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# First report of *Brachyplatys subaeneus* (Westwood) (Hemiptera: Heteroptera: Plataspidae) in the United States

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**Abstract.** *Brachyplatys subaeneus* (Westwood) (Hemiptera: Plataspidae), is reported from Miami Beach, FL, the first report from the United States. It was noticed first on a photo-sharing site (iNaturalist) providing an example of the importance of these sites for helping to track introduced species. Information on distribution, host plants and potential spread are provided along with photos and taxonomic characters to assist with identification of this recently introduced species.

**Key words.** Adventive species, invasive species, Florida, iNaturalist, photo-sharing, host plants.

**ZooBank registration.** urn:lsid:zoobank.org:pub:332C0E76-9AE9-4069-9240-F55CADC64165

## Introduction

The family Plataspidae was restricted to the Eastern Hemisphere until the discovery of the kudzu bug, *Megacopta cribraria* (Fabricius) in Georgia, USA (Eger et al. 2010; Suiter et al. 2010). A second species of Plataspidae was reported from Panama by Aiello et al. (2016) as *Brachyplatys vahlii* (Fabricius). Genomic DNA was extracted, and mitochondrial COI and 16s loci were amplified; the sequences then were subjected to a GenBank BLASTn search. Their results indicated a 99% similarity to *B. vahlii* at the 16s locus. However, based on morphology, Rédei (2016) showed that this species was misidentified, and the correct identification was *Brachyplatys subaeneus* (Westwood), also known as the black bean bug.

*Brachyplatys subaeneus* has continued to spread quickly in the Western Hemisphere. Añino et al. (2018) added to distribution records in Panama. In 2019, *B. subaeneus* was reported for the first time from Costa Rica (Carmona-Rios 2019) and the Dominican Republic (Perez-Gelabert et al. 2019). Añino et al. (2020) subsequently documented the spread of this species into Ecuador. In the Eastern Hemisphere, this bug is widely distributed from India to China, Japan, Taiwan, and into southeastern Asia, the Philippines, the Solomon Islands, and the Malay Archipelago (Rédei 2016; D. Rider, pers. comm.). *Brachyplatys subaeneus* had not been reported from America north of Mexico prior to this paper.

Photos of *B. subaeneus* on sea grape, *Coccoloba uvifera* (L.) L. (Polygonaceae), taken along the boardwalk near Miami Beach, FL, were posted on the website iNaturalist on 20 August 2020, by Rachel J. Warren (Warren 2020). These photos drew our attention to the presence of this potentially invasive species in Florida.

## Materials and Methods

After viewing posted photos on iNaturalist, visual inspections were made at potentially positive sites. Suspect specimens were sent to Florida Department of Agriculture and Consumer Services, Division of Plant Industry (DPI) diagnostic laboratories for confirmation. Vouchers were deposited at the Florida State Collection of Arthropods, Gainesville, FL (FSCA) and the United States National Museum, Washington, D.C. (USNM).

## Results

On 17 September 2020, DPI inspector Phellicia Perez went to the site at our request. She collected two females, one male and one nymph on sea grape near North Miami Beach (25.863449, −80.119456) and sent the sample to the DPI taxonomists. A comparison of these specimens with identified specimens of *B. subaeneus* confirmed the identity of this bug.

Following the confirmation of the species identification, a follow-up survey was conducted to determine the extent of the infestation in the immediate vicinity of the initial detection and to investigate the host status of *C. uvifera*. As *B. subaeneus* is known to have a strong preference for Fabaceae (Rédei 2016), plants in this family also were targeted. The initial infestation was located on the west side of a vegetated, low-lying sand dune which ran in a north-south direction. *Brachyplatys subaeneus* was observed on *Canavalia rosea* (Sw.) DC. (Fabaceae) (Fig. 1), and infestations on this plant appeared to be more numerous than the initial infestation on sea

**Figure 1.** *Brachyplatys subaeneus* (Westwood) on *Canavalia rosea* (Sw.) DC. North Miami Beach, FL. Photograph by Cory Penca.

grape and included adults and nymphs. Miller (1931) stated that *B. subaeneus* was found extensively on a related legume, *Canavalia ensiformis* (L.) DC. in the Malay Peninsula. *Brachyplatys subaeneus* was not observed on sea grape other than at the initial infested planting; this included intensive inspections of sea grape growing in close proximity to the infested patches of *C. rosea*. Based on these observations, it appears likely that *C. rosea* is the predominant host of *B. subaeneus* in the urbanized coastal dune habitat where the first detection in the United States was made. However, the observation of aggregations, feeding and multiple life stages on sea grape suggest this plant also may support *B. subaeneus* populations. Sea grape is significantly more abundant than *C. rosea* in the area of first detection.

**Material studied.** 1 male, 2 females, one nymph: USA: FLORIDA, Miami-Dade Co., N Miami Beach 7837-7801, Atlantic Way 25.86345, −80.11946, 16-IX-2020 Phellicia Perez, *Coccoloba uvifera*, FSCA# E2020-3609 (1 male, 2 females, 6 nymphs, USA: FLORIDA Miami-Dade Co., North Miami Beach, 25.86384, -80.11947, 18.IX.2020, C. Penca, coll., on *Canavalia rosea*, FSCA# E2020-3744 (deposited in FSCA and USNM).

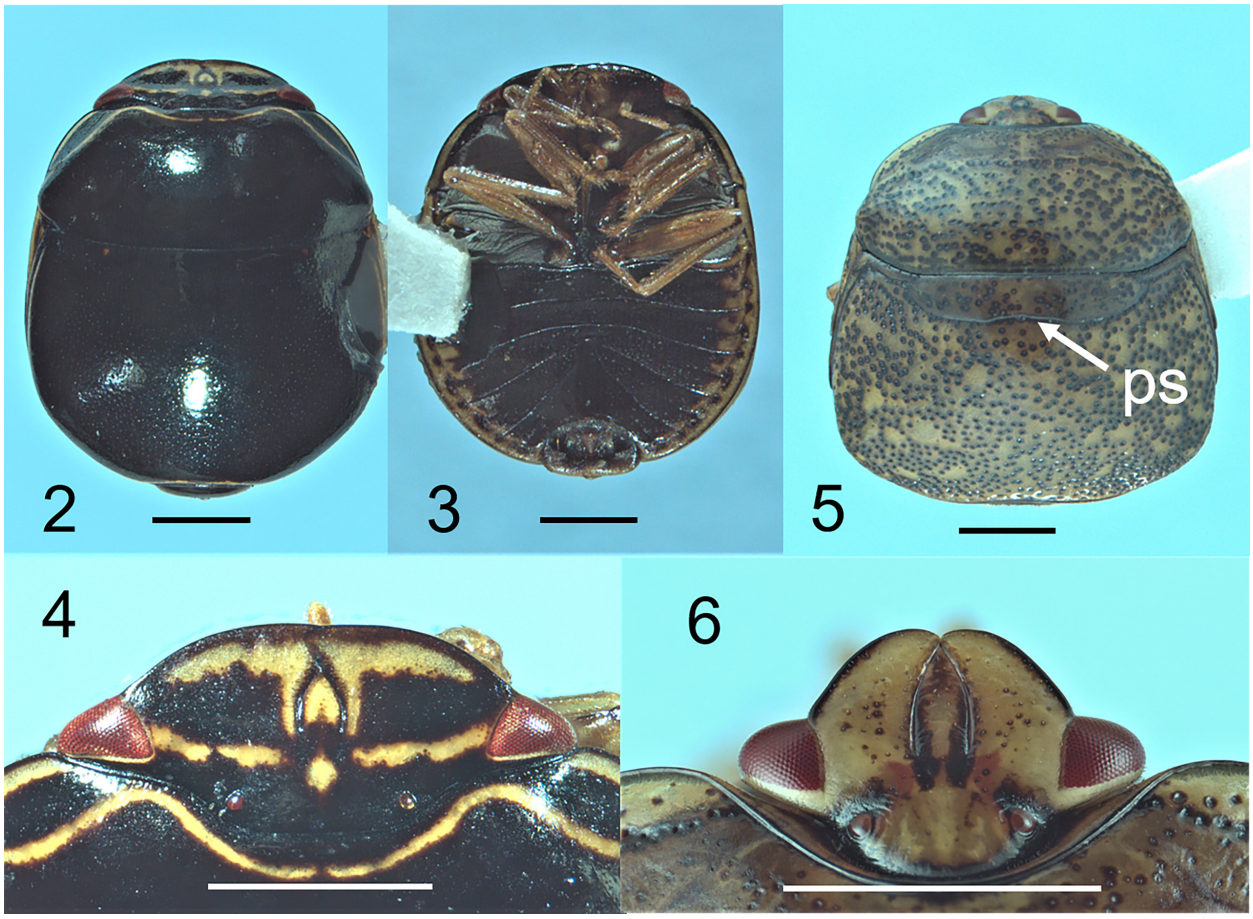
## Discussion

Eger et al. (2010) provided a key to families of Pentatomoidea occurring in America north of Mexico. This key works to place *B. subaeneus* in the Plataspidae as well as *M. cribraria*. It is a small, broadly oval bug about 4.5 to 5.5 mm in length, shiny black dorsally with pale linear markings on the head, along lateral and anterior margins of the pronotum, and along the lateral and posterior margins of the scutellum (Fig. 2). Ventrally the bug is primarily black with pale lateral markings; the legs and antennae are also pale (Fig. 3). It resembles the only other North American plataspid, *M. cribraria* (Fig. 4), in size, enlarged scutellum which is broad posteriorly, and two segmented tarsi. *Brachyplatys subaeneus* differs from *M. cribraria* by the black dorsal coloration with concolorous punctation (*Megacopta cribraria* is light brown to olive or dark brown with darker punctation; Fig. 5), by the lack of a pseudosuture on the anterior margin of the scutellum (present in *M. cribraria*) and by the head about 2.5 times as wide as long (about 1.5 times as wide as long in *M. cribraria*; Fig. 6).

In the United States, the insects most likely to be confused with *B. subaeneus* are probably hemipterans in the family Thyreocoridae. Both are shiny black pentatomoids with enlarged scutelli, and they could share some weedy host plants. The diagnostic pale linear markings on the anterior part of the pronotum of *B. subaeneus* are not present on Florida Thyreocoridae.

Rédei (2016) listed several reported host plants, including species cultivated in Florida, suggesting that *B. subaeneus* has the potential to become a crop pest in the United States. Añino et al. (2018) pointed out the pest potential of this bug, especially for Puerto Rico and Florida. Rédei (2016) stated that *B. subaeneus* seems to prefer Fabaceae, but it also has been reported to damage plants in other families. Some of the main crops in the family Fabaceae he cited are common bean, *Phaseolus vulgaris* L., lima bean, *P. lunatus* L., soybean, *Glycine max* (L.) Merr., and pigeon pea, *Cajanus cajan* (L.) Millsp. Reported host plants in other families include hemp, *Cannabis sativa* L. (Cannabaceae), potato, *Solanum tuberosum* L. (Solanaceae), sweet potato, *Ipomoea batatas* (L.) Lam. (Convolvulaceae), sugarcane, *Saccharum* sp., and rice, *Oryza sativa* L. (Poaceae). The Florida find on sea grape adds another plant to the list if it is indeed a host. Plataspid bugs tend to aggregate on other plants and surfaces and so reported hosts may not all be developmental hosts. Rédei (2016) further stated that the species is known primarily from tropical and subtropical forests in its native range and that it does not enter temperate forests. Thus, the potential distribution of this bug may be restricted to the extreme southern United States, such as USDA hardiness zone 9 or below. Further research is needed to more accurately determine the potential geographic range of this invasive species.

The example of *M. cribraria* may serve to illustrate the future spread and potential pest status for *Br. subaeneus*. *Megacopta cribraria* spread rapidly following introduction, moving to at least 13 states, primarily in the Southeastern USA, in the first decade after its discovery (Gardner 2013b; Eger et al. 2018). It became a serious pest of soybeans and a home invader, but numbers of this species declined sharply within five or six years of introduction (Gardner and Olson 2016; Blount et al. 2017), possibly due to the accidental introduction of its primary egg parasitoid, *Paratelenomus saccharalis* (Dodd) (Hymenoptera: Scelionidae) (Gardner et al. 2013a) and high levels of infestation by the pathogen *Beauveria bassiana* (Balsamo) Vuillemin (Clavicipitaceae) (Britt et al. 2016).




**Figures 2–6.** *Brachyplatys subaeneus* (Westwood) and *Megacopta cribraria* (Fabricius). **2–4)** *Brachyplatys subaeneus*. **2)** Adult dorsal habitus. **3)** Adult ventral habitus. **4)** Head. **5–6)** *Megacopta cribraria*. **5)** Adult dorsal habitus. **6)** Head and thorax. ps = pseudosuture. All scale bars = 1.0 mm. Photographs by Joseph E. Eger, Jr.

*Paratelenomus saccharalis* also parasitizes *Br. subaeneus* (Johnson 1996), and local strains of *Be. bassiana* adapted to *M. cribraria* also may attack *Br. subaeneus*, thus minimizing the impact of this introduced species on crops and native ecosystems.

The detection of *B. subaeneus* and the circumstances surrounding it are exemplative of a relatively new but expanding phenomenon in early plant pest detection: that of the citizen scientist using new technology. The ubiquity of smartphones with their associated mobile applications (apps) and cameras among the general populace has opened potential monitoring opportunities that may prove invaluable to future early detection efforts. Several apps and websites already have made efforts to capitalize on this novel data stream by tracking exotic species throughout the United States while many other apps record both native and exotic species (Silvertown 2009; Crall et al. 2010).

In the case of *B. subaeneus*, the original images that led to its collection and identification in Florida were uploaded using iNaturalist, a free app and website relying primarily on geotagged *in situ* pictures to record observations across all life kingdoms worldwide. Uploaded images subsequently can be viewed and tentatively identified by anyone with access to the app or website. Such a platform thus affords the unique potential for experts and professionals to access vast quantities of data while circumventing normal limitations of labor, time, and locality (Crall et al. 2010). Indeed, within iNaturalist, there are currently over 240,000 insect observations by more than 21,000 individuals in Florida alone (iNaturalist 2020).

Though the data submitted by citizen scientists may be limited by factors such as image quality and observer expertise for preliminary identification, the vast quantity of potential observations that can be made by volunteers has not gone unnoticed by researchers (Maistrello et al. 2016; Eritja et al. 2019; Hochmair et al. 2020). Efforts to enhance the role of citizen scientists in early plant pest detection have started to be realized by programs aimed at teaching pest detection skills such as identification and monitoring techniques, as well as bolstering general knowledge about the problems associated with invasive species and their introduction pathways (Stubbs et al. 2017; Pinkerton et al. 2019).

## Acknowledgments

Rachel J. Warren noticed that this bug was something of interest and subsequently photographed it and posted the photos on the iNaturalist website. We appreciate her efforts without which we might still be unaware of the presence of this bug in Florida. Phellicia Perez, FDACS, Cooperative Agricultural Pest Survey, promptly responded to our request for specimens allowing us to confirm the identity of this species and issue a report in less than two days. Mark J. Rothschild, FSCA, and David A. Rider, North Dakota State University, reviewed the manuscript. We thank the FDACS, DPI for support of this work.

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