado *et al.,* 2019). Newly recorded from Colombia from a single locality in the high Andes (Bogotá).

Examined material: 5 males, 3 females, 1 nymph, 1 adult of undetermined sex (damaged abdomen), **COLOMBIA, Bogotá D.C.,** parque Santa Helena de Baviera, 04.7313°N, 74.0569°W, 2,559 m, 26 Mar 2019, D. Forero; ex. *Eucalyptus* sp., MPUJ_ENT0065771 – MPUJ_ENT0065780 (MPUJ_ENT).

DISCUSSION

In Colombia, *B. subaenus* is only known from two localities, one in the Cauca valley (Cali) and the other in the Caribbean coast (Isla Grande). In all the other Neotropical countries from Central and South America where it has been recorded, the localities are close to the seashore (Aiello *et al.,* 2016; Añino *et al.,* 2018, 2020; Carmona-Ríos, 2019). In Colombia, the Caribbean locality is very close to Cartagena, a coastal touristic city receiving people from all over the world, mostly from cruises. This locality is also very close (less than 100 km) to Barranquilla, a city with the main port and with the most important industrial facilities on the Colombian Caribbean coast. Therefore, it is likely that *B. subaenus* might have arrived from another place in the Caribbean via either commercial or touristic routes. This also means, that given the proximity of the documented locality to potential areas of easy dispersion by human means, it is likely that *B. subaenus* would be soon found in other localities in Colombia. On the other hand, although Cali is in an inter-Andean valley far away from the seashore, it is the main city connecting the Buenaventura port in the Pacific coast to the rest of the cities in Colombia. Therefore, it seems plausible that individuals of *B. subaenus* found in Cali, might have ar-

rived there from Buenaventura trough sea commerce, and dispersed via terrestrial transportation to the interior of the country.

Thaumastocoris peregrinus, although widely distributed now in the Western Hemisphere, has not been recorded before from northern South America. It is intriguing that the locality in which it was found was in the middle of this large city in the high Andes. This could mean either that *T. peregrinus* arrived through commerce goods directly to Bogotá, or that it arrived at some lowland locality, and it later dispersed into the city. The first scenario would imply a contained distribution, whereas the second one would imply a much larger distribution already for *T. peregrinus*.

For both *B. subaenus* and *T. peregrinus* it is thus very important to document their present distribution and host plant associations in Colombia. An analysis of their geographic distribution will help to better understand the biology and development of each species regarding abiotic variables such as temperature or rainfall. Host plant associations will allow to, first, evaluate if these alien species are causing economic losses to cultivated crops, and second, to assess the extent of plant species serving as secondary hosts. This baseline information would be important to later implement adequate management practices for both species. Finding *B. subaenus* and *T. peregrinus* in Colombia for the first time highlights the importance of accurate taxonomic information derived from natural history collections and citizen science initiatives.

ACKNOWLEDGMENTS

I thank Wolfgang Rabitsch (University of Vienna) and two anonymous reviewers for their criticism that improved the manuscript. This paper is a contribution to the project "Actividades docentes y de investigación como apoyo al conocimiento de la biodiversidad colombiana" ID PPTA 00006416 to DF of the Pontificia Universidad Javeriana.

CONFLICT OF INTEREST

The author declares that he has no conflict of interest and confirms that there are no disputes over the ownership of the data presented, and all contributions have been attributed appropriately.

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Published with the financial support of the "Programa de Apoio às Publicações Científicas Periódicas da USP"