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PENSOFT

First record of *Conura* (*Conura*) *maculata* (Fabricius, 1787) (Hymenoptera, Chalcididae) parasitizing *Opsiphanes invirae amplificatus* Stichel, 1904 (Lepidoptera, Nymphalidae) in the province of Corrientes, Argentina

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Abstract
We report the first record of *Conura* (*Conura*) *maculata* (Fabricius, 1787) in the province of Corrientes, Argentina. A total of 85 adult wasps of *C. maculata* were obtained from 3 chrysalides of *Opsiphanes invirae amplificatus* Stichel, 1904, a lepidopteran pest of native and exotic palm trees. This is the first report of the occurrence of this parasitoid in the province of Corrientes, extending this species' known distribution in the country. This is also the first report of the parasitoid-host interaction between these 2 species for Argentina.

Key words
Chalcidoidea; natural enemy; palms; parasitoids wasps.

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Introduction

The parasitoids can be considered key species for maintaining communities' equilibrium by functioning as regulators of the population density of other insects (Stireman and Singer 2003, Nájera and Souza 2010). The majority of the Chalcididae are primarily parasitoids of Lepidoptera, Diptera, and Coleoptera, while some parasitize species in other insect orders, such as Hymenoptera and Neuroptera, and others are hyperparasitoids (Gibson 1993, De Santis 1989, Gates et al. 2012). The family has a worldwide distribution with 1,464 species in 87 genera (Noyes 2017). The Neotropical fauna is represented by 217 species (Delvare and Arias-Penna 2006) of which 63 have been reported in Argentina (Noyes 2017), where the genus *Conura* Spinola,1837 is the best represented, with 30 species (Noyes 2017). *Conura* are generally parasitoids of both larval and pupal stages of lepidopteran (Marchiori et al. 2004, Marcicano et al. 2007, Salgado-Neto and Lopes da Silva 2011, Tibcherani et al. 2016), but also parasitize larvae of Diptera and other Hymenoptera (Stireman and Singer 2003, Couri et al. 2006), Coleoptera (Montes and Costa 2011), and Neuroptera, or are hyperparasitoids of Icneumonidae and Tachinidae (Couri et al. 2006, Sakazaki et al. 2011). They are usually

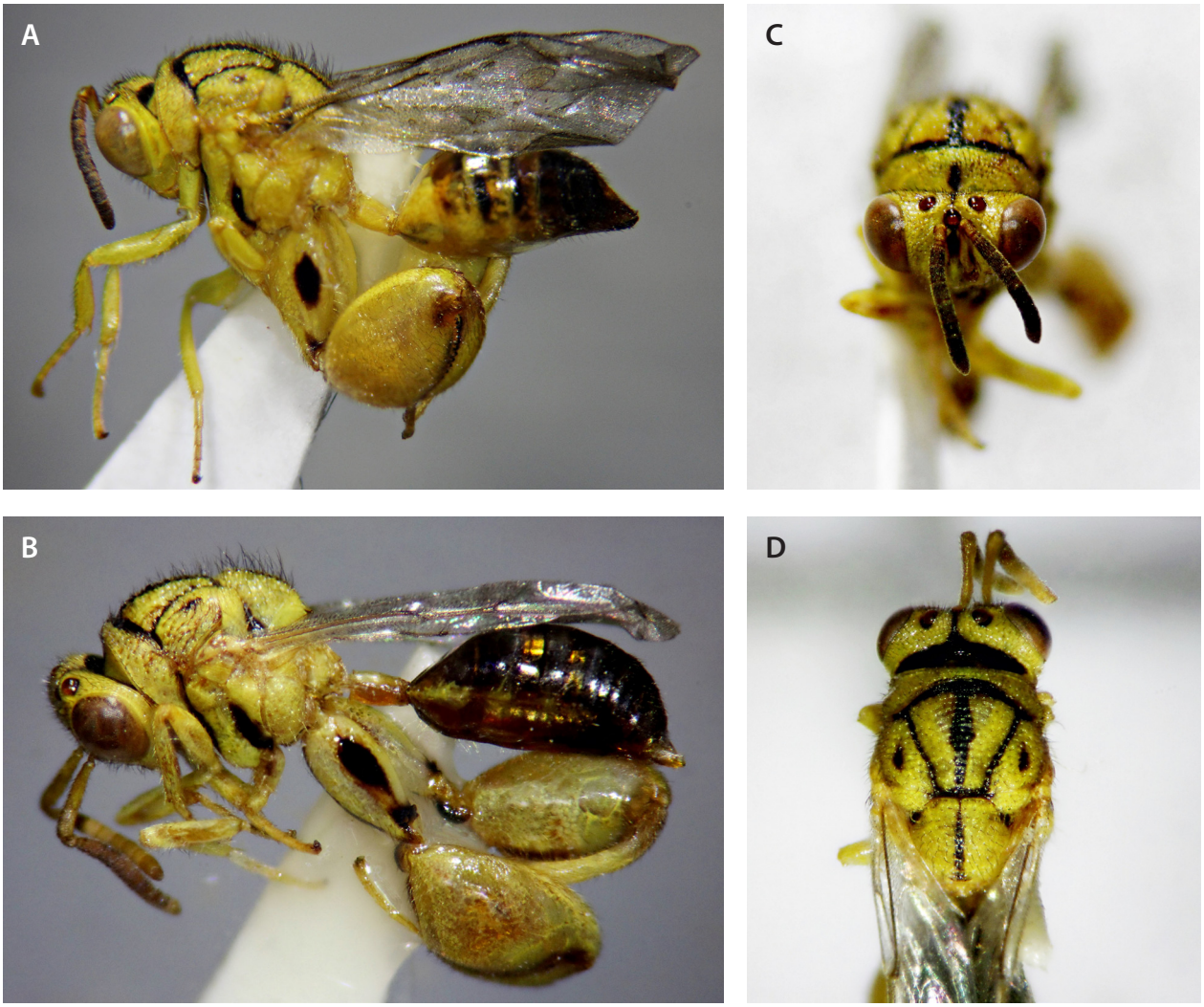

Figure 1. Specimens of *C. maculata* from Corrientes, Argentina. **A.** Female lateral view. **B.** Male lateral view. **C.** Head, frontal view. **D.** Thorax, dorsal view.

solitary parasitoids, but some smaller species are gregarious (Gates et al. 2012).

Conura maculata (Fabricius, 1787) is a gregarious parasitoid, currently known to occur in North America (USA and Mexico), Central America (Nicaragua, Panama, and Costa Rica) and South America (Venezuela, Colombia, French Guiana, Ecuador, Paraguay, Brazil, and Argentina) (De Santis and Fidalgo 1994, Salgado-Neto and Lopes da Silva 2011, Arias and Delvare 2003, Noyes 2017).

Opsiphanes invirae (Hübner, [1808]) is a lepidopteran of the family Nymphalidae. In some South American Countries, it is considered a pest of plants of economic interest, like bananas (Musaceae) (Pulido and Cardenas 1979), the açaí palm (*Euterpe oleraceae*), the oil palm (*Elaeis guineensis*), and the coconut (*Cocos nucifera*) (Salgado Neto 2013, Ferreira et al. 2015, Brandão et al. 2017). In Argentina, *O. invirae amplificatus* Stichel, 1904 is widely distributed in the central-northeastern provinces (Hayward 1973, Núñez Bustos 2008) and has been reported causing damage to native and exotic palms (Pastrana and Braun 2004). It is considered among the 3 most problematic insects for palms in the province of Buenos Aires (Márquez and Florentino 2007).

Conura maculata has been reported acting as a natural enemy of *O. invirae amplificatus* by Salgado-Neto and Lopez da Silva (2011) in Brazil. Here, we report for the first time the occurrence of this parasitoid in the province of Corrientes. Our new record extends the known distribution of this species in Argentina and expands the known distribution of the host-parazitoid interaction between *C. maculata* and *O. invirae amplificatus* to the province of Corrientes.

Methods

We sampled in an urban area near the campus of the Universidad Nacional del Nordeste, Corrientes city, province of Corrientes, Argentina (Fig 1). Between June 2013 and April 2014, we collected chrysalides of *O. invirae amplificatus* from *Syagrus romanzoffiana* (Cham.) Glassman stipes, house lintels, and external walls of buildings. Chrysalids were carefully removed, placed in plastic containers, and transported to the Laboratorio Biología de los Invertebrados. They were isolated in the lab and each chrysalid was hung by the cremaster with a thread inside cellophane paper bags (30 cm × 25 cm) with microperfo-

Figure 2. Specimen of *Conura maculata* from Corrientes emerging from a pupae of *Opsiphanes invirae amplificatus* in the laboratory.

rations. The chrysalids were kept under light-controlled conditions (equal amounts of light and darkness in a 24 h period) and natural temperature and humidity. The chrysalids were observed daily until the emergence of the butterfly or the parasitoids. Some parasitoids obtained were kept in 80% ethanol while others were mounted on entomological pins. We recorded the number of individuals and sex ratio of the emerged parasitoids.

Adults of *C. maculata* were identified based on the species redescriptions by Bouček and Delvare (1992) and Salgado-Neto (2008). Our identitification was confirmed by the group's specialist, Dr Gerard Delvare, (Centre de cooperation Internationale en Recherche Agronomique pour le Développement, Montpellier, France). The chrysalides and adult lepidopteran were identified based on Bristow (1991), Salgado-Neto (2008), and Canals (2003). The wasp's geographic distribution in South America was obtained from published data (De Santis and Fidalgo 1994, Salgado-Neto and Lopes da Silva 2011, Arias and Delvare 2003, Noyes 2017), and the map was designed using Quantum GIS v. 2.18.14 (datum WGS84).

All the material was deposited in the collection of the Universidad Nacional del Nordeste, Facultad de Ciencias Exactas, Naturales y Agrimensura, Corrientes, Corrientes, Argentina (CARTROUNNE).

Results

We randomly collected 21 chrysalids of *O. invirae amplificatus*. Thirteen emerged as adults, 5 died, and 3 were wild-caught parasitized (Cp). From the latter, 70 adult females and 15 adult males of *C. maculata* emerged (C1p: 32♀ 5♂; C2p: 27♀ 2♂; C3p: 11♀ 8♂). Chrysalids had an average of 3 perforations each made by the eruption of parasitoids. We observed that an adult of *C. maculata* emerges from the host through a circular opening (Fig. 2), which could be made with its mandibles or by taking advantage of a perforation already made by another individual.

Conura maculata (Fabricius, 1787)

Material examined. Argentina: Corrientes: city of Corrientes: Barrio Universitario (27°27′51″ S, 058°46′51″ W, 52 m elev.), caught manually, 06.iii.2014, P.B. Gervazoni leg., [CARTROUNNE 6665, 11 females; CARTROUNNE 6666, 8 males]. Argentina: Corrientes: city of Corrientes: Barrio Universitario (27°27′51″ S, 058°46′51″ W, 52 m elev.), caught manually 02.iii.2014, P.B. Gervazoni leg, [CARTROUNNE 6667, 27 females; CARTROUNNE 6668, 2 males; CARTROUNNE 6669, 32 females; CARTROUNNE 6670, 1 male; CARTROUNNE 6671, 1 male; CARTROUNNE 6672, 1 male; CARTROUNNE 6673, 1 male; CARTROUNNE 6674, 1 male].

Identification. To facilitate the identification of *C. maculata*, female body coloration and some external morphological characters of males (Fig. 1) are given below. The information is based on Bouček and Delvare (1992).

Female body size 5.5–6 mm. Scape and pedicel yellowish, flagellum brownish; body yellow with some parts black: an inverted V on the antennal scrobes (Fig. 1C); a median line between lateral and occipital ocelli; a median line on pronotal collum; a macula above occipital foramen (Fig. 1D); mesoscutal mid lobe also with a black part just behind posterior edge of pronotum; central small spots on each mesoscutal lateral lobes (Fig. 1D); transscutal line, mesoscutal mid lobe, median line on scutellum (Fig. 1C, D), and on mesopleuron anterior (Fig. 1C); mesopleuron with a small spot on the femoral scrobe (Fig. 1A, B), hind coxa with 2 spots, 1 proximal and dorsal, other at apex; hind trochanter and hind femur with a small spot apically, all teeth of hind femur and ovipositor sheaths; tergites 1 to 5 with transverse dorsal stripes.

Males present smaller body sizes than females, with a mean length of 4.5 mm. Antenna generally completely yellowish; scape hardly widening towards apex, with sensilar area hardly visible, pedicel not modified, clava area with sutures slightly oblique and, rounded at apex; striae of mesoscutum better developed than in female; hind coxa with a complete longitudinal strip ventrally; petiole only slightly longer than in female (Bouček and Delvare 1992).

Discussion

Conura maculata is not included among the species of *Conura* reported for Argentina by Bouček and Delvare (1992), De Santis and Fidalgo (1994), and Arias and

Figure 3. Geographic distribution of *Conura maculata* in South America: 1 = Ecuador, 2 = Colombia, 3 = Venezuela, 4 = Brazil, 5 = Paraguay, 6 = Argentina) and in Argentina (inset). Black dot represents the previously known record (Misiones) and red dot represents the new record (Corrientes).

Delvare (2003). However, De Santis (1989) reported it at Santa Inés, Posadas city in the Misiones province and Noyes (2017) includes Argentina in its distribution area, but did not provide a specific locality (Fig 3).

With our discovery of chysalids of *O. invirae amplificatus* parasitized by *C. maculata* in the city of Corrientes, we report *C. maculata* from the province for the first time. Our record is also only the second time that this species has been found in Argentina, and expands the geographical distribution of this parasitoid wasp west in the country from the previous Argentine record. The parasitoid-host interaction between *O. invirae amplificatus* and *C. maculata* is the first such report for Argentina.

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Authors' Contributions

PBG and MOA identified the specimens and wrote the text; PBG collected and photographed the specimens and produced the map.

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