

## ***Tetrapedia australis* (Apidae: Tetrapediini), a new species of oil-collecting bees from the southern distributional extreme of the genus**

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Short title: New species of oil-collecting bees

### **Abstract**

In this contribution, male and female of a new species of oil-collecting bees, *Tetrapedia australis* sp. nov., are described. Individuals reared from trap nests allowed for the correct association of the sexes. The geographic range of this new species considerably extends the known southern limits of the genus.

**Keywords:** Anthophila; Argentina; Wild bees.

### **Resumo**

Nesta contribuição, são descritos machos e fêmeas de uma nova espécie de abelha coletora de óleo, *Tetrapedia australis* sp. nov. Indivíduos criados em ninhos-armadilha permitiram a associação correta dos sexos. A área de distribuição desta nova espécie estende consideravelmente os limites meridionais conhecidos da distribuição do gênero.

**Palavras-chave:** Anthophila; Argentina; Abelhas silvestres.

### **Introduction**

Oil-collecting bees of the genus *Tetrapedia* Klug, 1810 are solitary, small to medium-sized species, usually black, and frequently with yellow or reddish-yellow markings on the clypeus or other parts of the body (Moure 1996, 1999; Michener 2007). The genus, with nearly 30 recognized species, is widely distributed in the New World, occurring from México (states of Jalisco and San Luis Potosí) to northern Argentina (provinces of Misiones and Tucumán) (Michener 2007; Moure 2007). However, an undetermined species of *Tetrapedia* has been found in a botanical garden of Buenos Aires city (Mazzeo and Torretta 2015). Later, in a work about the life cycles of the parasitic wasps of the genus *Leucospis* Fabricius, 1775 an undetermined species of *Tetrapedia* has been registered as host of *Leucospis signifera* Bouček, 1974 in the natural and historical reserve Isla Martín García, province of Buenos Aires

(Torretta et al. 2017). Moreover, an undetermined species of *Tetrapedia* has been captured in a natural riparian forest in Buenos Aires province, Argentina (Ramello et al. 2020).

The number of species of *Tetrapedia* in Argentina is, actually, uncertain. In the catalogue of bees in the Neotropical Region, only two species of the genus *Tetrapedia* are cited for Argentina: *Tetrapedia diversipes* Klug, 1810 (from Misiones) and *T. pulchella* Moure, 1999 (from Tucumán) (Moure 2007, Moure and Melo 2022). However, the estimated number of species present in the country is six (Roig-Alsina 2008). Recently, in a work about loyalty and robbery in the interaction among oil-rewarding flowers of Malpighiaceae and oil-collecting bees (Centridini, Tapinotaspidini and Tetrapediini) across more than 1000 km from northeastern to central Argentina (from Misiones to north of Buenos Aires), six undetermined species of *Tetrapedia* were reported (Torretta et al. 2022).

The aim of this work is to describe, based on both sexes, a new species of *Tetrapedia*, which

considerably extends the known southern limits of the genus.

This contribution is dedicated to the memory of Fernando Amaral da Silveira, whose studies on the systematics of bees have added greatly to their knowledge.

## Materials and Methods

Morphological terminology follows Michener (2007). The maximum diameter of the median ocellus (MOD) is used as a reference to express the length of other structures, and the diameter of punctures (PD) to indicate the size of the intervals between the punctures. The metasomal terga (T) and sterna (S) are identified with Arabic numerals. The sex of the specimens is indicated by F, female, and M, male. The distribution map was constructed using SimpleMapp (Shorthouse, 2010).

The studied material belongs to the following Argentinean institutions: Facultad de Agronomía, Universidad de Buenos Aires (FAUBA), Museo Argentino de Ciencias Naturales, Buenos Aires (MACN), and Museo de La Plata, La Plata (MLP).

## Systematics

Genus *Tetrapedia* Klug, 1810

*Tetrapedia australis* Torretta & Roig-Alsina sp. nov.  
(Figs. 1A-H, 2)

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*Tetrapedia* sp.: Mazzeo and Torretta, 2015: 185;  
Torretta, Molina and Aquino, 2017: 1236, 1238;  
Ramello, Álvarez, Almada and Lucia, 2020: 244.

## Diagnosis

Among species of *Tetrapedia* with an omaular ridge, both sexes of this species can be diagnosed by the omaular ridge weakly carinate and restricted to the upper third. Both sexes can be also diagnosed by the following combination of features: lack of yellow maculations (Fig. 1A-B, 1F-H), deeply infuscate wings (Fig. 1F), extensively black pilosity (Fig. 1F), dorsum of thorax and metapostnotum without scale-like hairs, and patch of pale hairs on the basal third of the outer surface of the hind tibia (Fig. 1E-F). Males are further

recognizable by the carinate hind coxa (Fig. 1C, arrow), and the shape of the carinate ventral surface of the hind basitarsus, with spatulate apex, and with the inner margin bearing a broad triangular projection near basal third (Fig. 1E).

## Male

Total length 8.5-12.0 mm (holotype 9.9 mm); forewing length 7.6-9.1 mm (holotype 8.4 mm).

*Color.* Black, without any yellow markings; scape, base of first flagellomere and last one to two flagellomeres brown, remainder of antenna orange (in some specimens pedicel brown basally) (Fig. 1A); apices of hind tibia and basitarsus brown (Fig. 1E). Wings deeply infuscated, veins brown, pterostigma yellowish brown.

*Pubescence.* Black, except white on lower paraocular area (Fig. 1A), white on gena, some white hairs on apex of clypeus laterally, white on labrum laterally (Fig. 1A), some white hairs on S1-S2 (Fig. 1C), pale brownish hairs forming oval patch on apical half of outer surface of midtibia, brownish hairs on apical inner surface of hind femur, white hairs on basal third of outer surface of hind tibia, yellow hairs on apical third of hind tibia (Fig. 1E), dark brown apical hairs on T4-T6, brown curved hairs on S3 (Fig. 1C), and brown lateral hairs on S4 (Fig. 1C). Hind tibia densely pilose, except polished, impunctate on undersurface and on lower half of outer surface; most hairs black, simple, but apical broad yellow tuft with plumose and intermixed simple hairs. Hind basitarsus with plumose hairs on basal half of outer surface and on dorsal surface, the latter with some intermixed simple hairs; inner surface with long, stout simple hairs; ventrally with row of giant setae branched apically (Fig. 1E). S1 with long, erect, simple black hairs on undersurface except median roundish impunctate area, and with short, plumose hairs on apical margin (Fig. 1C). S2 glabrous basally and with long erect black and white hairs surrounding preapical row of long white plumose hairs; apical margin impunctate, translucent (Fig. 1C). S3 with apical fringe of brownish hairs, shorter medially and extremely long and curled mesad laterally, basal to fringe with appressed plumose white hairs (Fig. 1C). S4 also with apical fringe, but much less developed, and appressed brownish plumose hairs basal to it (Fig. 1C). S5 with disc impunctate, strongly shining (Fig. 1C). S6 as in Fig. 1D.



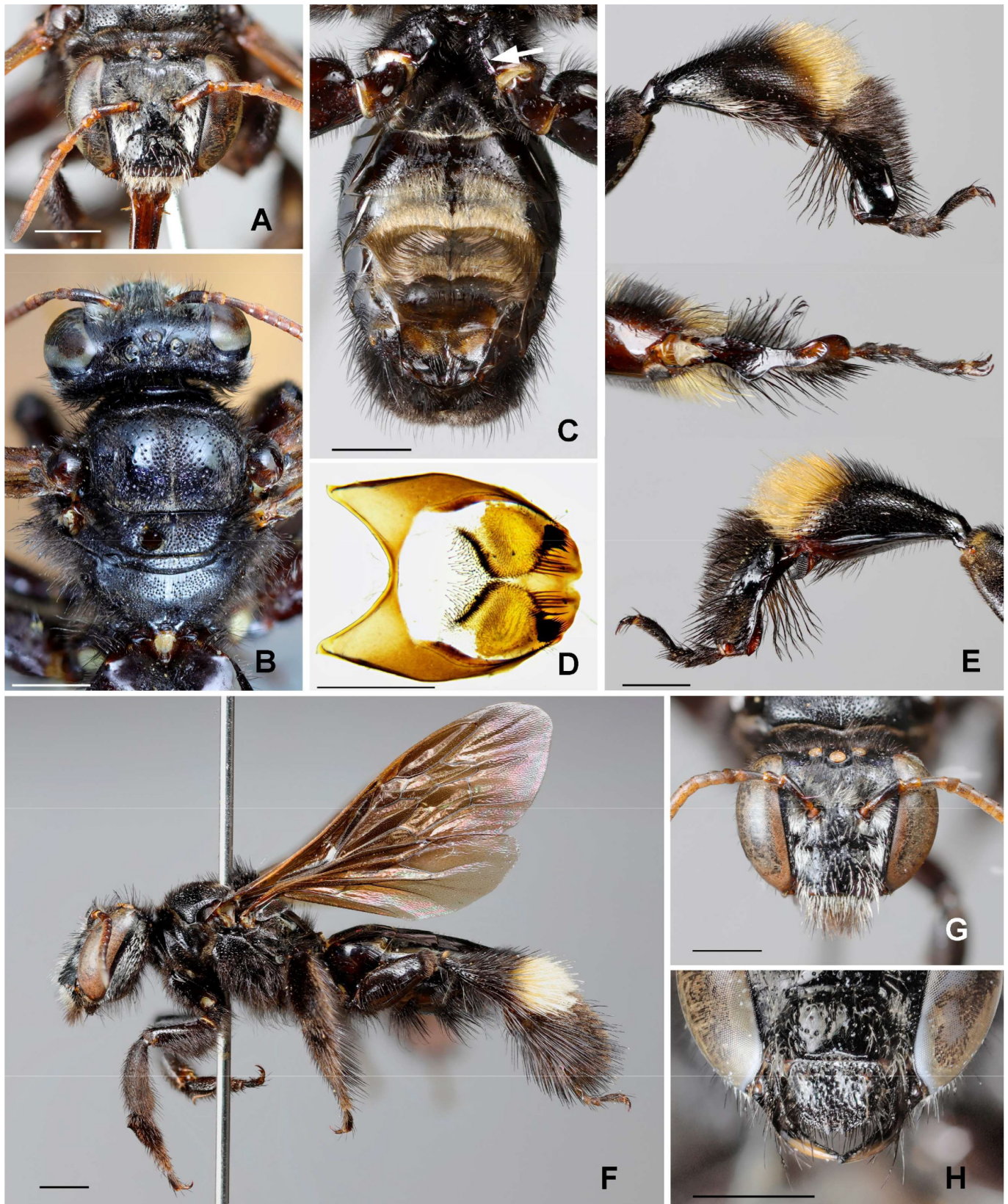


Figure 1: *Tetrapedia australis* sp. nov. A-E. Male. A. Face. B. Dorsal view of head and mesosoma. C. Holotype, ventral view of hind coxae and metasoma (arrow points to ventral carina of hind coxa). D. S6. E. Hind leg, outer view (top), ventral view (center), and inner view (bottom). F-G. Female. F. Lateral view. G. Face. H. Closer frontal view of clypeus, labrum and mandibles (hairs of labrum removed). Scale lines = 1 mm.

**Sculpture.** Integument polished between punctures, except weakly tessellate on metapostnotum in some specimens (Fig. 1B), and weakly tessellate on mesopleuron close to omaular ridge. Clypeus with

sparse punctures (ca. 30  $\mu$ ) separated by 3-4 PD (Fig. 1A). Supraclypeal area and frons with few punctures. Scutum with dense punctures (ca. 30  $\mu$ ) separated by 0.3-1.0 PD on center of disc and along midline (Fig.



1B), and sparse, several PD apart on anterolateral areas. Mesopleuron with large punctures (ca. 60  $\mu$ ) separated by 0.3-0.5 PD. Scutellum with dense punctures (ca. 30  $\mu$ ) on entire surface separated by 0.2-0.5 PD (Fig. 1B). Metapostnotum with punctures smaller than those of scutellum; with median longitudinal weak depression (nearly absent in some specimens). Propodeum with punctures similar to those of metapostnotum, sparser close to spiraculum (Fig. 1B). T1-T3 polished, basally with sparse piliferous micropunctures, with preapical arched band of piliferous punctures and impunctate margins. T4 with dense band of punctures surrounding median patch of dense plumose hairs (T4 polished basal to punctate band). T5-T6 basally polished; dense punctures delimiting apical plumose band (polished area and punctures usually hidden by preceding terga).

**Structure.** Inner margin of eyes converging below, upper interocular distance 1.24x lower interocular distance (Fig. 1A). Distance from lateral ocellus to posterior margin of head 1x MOD. Maximum genal width in lateral view 0.50x maximum eye width. Malar space nearly absent. Clypeus 1.80x as wide as long, with shallow apical depression. Labrum 1.54x as wide as long, with small median emargination. Proportions of scape, pedicel and first three flagellomeres 1.65:0.62:1:0.44:0.50; first flagellomere 2.30x as long as its apical width. Omaular ridge rounded, weakly carinated on upper third. Hind coxa with longitudinal carina along midline of basal half of ventral surface, sharply curved mesad and extending along ventral mesal margin towards apex (Fig. 1C). Hind trochanter simple. Hind basitarsus apically curved outwards; ventral surface entirely surrounded by sharp carina delimiting glabrous, shiny, concave surface; inner margin of carina with broad triangular projection near basal third; apex of carinate surface spatulate (Fig. 1E).

### Female

Total length 9.3-9.6 mm; forewing length 7.6-7.9 mm.

**Color.** Black, except reddish brown on apex of mandible, tibial spurs, and claws (Fig. 1F); antenna mostly orange as in male (Fig. 1G); wings as in male (Fig. 1F).

**Pubescence.** Head with white hairs on lower part of frons, around antennal sockets, on lower paraocular

area (Fig. 1G), sides of clypeus, base of labrum (Fig. 1H), and gena; remainder of head with black hairs (Fig. 1G). Meso and metasoma entirely with black hairs (Fig. 1F). Legs with black hairs, except hind tibia with apical broad yellow tuft of plumose and intermixed simple hairs (Fig. 1F).

**Sculpture.** Similar to that of male.

**Structure.** Inner margin of eyes converging below, upper interocular distance 1.22x lower interocular distance. Distance from lateral ocellus to posterior margin of head 1x MOD. Maximum genal width in lateral view 0.50x maximum eye width. Malar space similar to that of male. Clypeus 1.70x as wide as long, with shallow apical depression. Labrum 1.50x as wide as long, with small median emargination. Proportions of scape, pedicel and first three flagellomeres 1.66:0.66:1:0.50:0.55, first flagellomere 2.10x as long as its apical width. Omaular ridge rounded, weakly carinated on upper third.

### Comments

This species has been reared from trap nests in three sites within Argentina (natural and historical reserve Isla Martín García, province of Buenos Aires, in the Botanical Garden Lucien Hauman of Facultad de Agronomía, Universidad de Buenos Aires, and in the urban reserve Costanera Sur, Buenos Aires city). These specimens allowed for the correct association of the sexes. In addition to the individuals reared from the nests, females and males were collected and/or observed on flowers of different species of Malpighiaceae (*Alicia anisopetala*, *Banisteriopsis muricata*, *Heteropterys glabra*, and *Stigmaphyllon bonariense*) illegitimately foraging for floral oil. Moreover, individuals were observed foraging for nectar and/or pollen on flowers of *Bidens laevis* (Asteraceae), *Ludwigia elegans* (Onagraceae), *Origanum vulgare*, *Salvia uliginosa* (Lamiaceae), *Trimezia spathata* (Iridaceae) and *Psychotria carthagenensis* (Rubiaceae).

### Etymology

The name refers to the southern distribution of the species.

### Distribution

Argentina, Ciudad Autónoma de Buenos Aires, and provinces of Buenos Aires, Corrientes, and Misiones (Fig. 2).

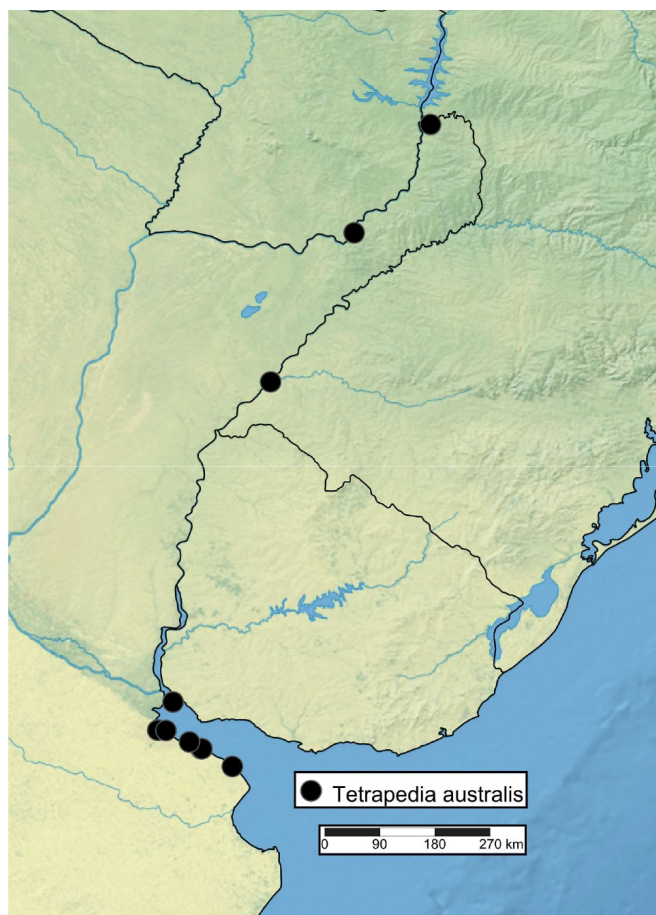


Figure 2: Distribution map of *Tetrapedia australis* sp. nov.

### Type Material

**Holotype:** Male, Argentina, Ciudad Autónoma de Buenos Aires, Reserva Ecológica Costanera Sur, reared from trap-nest, 10-III- 2023 (emergence date), J.P. Torretta (MACN).

**Paratypes:** ARGENTINA. Buenos Aires: 2 F, Berisso, camino a Palo Blanco y Terraplén costero, 2 females, 30-XII-2021, L. Álvarez (MLP); 1 F and 1 M, Berisso, Los Talas, La Florida, 34° 52' 25" S, 57° 50' 18" W, 11-I-2011, L. Álvarez & M. Lucía (MLP); 1 F, Berisso, Terraplén costero, sobre flores de *Ludwigia elegans*, 9-I-2016, L. Álvarez (MLP); 4 F, 20 km SE Magdalena, Estancia El Destino, ex *Stigmatophyllum littorale* [= *Stigmaphyllon bonariense*], 2/5-I-2000, A. Roig A. (MACN), 1 M, 20 km SE Magdalena, Estancia El Destino, ex *Bidens laevis*, 2/5-I-2000, A. Roig A. (MACN), 3 F, Magdalena, Estancia El Destino, costa del Río de la Plata, 7-I-2020, L. Álvarez & L. Demarchi (MLP), 2 F, Reserva Punta Lara, 34° 46' 55" S, 58° 00' 44" W, 2 msnm, 27-XII-2011, M. Lucía & L. Álvarez (MLP); 1 F, Reserva Punta Lara, 34° 46' 55" S, 58° 00' 44" W, 2 msnm, 2-I-2012, M. Lucía & L. Álvarez (MLP); 1

F and 1 M, Reserva Punta Lara, 34° 46' 55" S, 58° 00' 44" W, 2 msnm, 27-XII-2012, M. Lucía, L. Álvarez & P. Ramello (MLP), 1 F and 1 M, Isla Martín García, reared from trap-nests, 24 and 27-XII- 2015 (emergence date), J.P. Torretta (MACN). Ciudad Autónoma de Buenos Aires: 2 F and 1 M, Facultad de Agronomía, 14-XII-1994, G. Roitman (MACN), 2 M, Jardín Botánico, Facultad de Agronomía, 14-XII-1999, A. Roig A. (MACN), 1 F, Hort. Bot. FAUBA, ex *Stigmatophyllum littorale* [= *Stigmaphyllon bonariense*], 20-XII-2002, D. Medan, N.H. Montaldo & M. Chamer (FAUBA), 1 F and 2 M, Hort. Bot. FAUBA, ex *Heteropteris cf. angustifolia* [= *Heteropteris glabra*] and *Psychotria carthagenensis*, 13-XII-2004, D. Medan (FAUBA); 1 F, Hort. Bot. FAUBA, ex *Heteropteris glabra*, 18-XII-2009, N. Mazzeo & J.P. Torretta (FAUBA), 3 F, Hort. Bot. FAUBA, ex *Salvia uliginosa* and *Psychotria carthagenensis*, 30-XII-2009, N. Mazzeo & J.P. Torretta (FAUBA), 2 M, Hort. Bot. FAUBA, ex *Psychotria carthagenensis*, 30-XII-2009, N. Mazzeo & J.P. Torretta (FAUBA), 2 M, Hort. Bot. FAUBA, ex *Psychotria carthagenensis*, 11-I-2010, N. Mazzeo & J.P. Torretta (FAUBA), 2 M, Hort. Bot. FAUBA, ex *Origanum vulgare*, 14-XII-2010, N. Mazzeo & J.P. Torretta (FAUBA), 1 M, Hort. Bot. FAUBA, ex *Psychotria carthagenensis*, 7-I-2011, N. Mazzeo & J.P. Torretta (FAUBA), 1 F and 7 M, Reserva Ecológica Costanera Sur, reared from trap-nests, 3 and 10-III- 2023 (emergence date), J.P. Torretta (MACN), 1 F and 1 M, Hort. Bot. FAUBA, reared from trap-nests, 9 and 12-III- 2023 (emergence date), J.P. Torretta (MACN). Corrientes: 1 M, San Martín: Yapeyú, ex *Psychotria carthagenensis*, 3-XII-2012, N. Mazzeo & J.P. Torretta (FAUBA). Misiones: 1 M, Iguazú: PN Iguazú, ex *Banisteriopsis muricata*, 6-XII-2012, H.J. Marrero (MACN), 1 M, San Ignacio: PP Teyú Cuaré, ex *Alicia anisopetala*, 7-XII-2019, J.P.

### Acknowledgements

We thank Rafael Ferrari and an anonymous reviewer for critical reading of preliminary version of manuscript, the Administración de Parque Nacionales (Regional NEA), the Ministerio de Ecología y Recursos Naturales Renovables, province of Misiones, the Dirección de Áreas Naturales Protegidas, Organismo Provincial para el Desarrollo Sostenible,

province of Buenos Aires, the Reserva Ecológica Costanera Sur, Ciudad Autónoma de Buenos Aires, and the staff of the “Lucien Hauman” Botanical Garden (Facultad de Agronomía, U.B.A.) for permissions to conduct part of this study in protected areas.

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