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Taxonomic revision of the oil-collecting bee subgenus *Epicharis* (*Epicharitides*) Moure, 1945 (Hymenoptera: Apidae), with the description of two new species

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Abstract. A taxonomic revision of the oil-collecting bees of the subgenus *Epicharis* (*Epicharitides*) Moure, 1945 is provided. A total of nine species were recognized: *E. cockerelli* Friese, 1900; *E. duckei* Friese, 1901; *E. iheringi* Friese, 1899; *E. luteocincta* Moure & Seabra, 1959; *E. minima* (Friese, 1904); *E. obscura* Friese, 1899, and *E. rufescens* Moure & Seabra, 1959, along with *E. mesoamericana* sp. nov. and *E. lia* sp. nov., two new species from the Central American and Amazonian provinces, respectively. Redescriptions, diagnoses, and figures of specimens of both sexes, floral records, distribution maps, an identification key, and an updated catalogue of all species of the group are also provided. In addition, the lectotype of *E. duckei* was also designated to stabilize the application of the name.

Keywords. Apoidea, Neotropical Region, solitary bees, taxonomy, Mesoamerica.

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Introduction

Bees are a monophyletic group denominated Anthophila that contains more than 21 000 species divided into approximately 400 genera and seven families (Engel 2005; Michener 2007; Ascher & Pickering 2020). These insects exhibit a great diversity of forms, colors and behaviors, the latter being especially interesting by the mutualistic relationships that bees establish with certain groups of flowering plants (Angiosperms) (Michener 2007). Among the different groups of bees, stand out a very exclusive set of species that collect floral oils, which are used to build their nests and feed their offspring. These oil-collecting species are grouped into six tribes belonging to two families (Alves-dos-Santos *et al*. 2007; Michener 2007); of wich Tapinotaspidini Roig-Alsina & Michener, 1993, Tetrapediini Michener & Moure, 1957 and Centridini Cockerell & Cockerell, 1901 (sensu Michener 2007) correspond to exclusively

Neotropical lineages (Silveira *et al*. 2002; Michener 2007). The remaining tribes Ctenoplectrini Cockerell, 1920, Macropidini Robertson, 1904 and Melittini Kirby, 1802 (Melittidae), occur mainly in South Africa and in Europe (Michener 2007; Michez *et al*. 2009).

The centridine bees are one of the most studied groups of non-corbiculated bees in the Neotropical Region (Griswold *et al*. 2006). All species of this tribe are solitary (Silveira *et al*. 2002) and represent one of the most diversified and important oil-collecting groups in the New World, due the diversity of plant species that they visit to obtain this resource (Alves-dos-Santos *et al*. 2007). Centridini contains more than 300 species divided into two genera: *Centris* Fabricius, 1804 and *Epicharis* Klug, 1807 (Michener 2007), both occurring mainly in the Neotropics (Moure *et al*. 2007).

The classification of *Centris* and *Epicharis* has been relatively confusing since their inception. The first comprehensive taxonomic work that included species of both genera was published by Friese (1901), who considered *Epicharis* as a subgenus of *Centris*. However, the Friese's proposal was not followed by other melittologists and currently both groups are treated as valid genera. Currently, in *Epicharis* a total of 35 valid species grouped into nine subgenera are known (Moure *et al*. 2007). Among the subgeneric groups, *E*. (*Epicharitides*) Moure, 1945a is the most specious, with seven known species distributed mainly in South America (Moure *et al*. 2007). This taxon, as well as most groups of Neotropical bees, does not have modern taxonomic revisions that allow the recognition of its species, along with their respective distribution ranges, floral hosts, and/or bionomic data. Therefore, carrying out a modern taxonomic revision of *E*. (*Epicharitides*) is essential to assess the current state of knowledge of this lineage, its specific richness, their distributional ranges and the flowers they visit.

Taxonomic background of *E*. (*Epicharitides*) Moure, 1945

The taxonomic history of the subgenus began with the first descriptions of species made by the German melittologist Heinrich Friese (1860–1948) in the late 19th and early 20th centuries. From the study of several Neotropical new species of centridine bees, Friese (1899) described *E*. *iheringi* based on a male from São Paulo, Brazil, and *E*. *obscura* based on a series formed by three females, two of them collected in Espírito Santo State, Brazil. The following year, Friese (1900) described *E*. *cockerelli* using a single female specimen collected in São Paulo, along with the male of *E*. *obscura*, based on a specimen collected in Espírito Santo State. Later, Friese (1901) published a monograph of the genus *Centris*, gathering the descriptions of the species known to date. In that article was described *E*. *duckei* from a series of specimens of both sexes collected in Pará State, Brazil. In his monograph, Friese (1901) proposed *Epicharis* as a subgenus of *Centris*, originating some secondary homonyms. However, he did not always follow his own classification, because he described this latter species in the original combination "*Epicharis duckei*". Friese's classification was followed by Ducke (1901a, 1901b, 1902a, 1902b) citing *Centris duckei* (= *Epicharis duckei*) in Pará State, Brazil. In 1904, Friese published an addendum to his monograph, describing *Centris* (*Epicharis*) *minima* from a set of females collected in São Paulo State, Brazil. A couple of years before the description of this species, Schrottky (1902a) proposed *E*. *cockerelli* var. *fulvohirta* (= *E*. *iheringi*) based on a series of females from São Paulo, and in 1908, he described the varieties *E*. *maculata* forma *interrupta* and *E*. *maculata* forma *parvula*, based on females collected in Asunción, Paraguay. These two varieties are currently considered junior synonyms of *E*. *obscura* (Moure *et al*. 2007). Neither Schrottky (1901, 1902a, 1902b, 1904, 1908) nor other important researchers of that time who worked with centridine bees, such as Ducke (1901a, 1901b) and Cockerell (1922), followed the classification system proposed by Friese (1901).

Several decades after Friese's publications, the Brazilian melittologist Jesus Santiago Moure (1912–2010) provided new contributions to the taxonomy of *Epicharis*. In 1945 (Moure 1945a), he included *Epicharis* in its own subtribe, Epicharitina, describing in it nine new genera, being among them, *Epicharitides* with *E*. *cockerelli* as its type species. Just as happened with Friese's classification, the one

proposed by Moure was not followed by other melithologists, who considered *Epicharis* in a broader sense, including the genera proposed by Moure as subgenera. The last constribution on the taxonomy of *Epicharis* (*Epicharitides*) was made by Moure & Seabra (1959) who described the Brazilian species *E. luteocincta* from a single male collected in Goiás State, and *E. rufescens* based on a pair of specimens of both sexes collected in Pará State. According to Moure *et al*. (2007), this subgenus currently contains a total of seven species.

Material and methods

Terminology and descriptions

The morphological terminology used here follows Urban (1967) and Michener (2007) for external morphology and of male genitalia, whereas the structures of the oil-collecting apparatuses (elaiospathes) are according to Neff & Simpson (1981). No redescriptions were provided here. However, the morphological features cited for each species were based on type specimens except for *E. minima*, and the variations were based on the study of series of each species. Herein we refer to the term "macula" as a distinct area of the integument of yellowish coloration, nearly glabrous and smooth. Antennal flagellomeres are indicated as F1, F2, F3, etc.; and metasomal terga and sterna as T1, T2, S1, S2..., respectively. Measurements are given in millimeters and were taken from the following structures: total body length, from anterior margin of the head to the apex of the metasoma; mesosoma width, between the outer margins of tegulae; forewing length, from the posterior margin of tegula to the wing tip; metasoma width, across the apical margin of the second tergum (T2). Measurement intervals were based on the average of five individuals in most cases. The pubescence length ratio and some specific structures were measured in OD (maximum diameter of the median ocellus). The supraorbital line refers to the upper interocular tangent and it was used to indicate the position of the median ocellus, in frontal view. We refer to appressed pubescence as a very short (less than 0.5 × maximum diameter of the median ocellus) and dense pubescence that covers the entire tegument, commonly found on lower gena and metasoma.

Material studied and taxonomic procedures

The specimens studied or cited belong to the following collections:

AMNH = American Museum of Natural History, New York, United States
CEPANN = Coleção Entomológica "Paulo Nogueira-Neto", Instituto de Biologia, Universidade de São Paulo, São Paulo, Brazil
DSEC = Coleção Entomológica do Departamento de Sistemática e Ecologia, Universidade Federal da Paraíba, João Pessoa, Paraíba, Brazil
DZMG = Departamento de Zoologia, Universidade Federal de Minas Gerais, Belo Horizonte, Minas Gerais, Brazil
DZUP = Coleção Entomológica "Padre Jesus Santiago Moure", Universidade Federal do Paraná, Curitiba, Paraná, Brazil
FSCA = Florida State Collection of Arthropods, Gainesville, Florida, United States
HNHM = Magyar Természettudományi Múzeum, Budapest, Hungary
INPA = Instituto Nacional de Pesquisas da Amazônia, Manaus, Amazonas, Brazil
LABUN = Laboratorio de Investigaciones en Abejas Silvestres, Universidad Nacional de Colombia, Bogotá, Colombia
LEACOL = Laboratório de Estudos sobre Abelhas, Universidade Federal do Maranhão, São Luís, Maranhão, Brazil
MNRJ = Museu Nacional, Universidade Federal do Rio de Janeiro, Rio de Janeiro, Brazil
MPEG = Museu Paraense "Emílio Goeldi", Belém, Pará, Brazil
MZUFBA = Museu de Zoologia da Universidade Federal da Bahia, Salvador, Bahia, Brazil
MZUSP = Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil

NHMUK = Natural History Museum, London, United Kingdom
NHMW = Naturhistorisches Museum Wien, Vienna, Austria
RPSP = Coleção Entomológica "Prof. J.M.F. Camargo", Universidade de São Paulo, Ribeirão Preto, São Paulo, Brazil
ZMB = Museum für Naturkunde, Berlin, Germany

Information processing and figures

The information labels were transcribed verbatim under the section Material examined and was displayed between double quotes (" "). The backward slash (\ ) was used to distinguish different labels on the same specimen. Information on distribution and floral records was taken from label's data and records available in the literature cited in the section References. The floral hosts were compiled in the Table 1 and the plant names were checked and updated according to the International Plant Names Index (www.ipni.org). Information on localities provided in the section Distribution was arranged from north to south and east to west as follows: COUNTRY: main administrative division: specific locality. The localities indicated in the references are cited and those accompanied by an asterisk (*) correspond to new records, including a few personal records. Names and coordinates of each locality were verified and obtained through GeoNames (www.geonames.org) and Google Earth (Google, Mountain View, CA, USA). Distribution maps were made using ArcGIS (ver. 10.4) software. The distribution data was interpreted according to the biogeographic regionalization proposed by Morrone (2014). Photographs were taken using a Leica DFC 450 camera attached to a Leica M205A stereo microscope and the software LAS 4© (Leica Application Suite ver. 4.8.0), provided by Departamento de Vertebrados of the Museu Nacional (MNRJ). The images obtained were enhanced with Adobe Photoshop® (ver. 13.0) and Adobe Lightroom® (ver. 7.0), and the plates were organized with Adobe InDesign® (ver. 5.0).

On lost specimens

During the development of this research, almost all specimens studied were lost in the fire that destroyed the Museu Nacional (Zamudio *et al*. 2018), including the paratypes of *Epicharis rufescens* and the holotype of the new species *Epicharis lia*. Nonetheless, all the description process and morphological analysis were done before the fire and based on dry-pinned specimens. This means that the morphological descriptions here provided do not fit into recent debates about photo-based descriptions (i.e., Amorim *et al*. 2016; Ceríaco *et al*. 2016; Faúndez 2017; Thorpe 2017; Zhang 2017), particularly in the case of the new species cited above. The specimens destroyed are cited and accompanied by a cross (†).

Results

Systematics

Class Insecta Linnaeus, 1758
Order Hymenoptera Linnaeus, 1758
Family Apidae Latreille, 1802
Tribe Centridini Cockerell & Cockerell, 1901
Genus *Epicharis* Klug, 1807

Subgenus ***Epicharis* (*Epicharitides*)** Moure, 1945

Epicharitides Moure, 1945a: 311, 313, 314 (original description, key).

Epicharitides – Moure 1945b: 399, 400 (key).
Epicharis (*Epicharitides*) – Snelling 1984: 51 (key). — Michener *et al*. 1994: 154, 180 (cited, list). — Fernández 1995: 403 (list); 2001: 109 (list, distribution); 2002: 130 (list, distribution). — Ochoa & O'Connor 2000: 714, 735 (cited). — Silveira *et al*. 2002: 99–102 (key, distribution). — Smith-

Pardo 2003: 337 (preliminar account in Colombia). — Michener 2007: 74, 759−761 (cited, key, comparative note with *E*. (*Epicharoides*) Radoszkowski, 1884, distribution). — Moure *et al*. 2007: 138 (catalogue, distribution). — Zambão 2011: 34–65 (bionomy). — Werneck *et al*. 2012: 520 (cited). — Martins & Melo 2015: 23, 25–27 (molecular phylogenetic analysis).

Diagnosis

The species of the subgenus *E*. (*Epicharitides*) can be recognized by the following combination of characters: small body size (15–13 mm), being the smallest bees in *Epicharis*. Integument black to ferruginous. Maculae generally on face or metasoma. Apex of apical labial palpi straight. Clypeus subtriangular, concave in lateral view, with a pair of strong converging above carinae (except in *E. minima*) and with distinct coarse hairs on lateral sides. Labrum quadrangular with lower edge convex and two translucent spots on lateral basal margins. Occipital carina conspicuous. Occipital flagelliform hairs relatively short. Wings light brown, translucent. Jugal lobe of hind wing approximately ⅓ long in relation to vanal lobe. Mesoscutellum rounded or bilobed. Hind tibial spurs with similar length. Females can be distinguished by the pubescence of the mesosoma predominantly black or whitish (except orange to testaceous in *E. rufescens*), scape longer or equal to F1, mandible with two preapical teeth, primary basitibial plate rounded, scopa yellow, hind basitarsus semicircular, and preapical area of F5 nearly smooth and glabrous. Males have more developed maculation than females, pubescence of mesosoma mostly yellowish or whitish, mandible with one preapical tooth, spur of mid tibia leaf-shaped (except in *E. luteocincta*), pygidial plate narrow towards apex and gonocoxite without parapennial lobes.

Sometimes, both sexes of *E*. (*Epicharitides*) are confused with species of the subgenus *E*. (*Epicharoides*) Radoszkowski, 1884 due to their similar size, the developed maculae, and the dorsal surface of the mesoscutellum slightly concave; but the species of the former subgenus are the only that have a transversal carina on the preoccipital area within the genus.

The monotypic subgenus *E*. (*Cyphepicharis*) Moure, 1945 also has the anterior surface of the third maxillary palpomere flat and well-defined clypeal carinae, similar to the observed in species of *E*. (*Epicharitides*). However, both lineages can be easily distinguished by the almost absence of maculae over the body and the pubescence predominantly black in *E*. (*Cyphepicharis*), which constrast with the rich patterns of maculae and the coloration of the pubescence found in the species of *E*. (*Epicharitides*).

Epicharis* (*Epicharitides*) *cockerelli Friese, 1900
Figs 1, 10

Epicharis cockerelli Friese, 1900: 119 (original description).
Centris baccharis Friese, 1901: 345, 350. (nom. nov. for *Centris* (*Epicharis*) *cockerelli* Friese, 1900 due to secondary homonymy with *C. cockerelli* Fox, 1899).

Epicharis cockerelli – Schrottky 1901: 211, 214 (floral records); 1902a: 559–561, 565 (key, morphology of adult, distribution); 1902b: 320 (distribution); 1904: 348 (cited). — Ducke 1910: 365 (cited). — Cockerell 1922: 549 (morphology of adult). — Gottsberger 1986: 33 (floral records). — Pedro 1994: 252 (floral records). — Oliveira & Gibbs 2000: 320 (floral records). — Machado 2004: 269 (floral records). — Oliveira *et al*. 2007: 758 (floral record, bionomy). — Rosa 2009: 65 (floral record, bionomy). — Cappellari 2011: 22, 37, 181, 185, 187 (bionomy, floral records). — Mello *et al*. 2012: 4–5 (bionomy). — Giannini *et al*. 2014: 217 (pollinator). — Silveira-Sazan *et al*. 2014: 42 (pollinator). — Aguiar *et al*. 2017a: 80 (floral record, bionomy); 2018: 571 (bionomy). — Cardoso *et al*. 2017: 16–17 (figure of adult, floral record).
Epicharitides cockerelli – Moure 1945a: 312 (morphology of adult, new combination); 1945b: 399–400 (distribution, key).

Epicharis (*Epicharitides*) *cockerelli* – Moure & Seabra 1959: 125 (comparative note with *E. rufescens*). — Kerr & Cunha 1976: 36, 38, 41, 43 (list, relationship between fossils). — Neff & Simpson 1981: 99–102 (morphology of adult). — Gottsberger & Silberbauer-Gottsberger, 1988: 305 (floral record). — Mateus 1998: 20, 31, 42, 67, 107, 124–125, 139, 142 (floral records, bionomy). — Pedro & Camargo 1999: 200 (catalogue). — Gaglianone 2001: 24–27, 42–45, 47, 49, 52–53, 60, 63, 65, 67, 132, 144, 150, 186 (bionomy, floral records, morphology of adult, distribution); 2003: 282 (floral records, bionomy). — Almeida 2002: 36 (floral record). — Silveira *et al*. 2002: 102 (list, distribution). — Consolaro 2004: 19 (floral record, bionomy). — Anacleto & Marchini 2005: 280 (bionomy). — Andena *et al*. 2005: 61 (floral records); 2012: 1668 (floral records). — Moure *et al*. 2007: 138 (catalogue, distribution). — Vilhena & Augusto 2007: 16, 18–19 (floral record, distribution, bionomy). — Azevedo *et al*. 2008: 144 (list, local records). — Rasmussen & Ascher 2008: 39 (list). — Alves-dos-Santos 2009: 304 (catalogue). — Amorim 2009: 22 (floral record). — Carvalho & Oliveira 2010: 59 (floral record). — Amorim & De Marco 2011: 714 (floral record). — Gaglianone *et al*. 2011: 659 (list, distribution). — Imperatriz-Fonseca *et al*. 2011: 10 (list, floral records). — Menezes 2011: 25–26 (floral record, bionomy). — Martins *et al*. 2012: 31 (list); 2014: 89–92 (terminal taxon in molecular phylogenetic analysis, biogeographical analysis, bionomy). — Vilhena *et al*. 2012: 55 (floral record, bionomy). — Almeida & Laroca 2013: 91–95, 112, 121, 169, 171 (key, catalogue, floral records). — Ferreira 2013: 29 (floral record). — Pinto 2013: 34–35, 37, 52, 61 (floral record, bionomy, distribution). — Martins & Melo 2015: 25, 27 (terminal taxon in molecular phylogenetic analysis). — Lima & Silvestre 2016: 9 (list). — Sá *et al*. 2016: 702–703 (floral record, bionomy). — Sorreque 2016: 21 (bionomy). — Aguiar *et al*. 2017b: 71 (floral record, bionomy). — Sigrist *et al*. 2017: 3 (list).

Centris baccharis – Rasmussen & Ascher 2008: 29 (list).

Diagnoses

Females

Pubescence mostly whitish, mainly on mesosoma and T1; yellow maculae on face distinct and well-developed; malar area sub-rectangular; yellow maculae on T2–T5 relatively elliptical with irregular margins; tegula and wing veins reddish brown.

Males

Pubescence predominantly whitish; maculae well-developed mainly on labrum, supraclypeal and paraocular areas and on lower half of clypeus; maculae on metasomal terga as wide stripes, narrower on T2 medially; tegula and wing veins reddish brown; hind femur robust with whitish hairs. The female of this species resembles *E. iheringi* by the similar yellow maculation on metasoma. However, *E. cockerelli* can be differentiated by having more developed maculae on face, malar area sub-rectangular and by the pubescence of mesosoma predominantly whitish. *Epicharis iheringi* has the maculae on face less developed, malar area reduced and pubescence mostly black. The male of *E. cockerelli* is very similar to *E. duckei*, but in this latter species there is a macula on the posterior margin of mesoscutellum which is absent in *E. cockerelli*.

Type material

Holotype (with the following data label)

BRAZIL • ♀; "Brasil Jundiahy 21.I. [Handwriting] 1899 Schrottky\ *Bacharis dracuncufolia* [Handwriting label]\ *Epicharis cockerelli* ♀ [Handwriting] 1900 Friese det.\ Typus [Orange label]\ HOLÓTIPO [Red label]\ http://coll.mfn-berlin.de/u/58fa4e [Label with QR Code]"; ZMB (studied).

Material examined (n = 39 ♀♀, 29 ♂♂)

BRAZIL – **Bahia** • 1 ♀; "BRA, Bahia, Wenceslau Guimarães; Estação Ecológica; 21 I 2011; Rede Entomológica P. Ferreira Leg.\ *Epicharis cockerelli* Friese, 1900 Det. F. F. de Oliveira & T. Mahlmann, 2012\ Coletada na flor\ 64"; MZUFBA. – **Goiás** • 1 ♀; "BRASIL. GO. Iporá; 07, Novembro. 2004.; Centofante & Martins; DSEC • 1 ♀; "BRASIL. GO. Iporá; 12, Dezembro. 2004; Centofante & Martins"; DSEC. – **Maranhão** • 1 ♀; "Maranhão, São Luís, Alumar; 13/12/2002; Carvalho; 6476"; LEACOL. – **Mato Grosso** • 1 ♀; "BRASIL, Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64"S 57º44'47.00"W; Cerrado Sentido Restrito; Malaise; 24-VII-2017. MLS Almeida.\ 141\ *Epicharis cockerelli* ♀ Det. T. Mahlmann. 2017"; INPA • 5 ♂♂; "BRASIL, Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64"S 57º44'47.00"W; Cerrado Sentido Restrito; Malaise; 24-VII-2017. MLS Almeida.\ *Epicharis cockerelli* ♂ Det. T. Mahlmann. 2017\ 144\ C3, G4, borda; 145\ C3, G4, borda; C4, G1, P 300 Cerrado. Nº503; C4, G3, Pborda Cerrado. Nº 504"; INPA. – **Mato Grosso do Sul** • 1 ♀; "Expansão Min. Corumbaense Morraria; 13618-40338\ Corumbá MS BRASIL; 10/12/2008; F.A. Silveira\ *E*. (*Epicharitides*) *cockerelli* Friese, 1900 F.A. Silveira, det. 2008"; DZMG. – **Minas Gerais** • 1 ♀; "Brazil Estado de Minas Ger.\ Barbacena; 18.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130932"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 18.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130930"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 18.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130926"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 18.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130927"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 18.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130929"; MPEG • 1 ♀; "Belo Horizonte MG BRASIL; 17/01/1996; F.A. Silveira\ Abelhas da Zona Metalúrgica MG Pq. Mangabeiras; 0084-0330\ *Epicharis* (*Epicharitides*) *cockerelli* FRIESE ♀ det. F. Silveira 1996"; DZMG • 1 ♀; "Brasil, MG, Buenópolis Serra do Cabral; 17°54'57.3"S, 44°25'23.7"W; 961m; 16.xii.2012; Em Flor; B.C. Figueredo UFMG IHY 1301524\ *Epicharis* (*Epicharitides*) *cockerelli* (Friese, 1900) ♀ R.B. Martines, det. 2013"; DZMG • 1 ♀; "Brasilândia MG BRASIL; 30/09/96; A.G. Damasceno\ Projeto Abelhas de Brasilândia; *P. emarginatus* 14:00–15:00\ *Epicharis* (*Epicharitides*) *cockerelli* (FRIESE) ♀ F.A. Silveira. Det. 1997"; INPA • 1 ♂; "Brasilândia MG BRASIL; 17/10/96; A.G. Damasceno\ Projeto Abelhas de Brasilândia; *P. emarginatus* 08:00–09:00\ *Epicharis* (*Epicharitides*) *cockerelli* (FRIESE) ♂ F.A. Silveira. Det. 1997"; INPA • 1 ♂; "Brasil, MG, Brumadinho (Casa Branca); 20°04'S 44°02'W; 19/12/2013; E.A.B. Almeida\ RPSP 14.0002\ *Epicharis* (*Epicharitides*) *cockerelli* Friese, 1900 F. Vivallo det. 2014"; RPSP • 1 ♀; "Brasil, MG, Brumadinho Serra da Calçada; 21°06.026'S 43°59.092W; 1450m; 20.12.2013; E. Almeida\ RPSP 14.0017\ *Epicharis* (*Epicharitides*) *cockerelli* Friese, 1900 F. Vivallo det. 2014"; RPSP • 1 ♂; "Brasil, MG, Brumadinho (Casa Branca); 20°04'S 44°02'W; 19/12/2013; E.A.B. Almeida\ *Epicharis* (*Epicharitides*) *cockerelli* Friese 1900 F. Vivallo det. 2014"; RPSP • 1 ♂; "Abelhas Espinhaço Pq. E. do Intendente; 12332 – 36358\ Conceição do Mato Dentro MG BRASIL; 05/11/2005; A.A. Azevedo\ 25\ M"; DZMG • 1 ♂; "Brasil, MG, Corinto Faz. Pau-Ferro; S18°16'29.6", W44°35'21,2"; 551m; 19.10.2013; Flor; F.V. Freitas UFMG IHY 1317064\ *Epicharis* R.B. Martines, det 2013 ♂"; DZMG • 1 ♂; "Brasil, MG, Corinto Faz. Pau-Ferro; S18°16'29.6", W44°35'21,2"; 551m; 19.10.2013; Flor; F.V. Freitas UFMG IHY 1317057\ *Epicharis* R. B. Martines, det 2013 ♂"; DZMG • 1 ♂; "Abelhas-Cerrado Mannesmann Faz. Santa Cruz; 5068–13932\ Felixlândia MG BRASIL; 19/10/1999; A.A. Azevedo"; DZMG • 1 ♀; "Brasil, MG, Francisco Dumont, Serra do Cabral; 17°34'05.2" S, 44°19'28.3" W; 1052m; 21.xii.2012; Em Flor; B.C. Figueredo UFMG IHY 1301564\ *Epicharis* (*Epicharitides*) *cockerelli* (Friese, 1900) ♀ R.B. Martines, det. 2013"; DZMG • 1 ♀; "Olhos D'Agua MG BRASIL; 05/11/1998; F.A. Silveira\ *Epicharis* (*Epicharitides*) *cockerelli* (Fr, 1900) ♀ F.A. Silveira, det. 1999"; DZMG • 1 ♀; "PASSOS – MG Brasil; 20-25 XI-61; Claudionor Elias\ *E*. (*Epicharitides*) *cockerelli* Friese, 1900 Det. Moure, 1992"; RPSP • 1 ♀; "Paraopeba, MG, Brasil; Data 05/11/1986; F.A. Silveira\ *E*. (*Epicharitides*) *cockerelli* Friese, 1900 Pe. J. S. Moure DET/87"; DZMG • 1 ♀; "Sabará MG BRASIL; 14/01/1996; F.A. Silveira\ Abelhas da Zona Metalúrgica MG Clube A. Scharlé; 0057-0216\ *Epicharis* (*Epicharitides*) *cockerelli* FRIESE det. F. Silveira 1996"; DZMG • 1 ♀; "São Roque de

Minas MG. Brasil. SF.; 23 46°25'W, 20°15'S\ Cerrado.; 12,13/01/1992; Alt. 850. 1000m; Moure, Camargo, Serguei, Pedro, Leg\ 920615"; RPSP • 1 ♀; "Serra do Salitre MG; 01/2001; AJC AGUIAR\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN N° 25115"; CEPANN • 1 ♀; "Três Marias MG BRASIL; 09/11/1996; D.A. Yanega\ Est. Pirapitinga; 2971–8798\ ex *Qualea parviflora*\ *Epicharis* (*Epicharitides*) *cockerelli* (Fr, 1900) ♀ F.A. Silveira, det. 1999"; DZMG • 1 ♀; "BRAZIL Minas Gerais Est. Ecol. De Pirapitinga Lagoa Três Marias; 18°22'S, 45°19'W; 560m; 8-XI-1996; D. Yanega\ ex *Qualea parviflora*\ *Epicharis* sp. ♀ Det. A.H. Smith-Pardo\ *Epicharis* (*Epicharitides*) det. J.S. Ascher 2004\ *Epicharis* (*Epicharitides*) *cockerelli* Friese, 1901 F. Vivallo Det. 2017"; AMNH. – **São Paulo** • 1 ♀; "Araraquara; 22. 24. Marz 2; A. Seitz leg.\ ♀ *Epicharis cockerelli* Friese det. J.D. Alfken 1928\ Slg. Alfken"; ZMB • 1 ♀; "CAJURU.SP.Brasil; 29-1-88; Mazucato 880318\ *E.* (*Epicharitides*) *cockerelli* Friese, 1900 Det. Moure, 1992"; RPSP • 1 ♀; "Itirapina/SP Brasil; 7.XI.2007; fragmento Botelho Leg. I. Alves dos Santos\ em *Paulicourea rigida*\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN 39495"; CEPANN • 1 ♂; "Itirapina/SP Brasil; 7.XI.2007; fragmento Botelho Leg. I. Alves dos Santos\ em *Paulicourea rigida*\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN 39497"; CEPANN • 1 ♂; "Itirapina/SP Brasil; 7.XI.2007; fragmento Botelho Leg. I. Alves dos Santos\ em *Paulicourea rigida*\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN 39498"; CEPANN • 1 ♀; "Itirapina/SP Brasil; 7.XI.2007; Leg. C.E. Pinto da Silva\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN 39496"; CEPANN • 1 ♀; "Estação Ecol. De Jataí Luís Antônio/SP Brasil; 30.IV.1996; Leg. C. Pinheiro-Machado\ AT 735\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT735; CEPANN N° 36726"; CEPANN • 1 ♀; "Brasil, SP, Luis Antônio E.E. Jatai; 28.X.1998; M.C. Gaglianone leg.\ Em *Memora peregrine* (Miers) Sand w. Bignoniaceae"; RPSP • 1 ♀; "Brasil, SP, Luiz Antônio, E.E. Jatai; 21°33'18" S 47°42'16" W; 17.XII.1998; M.C. Gaglianone leg. Em *Byrsonima intermedia*"; RPSP • 1 ♀; "Brasil Jundiahy; 12–1902\ *Epicharis cockerelli* ♀1900 Friese det.\ Coleção Ducke\ MPEG-HYM 11130924"; MPEG • 1 ♂; "região de Luis Antônio/SP Brasil; 1996; Leg. C. Pinheiro-Machado\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT 677\ AT677; CEPANN N° 35561"; CEPANN • 1 ♀; "Fragmento "Limoeiro" Luis Antônio/SP Brasil; 30.X.1996; Leg. C. Pinheiro-Machado\ AT 3291\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT3291; CEPANN N° 36723"; CEPANN • 1 ♀; "região de Luis Antônio/ SP Brasil; 1996; Leg. C. Pinheiro-Machado\ AT 752\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT752; CEPANN N° 36716"; CEPANN • 1 ♂; "Itanhangá Ribeirão Preto, SP; 12/11/00; Leg. I. Alves dos Santos\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN 39291"; CEPANN • 1 ♀; "Rio Claro; 1962\ Rio Claro SP-Brasil; 1962\ *Epicharis cockerelli* ♀\ *Epicharis* (*Epicharitides*) cfr. *cockerelli* Fr. Det. Camargo 1973\ *E.cockerelli* ♀"; RPSP • 1 ♀; "Fragmento "Posto" Sta. Rita do P. Quatro/SP Brasil; 30.XI.1996; Leg. C. Pinheiro-Machado\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT 4474\ AT4474; CEPANN N° 36717"; CEPANN • 1 ♀; "Fragmento "Posto" Sta. Rita do P. Quatro/SP Brasil; 18.XI.1996; Leg. C. Pinheiro-Machado\ P.nor.t 96023\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT4473; CEPANN N° 36721"; CEPANN • 1 ♀; "Fragmento "Posto" Sta. Rita do P. Quatro/SP Brasil; 15. XII.1995; Leg. Pinheiro-Machado\ AT 742\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT742; CEPANN N°35564"; CEPANN • 1 ♀; "Pq. Est. de Vassununga Sta. Rita do P. Quatro/SP Brasil; 20.XII.1995; Leg. C. Pinheiro-Machado\ AT 659\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT659; CEPANN N° 36719"; CEPANN • 1 ♀; "Pq. Est. de Vassununga Sta. Rita do P. Quatro/SP Brasil; 15.XI.1996; Leg. C. Pinheiro-Machado\ X69 GnovI\ *Epicharis* (*E.*) *cockerelli* Friese 1900 Moure det. 1997\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ AT3454; CEPANN N° 36727"; CEPANN • 1 ♂; "IBUSP, São Paulo, SP IBUSP Brasil; 27 11 1985; Col: Darakjian, A B/ 10:00/P31\ ♂\ *Epicharis* (*E.*) *cockerelli* Friese 1900 F. Vivallo det. 2008\ CEPANN N° 14000";

CEPANN. – **Without information** • 1 ♀; "735 Michelin-Casc. V6; 09/01/2008; 10:00-11:00; *Byrsonima sericea* Rosa; J.F."; MZUFBA.

Morphology

Female (Fig. 1A–B)

Measurements. Approximate body length: 15.1 (15.2–14.8). Head width: 4.7 (4.8–4.5). Mesosoma width: 5.6 (5.7–5.5). Metasoma width: 5.5 (5.6–5.3). Forewing length: 10.5 (10.7–10.4).

Coloration. Integument predominantly black, except light brown on ventral apically surfaces of F1 and F2–F5, dark reddish brown on mandible and legs. Yellowish maculae as follows: longitudinal line on paraocular area near to the ocular orbit of compound eye, from the alveolar tangent to the lower paraocular area, broader on lower area; small spot on apex of ventral surface of scape and on supraclypeal area; longitudinal line along the clypeal disc; on basal half of labrum, emarginated medially; a faint spot on malar area and anterior basal margin of mandible; small spot at base of dorsal surface of fore tibia; a weak spot on anterior margin of tegula; an irregular stripe on lateral sides of T1 that extends towards the disc interrupted medially; an elliptical and irregular shape on lateral sides of T2–T5, longer than wide

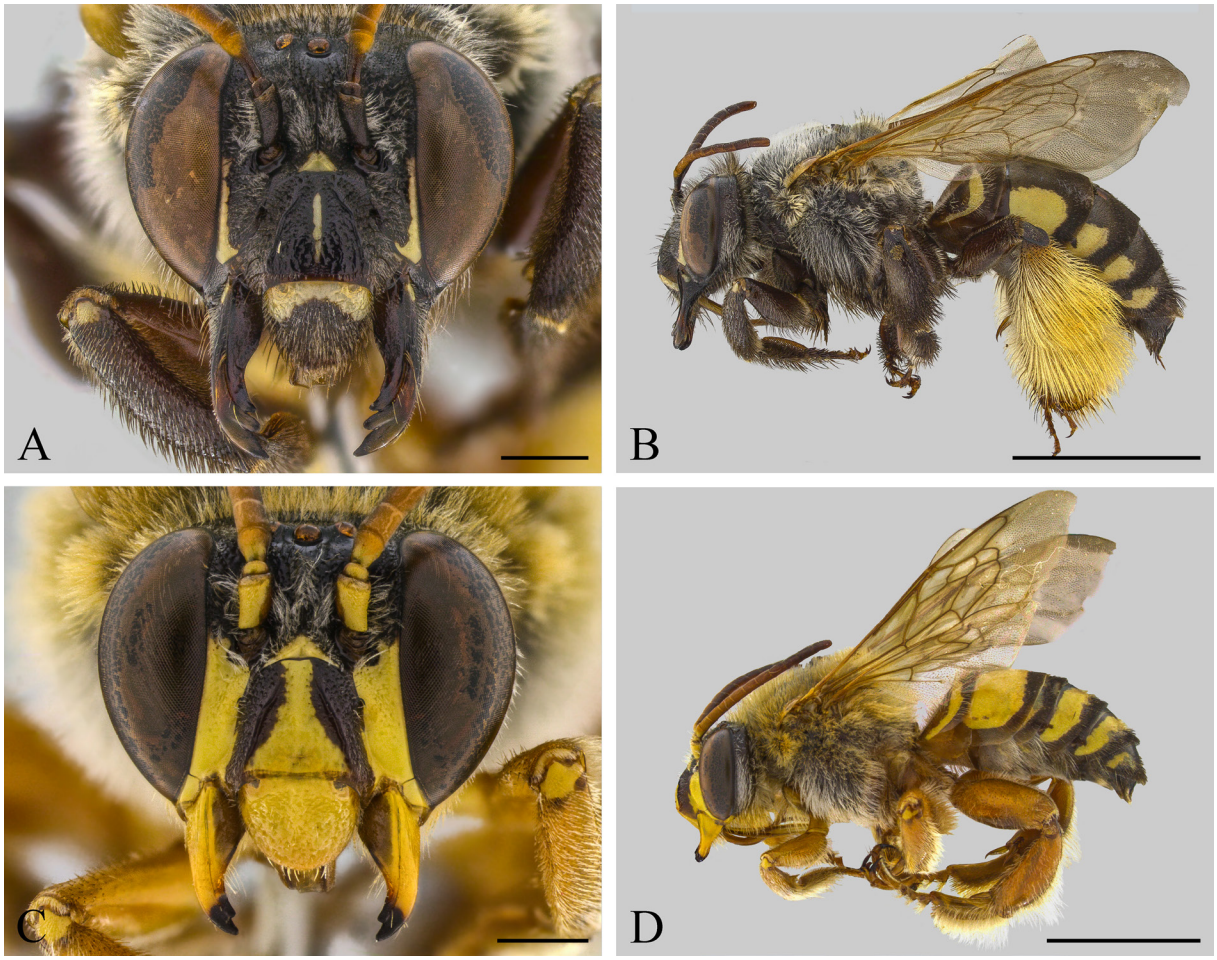

Fig. 1. *Epicharis* (*Epicharitides*) *cockerelli* Friese, 1900. **A–B**. Female (Brazil: Passos; DZMG). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: Passos; DZMG). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

on T2 and wider than long on T3–T5, interrupted basally; an elliptical shape on lateroanterior margins of S2–S5. Tegula reddish brown. Wings translucent with veins reddish brown. Tarsi reddish brown.

Pubescence. Mostly whitish. Hairs dark brown to black on clypeal disc, labrum basally, lower margin of mandible, ventral area of mesosoma, dorsal surface of fore and middle legs, and on discs of T2–T6. Black and whitish hairs intermixed giving a grayish aspect on lower gena, paraocular area, vertex and towards distal margins of S3–S6. Ferruginous on ventral surface of hind tibia and basitarsus. Long, decumbent and simple hairs (3–6 × OD) towards lateral margins of clypeus, lower paraocular area, apical area of labrum, apex of acetabular sulcus, lower margin of mandible and lower gena. Frons, paraocular area and vertex with long, scattered simple hairs (3–5 × OD) with short, dense and plumose hairs intermixed (3–1 × OD). Gena and occipital area with short, dense and plumose hairs, denser towards lower area. Long, dense and plumose hairs on mesosoma (3–4 × OD), sparser and shorter on pronotum and longer on mesepisternum. Ventral surface with long, coarse and simple hairs mainly on coxae. Disc of T1 with long, scattered and plumose hairs (3–4 × OD). T2 and T3 covered with short, appressed pubescence; preapical margins of T4 and T5 with long, decumbent and simple hairs (3–6 × OD). Median distal margin of T5 with plumose hairs. Long, decumbent, dense and simple hairs mostly on apical margins of sterna (4–6 × OD), denser on lateral sides.

Sculpture surface. Areolate on clypeal disc and apical area of labrum. Fine and uniform punctation on vertex (1–2 × puncture width), denser and coarser on frons and paraocular area. Fine and scattered punctures on upper gena (2–4 × puncture width), denser on lower gena and occipital area near to occipital carina. Mesosoma with fine and uniform punctation (2–3 × puncture width), denser towards axila and tegula. Weakly imbricate on metasoma and smooth on preapical areas of T4 and T5.

Structures. Head slightly broader than long (1.1–1: 1). Ratio of upper and lower interocular distances: 0.8–0.9: 1. Maximum interocular distance shorter than length of compound eye (0.6–0.8: 1). Clypeus broader than long (1.4–1.3: 1) with length almost equal to clypeocellar distance (1.05–1: 1). Labrum slightly longer than broad (1.1: 1). Interalveolar distance longer than alveolorbital distance (2.1–1.9: 1). Interalveolar distance shorter than alveolocellar distance (0.6–0.7: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance slightly longer than ocellocular distance (1.05: 1). Frontal carina extending from alveolar tangent (2.6–2.4 × OD). Length of F1 longer than the summed length of F2 and F3, and shorter than length of F2–F4 (0.8–0.7: 0.6–0.7: 0.9–1). Vertex at the same level of the upper supraorbital tangent. Clypeal disc with conspicuous carinae and epistomal suture poorly defined. Mesoscutellum rounded in lateral view.

Variation. Some specimens from Corumbá, Mato Grosso State and Araraquara, São Paulo State have the whitish pubescence more developed on middle and hind femur, and at lateral sides of metasoma; macula on apex of fore tibia absent; ferruginous hairs surrounding tegula and hypoepimeral lobe; tegula dark yellow to reddish brown (as in the holotype). A specimen from Mato Grosso State, Brazil, was identified as belonging to this species because it has all the features cited above, however, it also has a faint macula on lateral sides of mesoscutellum, not observed in other specimens studied.

Male (Fig. 1C–D)

As the female, except as follows:

Measurements. Approximate body length: 14.7 (14.9–14.5). Head width: 4.5 (4.6–4.3). Mesosoma width: 5.4 (5.7–5.3). Metasoma width: 5.5 (5.7–5.4). Forewing length: 10.4 (10.4–10.2).

Coloration. Legs, lateral sides of T1 and S1 reddish brown. Yellow maculae as follows: on paraocular area from alveolar tangent to lower paraocular area; at ventral surface of scape, pedicel and basal half of F1, an irregular triangle on clypeal disc that extends from lower to upper margin and on corners of lateral

sides; on supraclypeal and malar areas; at labrum, and on most of mandible except apex. Irregular spot on basal dorsal surface of fore and middle tibia, most of fore and middle coxae and trochanters; wide irregular stripes on T1–T6, narrower medially; irregular spot on lateral sides of S2–S6.

Pubescence. Predominantly yellowish on occipital area, lower gena and dorsal surface of mesosoma. Mostly whitish on lateral sides of mesosoma and metasoma ventrally, and legs.

Surface sculpture. Clypeal disc weakly areolate. Coarser punctation on upper paraocular area and frons. Punctation on dorsum of mesosoma finer and sparser (2–5 × puncture width).

Structures. Head broader than long (1.2–1.1: 1). Ratio of upper and lower interocular distances: 0.8–0.9: 1. Maximum interocular distance shorter than length of compound eye (0.7–0.8: 1). Clypeus broader than long (2.3–2.1: 1) with length shorter than clypeocellar distance (0.8: 1). Labrum as long as width (1: 1). Interalveolar distance longer than alveolorbital distance (1.5–1.4: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.2–1.1: 1). Frontal carina extending from alveolar tangent to near median ocellus (1.6–1.5 × OD). Length of F1 shorter than F2 (0.8: 1), F2 slightly shorter than F3 (0.9: 1) and F3 with the same length of F4 (1: 1), (0.6–0.7: 0.8–0.9: 1). Clypeal carinae well-defined. Epistomal suture inconspicuous. Malar area sub-rectangular. Apical tooth about twice as long as preapical tooth. Middle trochanter conical. Hind femur and tibia robust. Anterior and posterior surfaces of hind basitarsus curved.

Variation. Most variation is related to the configuration of the yellow maculae: on most part of the clypeal disc or restricted to basal half; on entire dorsal surface of mandible or except at apex; spot on apex of fore and middle tibiae faint or nearly absent; maculae on dorsal surface of middle coxa, distitarsus and claws. These variations are more evident in some specimens from Mato Grosso do Sul and São Paulo States.

Type locality

BRAZIL: São Paulo: Jundiaí.

Distribution (Fig. 10)

BRAZIL: Maranhão: São Luís*. **Rondônia:** Vilhena (Gaglianone 2001). **Mato Grosso:** Chapada dos Guimarães (Gaglianone 2001), Cáceres*, Tangará da Serra*. **Bahia:** Parque Nacional Chapada Diamantina (Aguiar *et al*. 2017b), Palmeiras (Aguiar *et al*. 2017b, 2018), Rio de Contas*, Wenceslau Guimarães*. **Goiás:** Iporá*, Catalão (Sá *et al*. 2016). **Distrito Federal:** Brasília (Oliveira & Gibbs 2000; Cappellari 2011). **Minas Gerais:** Brasilândia de Minas*, Curral de Dentro (Azevedo *et al*. 2008), Francisco Dumont*, Olhos-d'Água*, Buenópolis*, Corinto*, Três Marias*, Diamantina (Azevedo *et al*. 2008), Felixlândia*, Uberlândia (Consolaro 2004; Vilhena & Augusto 2007; Carvalho & Oliveira 2010; Cardoso *et al*. 2017; Vilhena *et al*. 2012), Serra do Salitre*, Conceição do Mato Dentro*, Paraopeba*, Ibiá (Gaglianone 2001), Lagõa Santa (Schrottky 1902b), Uberaba (Gaglianone 2001), Tapira (Gaglianone 2001), São Roque de Minas (Gaglianone 2001), Belo Horizonte*, Sabará*, Parque Estadual da Serra do Rola-Moça (Azevedo *et al*. 2008; Martins *et al*. 2012). Brumadinho*, Passos (Gaglianone 2001), Jacuí (Gaglianone 2001), Barbacena*, Varginha (Gaglianone 2001), Poços de Caldas (Gaglianone 2001). **Mato Grosso do Sul:** Corumbá*, Campo Grande (Oliveira *et al*. 2007), Dourados (Lima & Silvestre 2016). **Rio de Janeiro:** Reserva Biológica União (Menezes 2011). **São Paulo:** Pedregulho (Gaglianone 2001; Gaglianone *et al*. 2011), Patrocínio Paulista (Gaglianone 2001; Gaglianone *et al*. 2011), Batatais (Gaglianone 2001; Gaglianone *et al*. 2011), Ribeirão Preto (Gaglianone *et al*. 2011), Cajuru (Pedro 1994; Gaglianone 2001; Gaglianone *et al*. 2011), Luiz Antônio (Mateus 1998; Gaglianone 2001; Gaglianone *et al*. 2011), Santa Rita do Passa Quatro (Pinto 2013), Parque Estadual Vassununga (Andena *et al*. 2012), Araraquara*, Pirassununga (Almeida 2002; Anacleto & Marchini 2005), Corumbataí (Andena *et al*. 2005), Itirapina (Gaglianone *et al*. 2011; Pinto 2013), Rio Claro (Kerr & Cunha 1976; Gaglianone 2001;

Gaglianone *et al*. 2011), Botucatu (Gottsberger 1986; Gottsberger & Silberbauer-Gottsberger 1988), Campinas (Schrottky 1902a), Jataí (Mateus 1998; Gaglianone 2003; Pinto 2013), Jundiaí (Friese 1900; Friese 1901; Schrottky 1902a), São Paulo (Moure 1945b), Ipiranga (Schrottky 1902a), São Sebastião (Gaglianone 2001; Gaglianone *et al*. 2011). **Paraná:** Tuneiras do Oeste (Sorreque 2016), Jaguariaíva (Almeida & Laroca 2013). **BOLIVIA: La Paz:** Yungas*.

Comments

Epicharis cockerelli is the species of the subgenus most commonly found in collections. It also has the highest number of floral records, probably due to its easy identification or by its polylectic behavior (See table 1). It occurs mainly in southeastern Brazil, with records in the States of Minas Gerais and São Paulo. Its northernmost record is in Bahia State (Silveira *et al*. 2002). However, our results suggest a wider distribution, which extends to the northwest (São Luís, Maranhão State) and to the west with several records in the Brazilian States of Mato Grosso and Rondônia, and in the city of La Paz, Bolivia.

Epicharis* (*Epicharitides*) *duckei Friese, 1901
Figs 2, 10

Centris (*Epicharis*) *duckei* Friese, 1901: 345–346 (original description, floral record).

Centris (*Epicharis*) *duckei* – Ducke 1901a: 30 (floral record); 1901b: 49, 56 (floral record, distribution); 1902a: 324 (floral record); 1902b: 363 (catalogue). — Rasmussen & Ascher 2008: 45 (list).

Epicharis duckei – Cockerell 1922: 549 (descriptive note). — Pereira *et al*. 2014: 34 (floral record, capture method).

Epicharitides duckei – Moure 1945a: 312 (new combination, comparative note with *Epicharitides cockerelli* (= *Epicharis cockerelli*)); 1945b: 399–400 (key).

Epicharis (*Epicharitides*) *duckei* – Moure & Seabra 1959: 125 (comparative note with *E. rufescens*). — Gaglianone 2001: 186 (distribution, floral records). — Silveira *et al*. 2002: 102 (list, distribution). — Moure *et al*. 2007: 138–139 (catalogue, distribution).

Diagnoses

Females

Pubescence predominantly whitish on gena, mesepisternum and propodeum; black and whitish hairs intermixed giving a grayish aspect on vertex and dorsal surface of mesosoma; maculae on face, pronotum, tegula, mesoscutellum and metasomal terga well-developed; macula on posterior margin of mesoscutellum as a longitudinal irregular stripe; metasomal terga with maculae as longitudinal stripes throughout disc, on T2 restricted to lateral sides and interrupted medially; malar area sub-rectangular; tegula and wing veins reddish brown.

Males

Vertex and mesosoma mostly yellowish, dorsal surface of mesosoma and metasoma with whitish hairs; black hairs almost absent; maculae with similar configuration than those on female but more developed, especially on face and metasoma; hind femur robust and covered by whitish hairs. The female of this species shares with *E. lia* sp. nov. and *E. rufescens* the yellow macula on the posterior margin of mesoscutellum. However, it can be identified by the whitish pubescence on mesosoma and by the maculae on discs of T3–T5 as longitudinal stripes (grayish appearance on mesosoma and maculae on metasoma restricted to lateral sides in *E. lia* and pubescence predominantly orange-testaceous on mesosoma and without maculae on metasoma in *E. rufescens*).

Type material

The original description of this species was based on a series collected in the Brazilian State of Pará during different months of the year 1900. Here is designated the lectotype.

Lectotype (with the following data label)
BRAZIL • ♀; "Brasil Para 22.3. [Handwritten] 1900 Ducke\ *Epicharis duckei* ♀ [Handwritten] 1900 Friese det.\ Coll. Friese"; ZMB.

Paralectotypes
BRAZIL • 1 ♀; "Pará, 3.10.99, Ducke [Handwritten]\ 31619\ *Centris* (*Epicharis*) *duckei* Friese ♀, det. A. Duckei 1907 [Handwritten];" ZMB • 1 ♂; "Brasil Para 13.4. [Handwritten] 1900 Ducke\ Coll. Friese\ *Epicharis duckei* ♂ ? [Handwritten] 1900 Friese det."; ZMB.

Material examined (n = 7 ♀♀, 4 ♂♂)

BRAZIL – **Amazonas** • 1 ♀; "BRASIL AM QUERARI São Gabriel da Cachoeira 2ª Pel. Esp. De Fronteira 01º05'N/ 69º51'W 05-04/27/05 /1993 Vidal, J. Ferreira, RLM col.\ *Epicharis* (*Epicharitides*) sp.? Det. T. Mahlmann, 2016\ Malaise"; INPA • 1 ♀; "Brazil Estado do Amazonas\ Coleção Ducke\ Teffé 27.9.1904 Ducke\ MPEG-HYM 11130936"; MPEG. – **Mato Grosso** • 1 ♀; "BRASIL: Mato Grosso. Nova Maringá; Faz. J.A; 13º08'43"S. 57º04'46"W; Floresta. Malaise; 22-XII-2017; Ferreira, JVA.\ *Epicharis cockerelli*\ G16NAT Ferreira_2282"; INPA • 1 ♀; "BRASIL Mato Grosso, Nova Mutum, Fazenda Buriti; 13°49' S, 56°04' W; Estrada da Roda D'agua; 7/XII/1997; H. Mendes leg.\ *Epicharis duckei* Friese, 1900 det. Gaglianone, 2000\ 980016"; CEPANN. – **Minas Gerais** • 1 ♂; "Lagoa santa.\ *Epicharis duckei* Fr. ♂ 1909 Friese det.\ Am. Mus. Nat. Hist. Dept. Invert. Zool. No. 28251\ AMNH_ENT AMNH_BEE 00014614"; AMNH. – **Pará** • 1 ♀; "Brasil Para; 28.2.1902; Ducke\ Coleção Ducke\ MPEG-HYM 11130939"; MPEG •1 ♀; "Brasil Para; 28.2.1902; Ducke\ Coleção Ducke\ MPEG-HYM 11130934"; MPEG • 1 ♀; "Brasil Para; 2. 1902; Ducke\ *Epicharis duckei* ♀ 1909 Friese det.\ Am. Mus. Nat. Hist. Dept. Invert. Zool. No. 26409\ *Epicharitides duckei* (Friese)\ AMNH_ENT AMNH_BEE 00014613"; AMNH • 1 ♀; "Pará; 3.10.99; Ducke\ 31619\ *Centris* (*Epicharis*) *duckei* det. A. Ducke 1907"; ZMB • 1 ♂; "Belém Utinga; 27.I.1979\ Brasil PA A F Ramos\ MPEG-HYM 11130938"; MPEG • 1 ♂; "Nord-Brasilien Para Soure Marajo; O. Bertram S. V.\ *Epicharis duckei* Friese ♂"; ZMB • 1 ♂; "Brasil Para; 13. 4. 1900; Ducke\ *Epicharis duckei*? ♂ 1900 Friese det. F.\ Coll. Friese"; ZMB.

COLOMBIA – **Meta** • "Meta Dep Sierra la Macarena; 7.X.1986; col. BONILLA\ *Epicharis* D. Guevara Ene 2018\ 2994\ LABUN 007973"; LABUN.

Morphology

Female (Fig. 2A–B)
Measurements. Approximate body length: 14.5 (14.3–14.7). Head width: 4.4 (4.3–4.4). Mesosoma width: 5.3 (5.1–5.3). Metasoma width: 5.1 (5–5.3). Forewing length: 10.1 (9.9–10.2).

Coloration. Integument mostly dark brown to black, lighter on legs, lateral sides of T1 and S1. Ventral surface of flagellomeres except basal half of F1 reddish brown. Maculation as follows: longitudinal stripe on paraocular area close to the margin of the compound eyes, from alveolar tangent to lower paraocular area, wider on lower area; irregular spot at the apex of the ventral surface of scape and on supraclypeal area; weak on basal margin and lateral sides of clypeus; at basal half of labrum, emarginated on medial area; most of malar area; dorsal surface of mandible except apex; an irregular stripe close to dorsolateral angles of pronotum; concave shape on anterior margin of tegula; a small spot at the base of the dorsal surface of fore tibia; a transversal curved stripe restricted to posterior margin of mesoscutellum; an irregular stripe throughout T1 and T3–T5, narrower medially; a sub-rectangular shape on lateral sides of T2, extending finely towards disc. Tegula reddish brown. Wings translucent with veins dark brown. Tarsi brown.

Pubescence. Predominantly whitish. Black and whitish hairs intermixed giving a grayish appearance on vertex, near to occipital carina, dorsal surfaces of mesosoma and on fore and middle tibiae. Ferruginous to dark brown hairs on ventral surface of hind tibia and basitarsus, and on distal segments of metasoma. Basal half of labrum, lower margin of mandible and lateral sides of clypeus with long, decumbent, sparse and simple hairs (2–5 × OD), denser and shorter on apex. Dense and plumose hairs on paraocular area, longer on vertex, occipital area and lower gena (2–4 × OD). Appressed pubescence on lower gena near to compound eyes. Mesosoma with dense, uniform and plumose hairs (2–4 × OD), shorter and scattered (almost absent) on dorsum of pronotum, denser on hypoepimeral lobe and longer hairs on mesepisternum and metepisternum. Ventral surface of mesepisternum with long, dense, coarse and simple hairs. Anterior surface and disc of T1 with plumose hairs similar to those on dorsum of mesosoma. Short and appressed pubescence on discs of T2–T5, glabrous on distal margins of T2 and T3, and distal halves of T4 and T5. Long, decumbent, sparse and simple hairs on lateral sides of T3 and T4, and on preapical margin of T5 (3–5 × OD), being longer progressively towards apical segments. Distal margin of T5 with short, tomentose and plumose hairs. Distal margins of S2–S5 with long, dense and simple hairs (2–5 × OD), longer medially and towards apex.

Surface sculpture. Labrum and clypeal disc weakly areolate, more conspicuous on apical area of labrum and lateral sides of clypeus. Fine and scattered punctation on paraocular area, vertex and upper gena (2–4 × puncture width), denser on occipital area close to occipital carina and lower gena. Mesosoma with fine and uniform punctation (2–4 × puncture width), denser on metepisternum and sparser, almost absent on dorsum of pronotum. Metasoma weakly imbricate with large impunctate areas on distal margins of T2–T4 and distal half of T5. Punctation on sterna barely noticeable.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.8: 1. Maximum interocular distance shorter than length of compound eye (0.7: 1). Clypeus broader than long (1.4: 1) with length almost equal to clypeocellar distance (1.1: 1). Labrum slightly longer than broad (1.1: 1). Interalveolar distance longer than alveolorbital distance (2.2: 1). Interalveolar distance shorter than alveolocellar distance (0.5: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.1: 1). Frontal carina extending from alveolar tangent to near median ocellus (1.8 × OD). Length of F1 longer than the sum of F2 and F3, and slightly shorter than the length of F2–F4 (0.8: 0.6: 1). Vertex at the same level of the upper supraorbital tangent. Carinae of clypeal disc well-defined. Epistomal suture inconspicuous. Mesoscutellum rounded in lateral view.

Variation. The integument of legs varies from dark to light brown. A variation in the yellow macula on the posterior margin of the mesoscutellum was also observed. In some specimens from Amazonas State, the macula extends to the middle of the disc, while in others it is much narrower. An unusual Colombian specimen of this species has the maculae of the face obscured and the macula of the mesoscutellum orange. We consider that this is due to its state of preservation.

Male (Fig. 2C–2D)

As the female, except as follows:

Measurements. Approximate body length: 14.3. Head width: 4.2. Mesosoma width: 5.3. Metasoma width: 5.0. Forewing length: 10.5.

Coloration. Legs and metasoma light reddish brown. Yellow maculae as follows: paraocular area, from alveolar tangent to lower paraocular area; ventral surface of scape, pedicel, and basal half of F1; irregular triangle on lower margin of the clypeal disc, finely prolonged towards upper margin and on corner of lateral sides; supraclypeal area and labrum; at malar area; on most of mandible except apex; a faint spot on basal margin of fore tibia; a transversal curved stripe restricted to posterior margin of mesoscutellum; an irregular stripe throughout T1; wide stripe basally on T2–T6, narrower on medial area of disc; an irregular spot on lateral sides of S2–S6.

Pubescence. Largely yellowish on occipital area, lower gena and dorsum of mesosoma and metasoma. Whitish hairs on upper gena, legs, propodeum and on ventral surfaces of mesosoma and metasoma. Occipital area and mesosoma with denser and longer pubescence (2–5 × OD). Distal margins of T3–T6 with dense, short and simple hairs (1–3 × OD), being progressively longer towards distal segments. Simple hairs on lateral margins of S2–S6 shorter and sparser (1–3 × OD).

Surface sculpture. Punctation on upper paraocular area, frons and vertex coarser and denser (0.5–2 × punctation width).

Structures. Head slightly broader than long (1.1: 1). Ratio of upper and lower interocular distances: 0.7: 1. Maximum interocular distance shorter than length of the compound eye (0.6: 1). Clypeus broader than long (1.5: 1) with length equal to clypeocellar distance (1: 1). Labrum as long as wide (1: 1). Interalveolar distance longer than alveolorbital distance (2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.6: 1). Lateral ocelli below the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.1: 1). Frontal carina extending from tip of supraclypeal carina (1.9 × OD). Length of F1 shorter than F2 (0.9: 1), F2 shorter than F3 (0.8: 1) and F3 shorter than F4 (0.9: 1), (0.7: 0.8: 0.9: 1). Clypeal carinae conspicuous. Epistomal suture barely evident. Malar area

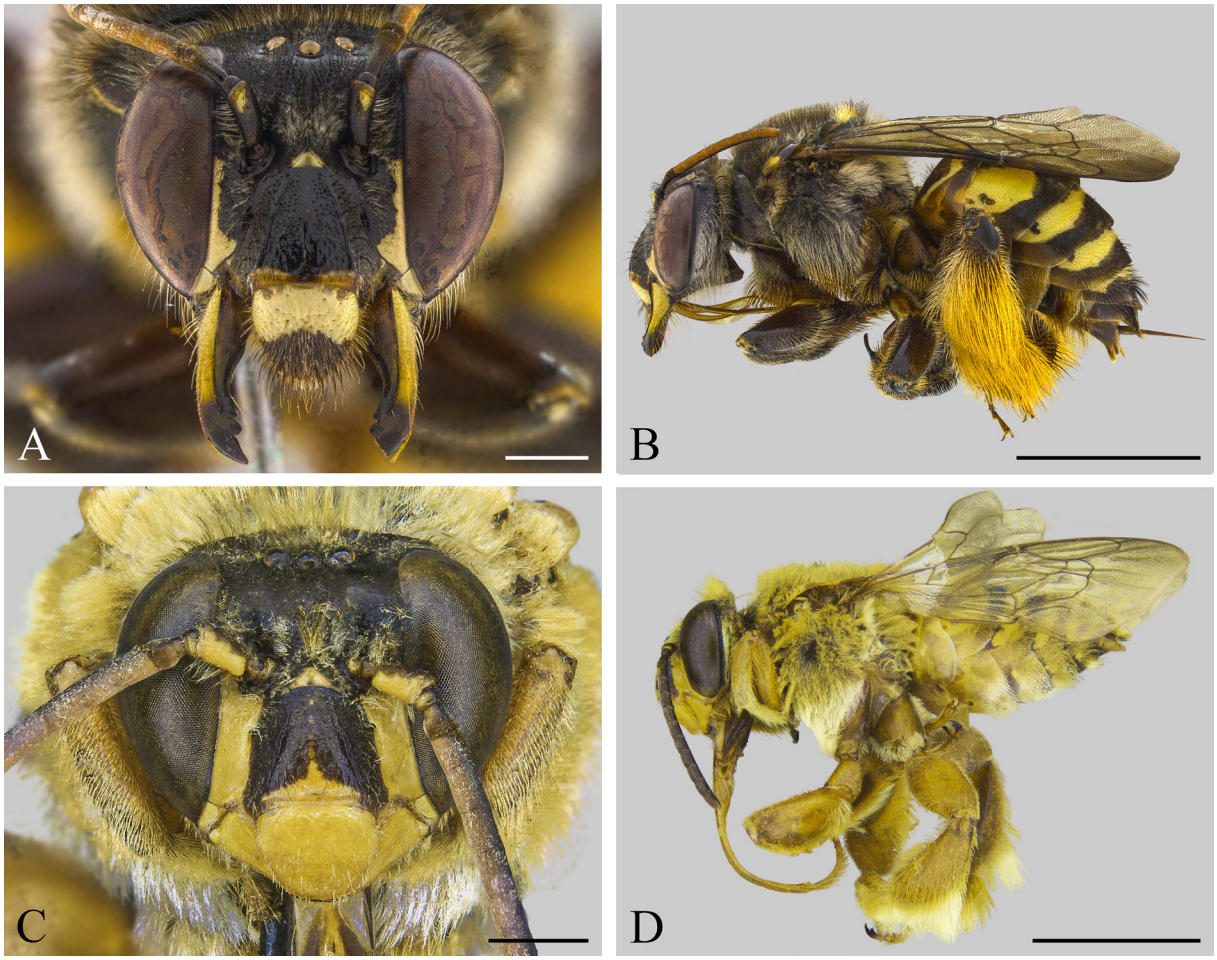

Fig. 2. *Epicharis* (*Epicharitides*) *duckei* Friese, 1901. **A–B**. Female (Brazil: Nova Mutum; INPA). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: Belém; MPEG). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

sub-rectangular. Apical tooth about twice as long as preapical tooth. Middle trochanter conical. Hind femur and tibia robust. Anterior and posterior surfaces of hind basitarsus biconcave.

Type locality

BRAZIL: Pará State.

Distribution (Fig. 10)

COLOMBIA: Meta: La Macarena*. **BRAZIL: Amazonas:** São Gabriel da Cachoeira*, Tefé*. **Pará:** Soure*, Ilha de Marajó (Gaglianone 2001), Belém (Gaglianone 2001), Tomé Açu (Pereira *et al*. 2014). **Mato Grosso:** Nova Maringá*, Nova Mutum (Gaglianone 2001), Chapada dos Guimarães (Gaglianone 2001). **Minas Gerais:** Lagoa Santa*, Jacuí (Gaglianone 2001).

Comments

Epicharis duckei has been known as a predominantly Amazonian species. Most of the material that we studied, including the lectotype here designated, corresponds to specimens collected by botanist Adolpho Ducke (1876–1959) in the Brazilian states of Amazonas and Pará. In addition to that, new records were compiled in this research, extending northwards to the Colombian Department of Meta and southwards to Minas Gerais State, Brazil.

This study provides the description of the male of this species for the very first time. Although we studied male specimens collected by Ducke and doubtfully identified by Friese as *E. duckei*, their identity was not confirmed with certainty. This may be due to the great similarity between the males of this species and those of *E. cockerelli*, *E. iheringi* and *E. rufescens*.

Epicharis* (*Epicharitides*) *iheringi Friese, 1899
Figs 3, 10

Epicharis iheringi Friese, 1899: 40 (original description).
Epicharis cockerelli var. *fulvohirta* Schrottky, 1902a: 566 (original description).

Epicharis iheringi – Friese 1900: 119 (cited). — Schrottky 1902a: 559–561, 569 (key, morphology). — Fischer & Gordo 1993: 564, 566 (floral record, bionomy). — Pedro 1994: 252 (floral records). — Oliveira & Gibbs 2000: 320 (floral record). — Machado 2004: 269 (floral records). — Barônio & Torezan-Silingardi 2017: 172 (floral record, bionomy).

Centris (*Epicharis*) *iheringi* – Friese 1901: 241, 244–246, 264, (list, key, description, distribution).

Epicharis cockerelli var. *fulvohirta* – Moure 1945a: 312 (synonymy). — Rasmussen *et al*. 2009: 27 (list). — Ramos *et al*. 2015: (catalogue).

Epicharitides iheringi – Moure 1945a: 312 (new combination, synonymy, morphology of adult, comparative note with *Epicharitides cockerelli* and *E. duckei*); 1945b: 399–400 (distribution, synonymy, comparative note with *Epicharitides cockerelli*, key).

Epicharis (*Epicharitides*) *iheringi* – Mateus 1998: 20, 65, 107, 119, 124–125, 139, 142 (floral records, bionomy). — Pedro & Camargo 1999: 200 (catalogue). — Gaglianone 2001: 24–26, 28, 42–44, 47, 52–53, 58–59, 63, 66–68, 123–128, 131, 137–138, 150, 187 (bionomy, floral records, morphology of adult, phylogeny, distribution); 2003: 282 (floral records, bionomy); 2005: 198 (cited). — Silveira *et al*. 2002: 102 (list, distribution). — Andena *et al*. 2005: 84 (list). — Gonçalves & Melo 2005: 566 (floral record, bionomy). — Neves *et al*. 2006: 99 (floral record). — Oliveira *et al*. 2006: 34 (floral record). — Moure *et al*. 2007: 139 (catalogue, distribution). — Azevedo *et al*. 2008: 144 (list, distribution records). — Rasmussen & Ascher 2008: 58 (list). — Alves-dos-Santos 2009: 304 (catalogue). — Carvalho & Oliveira 2010: 59 (floral record). — Vianna 2010: 92 (list). — Gaglianone *et al*. 2011: 659 (list, distribution). — Imperatriz-Fonseca *et al*. 2011: 10 (list, floral

records). — Rabelo *et al*. 2012: 1135 (cited). — Amaral-Neto 2013: 45, 101 (floral records, phenology). — Almeida & Laroca 2013: 91–95, 112, 121, 169, 171–172 (key, catalogue, floral records). — Pinto 2013: 52 (bionomy). — Martins *et al*. 2014: 89–92 (terminal taxon in molecular phylogenetic analysis, biogeographical analysis). — Martins & Melo 2015: 25, 27 (terminal taxon in molecular phylogenetic analysis). — Lima & Silvestre 2016: 9 (checklist). — Sorreque 2016: 21 (bionomy). — Álvarez *et al*. 2019: 2 (gynandromorph).

Diagnoses

Females

The largest bee of the subgenus (14–15 mm); pubescence predominantly dark brown to black with whitish hairs on gena, propodeum and ventral surface of metasoma; distinct maculae on face; malar area reduced; metasomal terga with irregular stripes or elliptical spots on lateral sides; tegula and wing veins reddish brown; hind elaiospathe without hook-shaped hairs.

Males

Pubescence of mesosoma ferruginous to yellowish; whitish hairs on head, legs and dorsal surfaces of mesosoma and metasoma; maculae on face with same configuration than those on females but more developed, mainly on clypeus and ventral surface of scape; malar area reduced; lateral sides of T1 and T2 with maculae as irregular stripes and sub-rectangular spots respectively, the remaining terga with maculae as wide stripes throughout disc; tegula and wing veins reddish brown; hind femur slender; S2–S4 with long and simple hairs curved towards medial area. The males of this species superficially resemble that of *E*. *cockerelli*, *E*. *duckei* and *E*. *rufescens* but they can be distinguished by the shape of the malar area and the hind femur; in *E*. *iheringi* the malar area is reduced and the hind femur is slender, while in the remaining species the malar area is sub-rectangular and the hind femur robust. Furthermore, the long pubescence on S2–S4 is characteristic in the male of this species.

Type material (with the following data label)

Holotype

BRAZIL • ♂; "1578 [Rectangular label]\ St. Paul [Handwriting label]\ *Epicharis iheringi* ♂ [Handwriting] det. Friese 1898; ZMB (studied).

Lectotype of *Epicharis cockerelli fulvohirta* Schrottky, 1902 (here designated, with the following data label)

BRAZIL • 1 ♀; "*Epicharis cockerelli* Fri var *fulvohirta* Schr .17.874 Ypiranga. Ducke rev. 13.\ 17874\ ♀\ 97057"; MZUSP.

Paralectotypes

BRAZIL • 1 ♀; "17.876\ 97061"; MZUSP • 1 ♂; "17.876\ 97045\ ♂"; MZUSP • 1 ♂; "17.876\ 97054\ ♂"; MZUSP.

Material examined (n = 43 ♀♀, 22 ♂♂)

BRAZIL – **Bahia** • 1 ♀; "BRASIL Bahia, Chapada Diamantina, Agropolo-Bagisa-POLINFRUT; Data: 04.04.2011; Coordenadas; Rede entomológica\ Ponto:56 PL:01; Hora: 10:08; Data:04.04.2011; Coletor: Eduardo 1477\ EPICHARIS IHERINGI"; MZUFBA • 1 ♀; "Brasil, Bahia, Chapada Diamantina, Cascavel, Agropolo-Bagisa-POLINFRUT; Data: 06.XI.2011; GPS; Rede entomológica; E.F. Moreira e Equipe leg\ Ponto:77 PL:02; Hora: 13:45; Data:06/XI/2011; Coletor Eduardo\ Eduardo 3262"; MZUFBA • 1 ♀; "Lençois BA BRASIL; 08/01/1997; E.A.B. Almeida"; DZMG • 1 ♀; "Brasil, Bahia, Lençóis; 26.iv.2003; 15:50\ 05106"; MZUFBA • 1 ♀; "Palmeiras BA BRASIL; 24/04/2003; A.A. Azevedo\ Estrada Morro do Pai Inácio Chap. Diamantina; 8646–26239"; DZMG. – **Goiás** • 1 ♀; "Alto Paraíso de Goiás GO BRASIL; 10/04/2007; M.F. Goulart\ Abelhas Altimontanas Par Na Ch dos Veadeiros; 13002–

38482"; DZMG • 1 ♀; "BRASIL. GO. Iporá; 20, Março. 2005; Centofante & Martins"; DSEC • 1 ♀; "BRASIL. GO. Iporá; 24, Outubro. 2004; Centofante & Martins"; DSEC • 1 ♀; "Brasil, GO, Rd. GO; 241.24 km N Cavalcante; 13°36'17" S 47°31'34" W; 1190m; *Vochysia*; 15.ii.2012; E. Almeida & A. Aguiar\ RPSP 12.1654\ VOUCHER # 21 BRASIL–2012\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♂; "BRASIL, GO, MINEIROS PARNA Emas; 18°15'38", 52°53'02"; 11.x.2014; Em flor, D.P. Campos et al.; UFMG IHY 1415182\ *Epicharis* (*Epicharitides*) *cockerelli* ♂ Friese, 1900 J.E. Santos JR, det. 2014"; DZMG. – **Mato Grosso** • 1 ♀; "BRASIL: Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64"S 57º44'47.00"W; Cerrado Sentido Restrito Malaise; 24-VIII-2017; MLS Almeida.\ 142\ *Epicharis iheringi* Det. T. Mahlmann, 2017\ C2, G4, P300, Cerrado"; INPA • 1 ♀; "Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64" S 57º44'47.00"W; Cerrado; Malaise; 29-IX-2017; MLS Almeida\ C4, G3, P150; Cerrado; Nº 466"; INPA • 2 ♀♀; "Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64" S 57º44'47.00"W; Cerrado; Malaise; 27-X-2017; MLS Almeida\ C3, G3, P 150; Cerrado; Nº 257; C4, G3, P 150; Cerrado; Nº 464"; INPA • 1 ♂; "BRASIL: Mato Grosso. Tangará da Serra. Fazenda Aparecida da Serra; 14º18'36.64" S 57º44'47.00"W; Cerrado; Malaise; 29-IX-2017; MLS Almeida\ C3, G3, P150; Cerrado; Nº258"; INPA. – **Minas Gerais** • 1 ♀; "Brazil Estado de Minas Ger.\ Barbacena; 14.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130931"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 12.11.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130925"; MPEG • 1 ♂; "Brazil Estado de Minas Ger.\ Barbacena; 18.12.1905; Ducke\ Coleção Ducke\ MPEG-HYM 11130928"; MPEG • 1 ♀; "Bonfinópolis de Minas; 45°59' W, 16°34' S; Fazenda Assa Peixe\ MG-Brasil; 25.II.2001; M. Mazucato leg.\ RPSP 010529\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♀; "Bonfinópolis de Minas; 45°59' W, 16°34' S; Fazenda Assa Peixe\ MG-Brasil; 25.II.2001; M. Mazucato leg.\ RPSP 010528\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♂; "Bonfinópolis de Minas; 45°59' W, 16°34' S; Fazenda Assa Peixe\ MG-Brasil; 25.II.2001; M. Mazucato leg.\ RPSP 010530\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♂; "Bonfinópolis de Minas; 45°59' W, 16°34' S; Fazenda Assa Peixe\ MG-Brasil; 25.II.2001; M. Mazucato leg.\ RPSP 010527\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♀; "Fazenda Boa Esperança Bonfinópolis de Minas 30 Km NW–MG\ BRASIL; 17.IV.2008; M. Mazucato leg.\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 Det. S.Pedro 2010\ RPSP 09.0964"; RPSP • 1 ♀; "Brasilândia MG BRASIL; 01/10/1996; A.G. Damasceno\ Projeto Abelhas de Brasilândia; *P. emarginatus*; 16:00–17:00\ *Epicharis* (*Epicharitides*) *iheringi* (FRIESE) ♀ F.A. Silveira, det. 1997"; INPA • 1 ♂; "Brasilândia MG BRASIL; 20/09/1996; A.G. Damasceno\ Projeto Abelhas de Brasilândia; *P. emarginatus*; 15:00–16:00\ *Epicharis* (*Epicharitides*) *iheringi* (Friese) ♂ F.A. Silveira, det. 1997"; INPA • 1 ♂; "Brasilândia de Minas MG BRASIL; 24/05/2002; A.A. Azevedo\ Monitor V&M; *Vochysia rufa* Faz.; Brejão 7889–24000"; DZMG • 1 ♀; "Diamantina MG BRASIL; 02/10/2005; M. F. Goulart\ Abelhas Espinhaço Pq. E. Biribiri; 10586–31006"; DZMG • 1 ♀; "Brasil, MG, Francisco Dumont, Serra do Cabral; 17°36'16.0" S, 44°27'05.0" W; 1053m; 20.xii.2012; Em flor, R.M. Carmo; UFMG IHY 1301751\ *Epicharis* (*Epicharitides*) *iheringi* ♀ Friese, 1899 R.B. Martines, det. 2013"; DZMG • 1 ♂; "Itacambira MG BRASIL; 01/10/2005; A.A. Azevedo\ Abelhas Espinhaço; 10538–30694"; DZMG • 1 ♂; "Itaúna MG BRASIL; 27/12/1997; P.E.M. Guimarães\ Morro do Bonfim; 1973–6005\ *Epicharis* (*Epicharitides*) *iheringi* ♂ (Fr. 1899) F.A. Silveira, det 1999"; DZMG • 1 ♂; "Jaboticatubas MG BRASIL; 25/03/1998; D.A. Yanega\ Serra do Cipó; 3009–8892\ *Epicharis* (*Epicharitides*) *iheringi* ♂ (Fr. 1899) F.A. Silveira, det 1999"; DZMG • 1 ♂; "Lassance MG BRASIL; 28/10/2004; A.A. Azevedo\ Abelhas Espinhaço S. do Cabral; 10210–29872"; DZMG • 1 ♀; "Paraopeba, MG, Brasil; Data 11/10/1987; F.A. Silveira\ 528/1413\ *E.* (*Epicharitides*) *iheringi* ♀ Friese, 1989 Pe. J.S. Moure det. 1988"; DZMG • 1 ♀; "RITAPOLIS MG, BRASIL SF; - 23, 44-21d/19-I-1974; M. Mazucato, Velthuis J.M.F. Camargo leg.\ *Epicharis* (*Epicharitides*) *iheringi* (Fr.) Moure det. 86\ *E.* (*Epicharitides*) *iheringi* Friese, 1899 Det. Moure, 1992"; RPSP • 1 ♀; "S. João del Rei MG Brasil SF; 23,44-21c; 26-XII-1974; Welthuis leg\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 Det. Camargo 1989\ *E.* (*Epicharitides*) *iheringi* Friese, 1899 Det. Moure, 1992"; RPSP • 1 ♂; "São Roque de Minas MG Brasil SF.; 25 46°25'

W, 20° 15' S\ Cerrado; 12,13/01/1992; Alt. 850–1000m; Moure, Camargo, Serguei, Pedro Leg\ 920614"; RPSP • 1 ♀; "São Roque de Minas MG BRASIL; 28/03/2007; M.F. Goulart\ Abelhas Altimontanas Par Na S. da Canastra; 12928–38234"; DZMG • 1 ♀; "Santana do Riacho MG BRASIL; 01/06/2003; M.F. Goulart\ *Chamaecrista semaphore* S. do Cipó; 8511–25944"; DZMG • 1 ♀; "Serra do Cipó-MG; 43°, 35' W–19°, 18' S; Brasil; 08.III.1990; Faria–Mazucato\ No 900043; Pl. 064; h. 14:00–16:00\ *E*. (*Epicharitides*) *iheringi* Friese, 1899 Det. Camargo 1990"; RPSP • 1 ♂; "Serra do Cipó-MG; 43°35' W–19°18' S; Brasil; 25.II.1993; Faria, G.M. leg.\ Pl. Malpighiaceae h.\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 Det. Camargo 1993"; RPSP • 1 ♀; "Serra do Cipó-MG; 43°35' W–19°18' S; Brasil; 26.II.1993; Faria, G.M. leg.\ Pl. *Vochysia pygmaea* h.\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 Det. Camargo 1993"; RPSP • 1 ♂; "Serra do Salitre MG BRASIL; 23/10/2009; A.F. Kumagai *et al*.\ RPPN; Cachoeira do Campo; 22062–64966\ *Epicharis* (*Epicharitides*) *iheringi* R.CC Arante"; DZMG • 1 ♀; "Clube Caça e Pesca, Uberlândia, MG Brasil; 18.X.2007; Leg. G.D. Cordeiro\ CEPANN 39494"; CEPANN • 1 ♀; "VARGINHA M. Gerais BRASIL; II-1955; F. M. Oliveira\ *Epicharis iheringi* ♀ Friese\ COLEÇÃO CAMPOS SEABRA"; MNRJ. – **Pará** • 1 ♂; "Brasil Para; 19.4.1900; Ducke\ Coleção Ducke\ MPEG-HYM 11130935"; MPEG. – **São Paulo** • 1 ♀; "Cassia dos Coqueiros SP. Brasil; 08/III/1997; Camargo, Pedro leg.\ 970568\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899 F. Vivallo det. 2014"; RPSP • 1 ♀; "Estação Ecol. De Jataí Luis Antônio/SP Brasil; 25.II.1996; Leg. C. Pinheiro-Machado\ AT751\ AT751; CEPANN N° 35565"; CEPANN • 1 ♂; "Estação Ecol. De Jataí Luis Antônio/ SP Brasil; 17.XI.1996; Leg. C. Pinheiro-Machado\ B53\ 05; 17.11.96\ *Epicharis* (*E*.) *iheringi* Friese, 1899 Moure det. 1997\ *Epicharis* (*E*.) *iheringi* Friese, 1899; F. Vivallo det. 2008\ AT3460; CEPANN N° 38539"; CEPANN • 1 ♂; "Estação Ecol. De Jataí Luis Antônio/SP Brasil; 30.X.1996; Leg. C. Pinheiro-Machado\ AT668\ *Epicharis* (*E*.) *iheringi* Friese, 1899; Moure det. 1997\ *Epicharis* (*E*.) *iheringi* Friese, 1899; F. Vivallo det. 2008\ AT668; CEPANN N° 35597"; CEPANN • 1 ♀; "Brasil, SP, Luis Antônio E.E. Jatai; 28.X.1998; M.C. Gaglianone leg.\ Em *Memora peregrine* (Miers) Sandw.–Bignonaceae"; RPSP • 1 ♀; "Brasil, SP, Luis Antônio E.E. Jatai; 16.I.1998; M.C. Gaglianone leg.\ *Byrsonima intermedia* Adr Juss."; RPSP • 1 ♀; "Brasil Jundiahy; 20.12 1902\ *Epicharis cockerelli* ♀ 1910 Friese det.\ Am. Mus. Nat. Hist. Dept. Invert. Zool. No. 26407\ *Epicharis iheringi* ♀ Det. J. S. Moure 1951\ *Epicharis cockerelli* Friese"; AMNH • 1 ♀; "Brasil 13.5km SW Estreito Rd Antonio Giolo; 20°14'44" S 47° 21'01" W; 990m; 25.i.2012; E. Almeida & E. Alencar, cols\ RPSP12.1681\ *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899; F. Vivallo det. 2014"; RPSP • 1 ♂; "região de Luis Antônio/SP Brasil; 1996; Leg. C. Pinheiro-Machado\ AT 3463\ M\ *Epicharis* (*E*.) *iheringi* Friese, 1899; Moure det. 1997\ *Epicharis* (*E*.) *iheringi* Friese, 1899; F. Vivallo det. 2008\ AT3463; CEPANN N° 35598"; CEPANN • 1 ♀; "região de Luis Antônio/SP Brasil; 1996; Leg. C. Pinheiro-Machado\ AT 3001\ AT3001; CEPANN N° 35572"; CEPANN • 1 ♀; "região de Luis Antônio/SP Brasil; 1996; Leg. C. Pinheiro-Machado\ AT 1217\ AT1217; CEPANN N° 35573"; CEPANN.

PARAGUAY – **Amambay** • 1 ♀; "PARAGUAY: Amambay, Cerro Corá; 350m; 3-10.ii.1990; M. Cooper\ *Epicharis*?\ Cooper coll.; BMNH-ENT-2018-128; NHMUK013621085"; NHMUK. – **San Pedro** • 1 ♀; "PARAG. –CORORO SAN PEDRO RIO YPANE; Fritz–2.79"; AMNH.

Morphology

Female (Fig. 3A–B)

Measurements. Approximate body length: 15.2 (15.4–14.8). Head width: 4.6 (4.7–4.4). Mesosoma width: 5.4 (5.4–5.1). Metasoma width: 5.4 (5.5–5.2). Forewing length: 10.3 (10.3–10.1).

Coloration. Integument dark brown to black, appendages lighter brown. Ventral surface of flagellomeres reddish brown, except F1 basally. Apical flagellomeres lighter. Yellow maculae as follows: longitudinal stripe on paraocular area close to the orbits of compound eyes, through the alveolar tangent and the lower paraocular area; on supraclypeal area; longitudinal stripe on clypeal disc; basal margin of labrum, medially emarginated; irregular spot on basal anterior margin of mandible; faint spot on anterior margin

of tegula; irregular stripe on lateral sides of T1; sub-rectangular spot on lateral sides of T2 and irregular elliptical spot on lateral sides of T3–T5. Tegula, tarsi and wing veins reddish brown.

Pubescence. Largely dark brown to black with whitish hairs on paraocular area, gena, lateral sides of pronotum, propodeum, metepisternum and metasoma ventrally. Ferruginous hairs on apex of labrum, mandible and on ventral surface of hind tibia and basitarsus. Long, coarse, decumbent and simple hairs on labrum, acetabular sulcus, lateral sides of clypeus and paraocular area (2–4 × OD). Dense, plumose and simple hairs intermixed on paraocular area, longer and denser on vertex, occipital area near the carina and lower gena (1–3 × OD). Gena with appressed pubescence nearby the compound eyes. Disc of clypeus and basal margin of labrum glabrous. Metasoma with dense, short and plumose hairs (1–2 × OD), denser on hypoepimeral lobe and scattered on pronotum. Coarse hairs of similar length on ventral surface. Short, sparse and plumose hairs on disc of T1 (1–2 × OD), denser on lateral sides; discs of T2–T5 covered with appressed, short, semi erected and simple hairs (0.5–2 × OD), longer on distal margins of apical terga. Distal margin of T5 glabrous. Distal margins of sterna with decumbent, long, dense and simple hairs, denser on lateral sides.

Sculpture surface. Clypeus and labrum areolate, more conspicuous on lateral sides of clypeus and on lower half of labrum. Coarse and uniform punctation on vertex (1–2 × puncture width), coarser on frons and paraocular area, and denser on occipital area close to the occipital carina. Mesosoma imbricate, weaker on dorsum of pronotum. Terga weakly imbricate, except distal margin of T5 smooth. Sterna with fine and sparse punctures on disc, denser towards distal margins and almost smooth on basal half.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.8–0.9: 1. Maximum interocular distance shorter than length of compound eye (0.7: 1). Clypeus broader than long (1.5–1.4: 1) with length almost equal to clypeocellar distance (1.1: 1). Labrum longer than broad (1.1–1: 1). Interalveolar distance longer than alveolorbital distance (2.3–2.1: 1). Interalveolar distance shorter than alveolocellar distance (0.5–0.7: 1). Lateral ocelli above the upper supraorbital tangent; interocellar distance longer than ocellocular distance (1.4–1.3: 1). Frontal carina extending from tip of the supraclypeal carina to median ocellus (2–1.8 × OD). Length of F1 longer than the sum of F2 and F3 and slightly shorter than the sum of F2–F4 (0.8: 0.7: 1). Vertex below the upper supraorbital tangent. Clypeus with carinae and epistomal suture conspicuous. Mesoscutellum rounded in lateral view.

Variation. In general, the female's features do not show relevant variation. Only a variation in the configuration of the maculae on the face of some specimens from Minas Gerais State was noticed: longitudinal macula through the clypeal disc absent or conspicuous; maculae on paraocular area shorter than level of tentorial pit; macula on labrum restricted to basal margin. Some specimens have the whitish pubescence more developed on the metepisternum and propodeum.

Male (Fig. 3C–D)

As the female, except as follows:

Measurements. Approximate body length: 14.7 (14.9–14.2). Head width: 4.4 (4.4–4.2). Mesosoma width: 5.3 (5.5–5.2). Metasoma width: 5.3 (5.5–5.1). Forewing length: 10.2 (10.3–9.9).

Coloration. Preapical area of mandible and legs reddish brown. Yellow maculae as follows: at paraocular area, from the alveolar tangent and the lower paraocular area; on ventral surface of scape; irregular wide spot on clypeal disc, wider basally; at labrum; on most of malar area, mainly on anterior area; faint spot at base of mandible; irregular spot on lateral sides of T1; sub-rectangular spot on lateral sides of T2; irregular area on lateral sides of T3–T6, narrower on medial area.

Pubescence. Predominantly yellowish to testaceous on occipital area and mesosoma, reddish dorsally. Whitish hairs on face, upper gena, legs and ventral surface of mesosoma and metasoma. Ferruginous on

central area of S2–S6. Dense, long and plumose hairs on occipital area, mesosoma and T1 (2–4 × OD). Distal margins of S2–S4 with long, dense and plumose hairs (3–5 × OD) arranged towards medial area forming a wide patch.

Sculpture surface. Clypeal disc with fine and scattered punctation (2–4 × puncture width), except on maculae. Labrum with finer punctures than on clypeus.

Structures. Head broader than long (1.3–1.2: 1). Ratio of upper and lower interocular distances: 0.9–0.8: 1. Maximum interocular distance shorter than length of compound eye (0.5–0.6: 1). Clypeus broader than long (1.5–1.4: 1) shorter than clypeocellar distance (0.9: 1). Labrum slightly longer than broad (1.1: 1). Interalveolar distance longer than alveolorbital distance (2.5–2.4: 1). Interalveolar distance shorter than alveolocellar distance (0.6–0.7: 1). Lateral ocelli below the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.4–1.3: 1). Frontal carina extending from tip of supraclypeal carina (1.6–1.4 × OD). Length of F1 longer than F2 (1.2–1.1: 1), F2 shorter than F3 (0.8–0.7: 1) and F3 slightly shorter than F4 (0.95: 1), (1: 0.8–0.7: 0.95: 1). Clypeal carinae and epistomal suture conspicuous. Malar area reduced. Length of apical tooth more than twice the length of preapical

Fig. 3. *Epicharis* (*Epicharitides*) *iheringi* Friese, 1899. **A–B**. Female (Brazil: Cássia dos Coqueiros; RPSP). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: Varginha; MNRJ). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

tooth. Middle trochanter cylindrical. Hind femur and tibia slender. Anterior and posterior margins of hind basitarsus sub-parallel.

Variation. There are specimens from São Paulo State with the maculae on the face more developed, mainly on the clypeus and at the base of the mandible.

Type locality

BRAZIL: São Paulo: Jundiaí.

Distribution (Fig. 10)

BRAZIL: Mato Grosso: Serra do Roncador*, Tangará da Serra*, Chapada dos Guimarães (Gaglianone 2001). **Bahia:** Parque Nacional Chapada Diamantina (Neves *et al*. 2006; Oliveira *et al*. 2006), Palmeiras*, Lençóis*. **Goiás:** Cavalcante*, Alto Paraíso de Goiás, Parque Nacional da Chapada dos Veadeiros*, Iporá*, Parque Nacional das Emas*. **Distrito Federal:** Parque Nacional de Brasilia (Alvarez *et al*. 2019), Brasilia (Oliveira & Gibbs 2000). **Minas Gerais:** Bonfinópolis de Minas*, Brasilândia de Minas*, Itacambira (Azevedo *et al*. 2008), Francisco Dumont*, Parque Estadual Serra do Cabral (Azevedo *et al*. 2008), Lassance*, Corinto*, Parque Estadual do Biribiri (Azevedo *et al*. 2008), Diamantina (Azevedo *et al*. 2008), Uberlândia (Carvalho & Oliveira 2010; Barônio & Torezan-Silingardi 2017), Serra do Salitre*, Santana do Riacho*, Paraopeba*, Parque Nacional da Serra do Cipó (Fischer & Gordo 1993; Gaglianone 2001; Azevedo *et al*. 2008), Ibiá (Gaglianone 2001), Jaboticatubas*, Tapira (Gaglianone 2001), Itaúna*, São Roque de Minas (Gaglianone 2001), Lavras Novas (Azevedo *et al*. 2008), Passos (Gaglianone 2001), Ritápolis (Gaglianone 2001), São João del-Rei (Gaglianone 2001), Barbacena*, Varginha (Gaglianone 2001). **Mato Grosso do Sul:** Dourados (Lima & Silvestre 2016). **São Paulo:** Pedregulho (Gaglianone 2001; Gaglianone *et al*. 2011), Rifaina (Gaglianone 2001; Gaglianone *et al.* 2011), São Paulo (Moure 1945b), Cajuru (Pedro 1994; Gaglianone 2001; Gaglianone *et al.* 2011), Cássia dos Coqueiros*, Guatapará*, Luiz Antônio (Mateus 1998; Gaglianone 2001; Gaglianone *et al.* 2011), Corumbataí (Gaglianone 2001; Andena *et al*. 2005), Itirapina (Vianna 2010; Gaglianone *et al.* 2011), Jataí (Mateus 1998; Gaglianone 2003; Pinto 2013), Jundiaí (Schrottky, 1902a; Ramos *et al.* 2015), Angatuba (Gaglianone 2001), Ipiranga (Schrottky 1902a; Ramos *et al.* 2015). **Paraná:** Tuneiras do Oeste (Sorreque 2016), Arapoti*, Jaguariaíva (Almeida & Laroca 2013), Ponta Grossa (Amaral-Neto 2013), Parque Estadual de Vila Velha (Gonçalves & Melo 2005). **PARAGUAY: Amambay:** Parque Nacional Cerro Corá*. **San Pedro:** Cororo*.

Comments

Epicharis iheringi is commonly confused with *E. cockerelli* because of its similar distribution range and the resemblance of their morphology. In fact, when we studied the type series of *E. cockerelli fulvohirta* at MZUSP, we realized that it was composed of specimens of both species. Like *E. obscura*, this species has the southernmost records of the subgenus, occurring in the Brazilian state of Paraná and in the Paraguayan Parque Nacional de Cerro Corá (Parana and Chacoan biogeographic domains sensu Morrone 2014).

Epicharis* (*Epicharitides*) *lia sp. nov.
urn:lsid:zoobank.org:act:E3F19993-F355-46AC-B382-4F807718FCB1
Figs 4, 12

Diagnosis

Female

Pubescence dark brown to black with whitish hairs mostly on gena, area near tegula, legs and propodeum; distinct yellow maculae on face, mainly on paraocular area, labrum and dorsal surface of mandible;

malar area sub-rectangular; yellow macula on most of posterior margin of mesoscutellum; lateral sides of T2–T4 with yellow maculae as irregular crescent spots; tegula and wing veins dark brown.

Male

Unknown.

Comments

This new species can be confused with *E. duckei* by the configuration of its maculae, mainly on the face and mesoscutellum. However, *E. lia* sp. nov. can be distinguished by the wings, wing veins and dark brown tegulae, the pubescence being predominantly dark brown to black and the maculae less developed on T2–T5.

Etymology

This species is dedicated to Martha Lia Romero, grandmother of the first author. The specific epithet is used as a noun in apposition.

Type material

Holotype

PERU • ♀; "PERU: Cusco Prov., Pilcopata, Villa Carmen, Bio. Station, E. Rodriguez XII-2013\ *Epicharis* sp. det. Whitehead"; MNRJ †.

Description

Holotype female (Fig. 4A–B)

Measurements. Approximate body length: 14.3. Head width: 4.3. Mesosoma width: 5.2. Metasoma width: 5.1. Forewing length: 10.0.

Coloration. Mostly dark brown to black with mandible, legs and lateral sides of T1 light brown. Integument reddish brown on ventral surface of flagellomeres except basal area of F1. Yellow maculae as follows: a stripe on paraocular area near margin of compound eyes from alveolar tangent to lower paraocular area, wider on lower area; a spot on apex of ventral surface of scape; a faint stripe on basal lateral margin of clypeus; on most of malar area; on basal half of labrum, deeply emarginated on medial area; on most of mandible, except apex and ventral surface; an elliptical spot on basal margin of fore tibia;

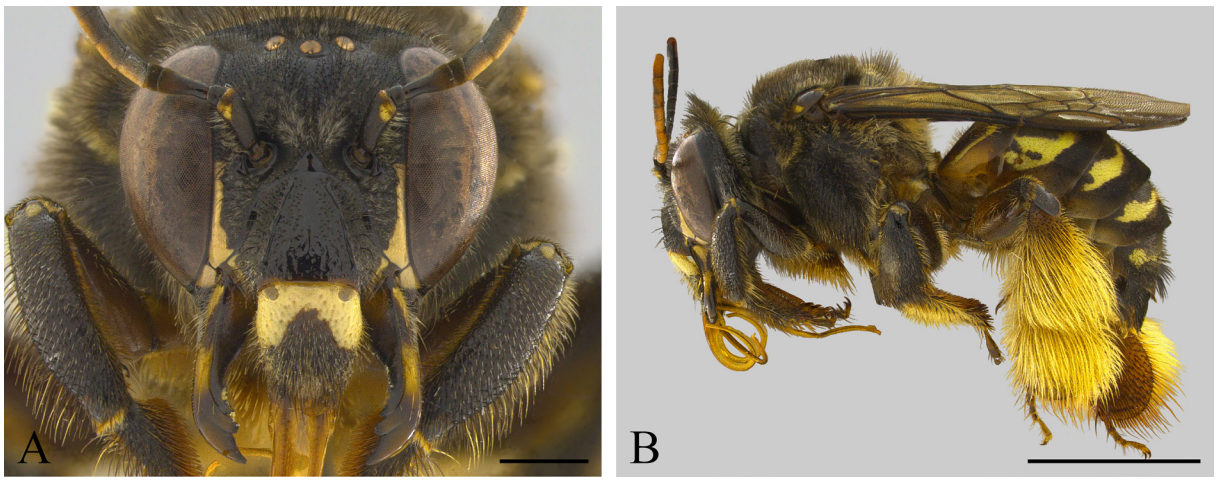

Fig. 4. *Epicharis* (*Epicharitides*) *lia* sp. nov., holotype, ♀ (Peru: Pilcopata; MNRJ). **A**. Head, frontal view. **B**. Habitus, lateral view. Scale bars: A = 1 mm; B = 5 mm.

an irregular spot on anterior and posterior margin of tegula respectively; an irregular stripe on posterior margin of mesoscutellum, finely interrupted medially; an irregular stripe throughout T1, interrupted in the middle; an irregular crescent spots on lateral sides of T2–T4; an irregular spot on lateral sides of T5. Tegula, wings and veins dark brown. Tarsus reddish brown.

Pubescence. Largely dark brown to black with whitish hairs intermixed giving a grayish aspect on paraocular area, lateral sides of clypeus, base of mandible, apical margin of labrum, occipital area, hypoepimeral lobe and on T5. Gena, legs, metepisternum, propodeum and T1 predominantly whitish, except ferruginous on ventral surface of hind tibia and basitarsus. Yellowish hairs on dorsal surface of middle basitarsus and scopa. Ventral surface of mesosoma ferruginous. Long, decumbent, coarse and simple hairs on lateral sides of clypeus and on apex of labrum, coarser on clypeus. Lower lateral sides of clypeus, apex of labrum and base of mandible with short, dense and simple hairs (0.2–2 × OD). Paraocular area and vertex with long, sparse and plumose hairs of similar length (1–2 × OD), denser near alveolus and longer towards occipital area. Gena with dense and plumose hairs progressively longer from upper to lower area (0.5–4 × OD). Mesosoma with long, dense and plumose hairs (3–4 × OD), longer on posterior surface and sparser, almost glabrous on pronotum. Anterior surface of T1 with scattered plumose hairs of similar length than those on propodeum, sparser on disc. T2–T5 with appressed hairs, except on maculae, and short simple hairs (0.2–2 × OD), longer on apical segments. Preapical margin of T5 with long, dense and simple hairs (1–3 × OD), with tomentose pubescence on distal margin. Long, decumbent, dense and simple hairs on laterodistal margins of S2–S5, very scattered on medial surface.

Sculpture surface. Clypeus weakly areolate, stronger on labrum mainly on apical area and on lateral sides of clypeus. Coarse and uniform punctation on paraocular areas (1–2 × puncture width), coarser towards frons. Vertex, occipital area and gena with fine and dense punctation (0.5–2 × puncture width), denser near occipital carina. Mesosoma with fine and uniform punctation (1–2 × puncture width), finer on dorsal area and coarser on metepisternum. Pronotum nearly smooth. Terga weakly imbricate, with a large impunctate area on preapical margin of T5. Coarse and sparse punctation on medial areas of S2–S5 (1–4 × puncture width), finer and denser towards distal margins.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.9: 1. Maximum interocular distance shorter than length of compound eye (0.8: 1). Clypeus broader than long (1.7: 1) with length equal to clypeocellar distance (1: 1). Labrum longer than broad (1.2: 1). Interalveolar distance longer than alveolorbital distance (2.4: 1). Interalveolar distance shorter than alveolocellar distance (0.7: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance slightly longer than ocellocular distance (1.1: 1). Length of frontal carina: 1.7 × OD. Length of F1 longer than the length of F2 and F3 together, but shorter than length of F2–F4 (0.7: 0.6: 1). Vertex at the same level of the upper supraorbital tangent. Epistomal suture and clypeal carinae conspicuous. Mesoscutellum rounded, slightly flat in lateral view.

Type locality

PERU: Cusco: Kosñipata: Pilcopata.

Distribution (Fig. 12)

Only known from the type locality.

Comments

As mentioned in the "Material and methods" section, the holotype of this species was lost in the fire that destroyed the Museu Nacional. However, the morphological description presented here was made before the fire. This case is particularly more complex because this new species is only known from the specimen that was destroyed.

The single known specimen of this new species was collected in the foothills of the Peruvian Andes, in the Biological Station of Villa del Carmen, approximately 550 m.a.s.l. This locality is characterized by the confluence between the Andean cloud and the low Amazon forests, being of great interest due the presence of the gradient of several habitats. More specimens of *Epicharis lia* sp. nov. need to be collected to determine the morphological variation of this species, as well as to describe the unknown male and to determine its distributional range.

Epicharis* (*Epicharitides*) *luteocincta Moure & Seabra, 1959
Figs 5, 11

Epicharis (*Epicharitides*) *luteocincta* Moure & Seabra, 1959: 125 (original description).

Epicharis (*Epicharitides*) *luteocincta* – Gaglianone 2001: 187 (distribution); 2003: 281 (cited). — Silveira *et al.* 2002: 102 (list, distribution). — Moure *et al.* 2007: 139 (catalogue, distribution). — Gaglianone *et al.* 2011: 659 (list, distribution). — Martins *et al.* 2014: 89–92 (terminal taxon in molecular phylogenetic analysis, biogeographical analysis). — Martins & Melo 2015: 25, 27 (terminal taxon in molecular phylogenetic analysis). — Lima & Silvestre 2016: 9 (list).

Diagnoses

Females

Pubescence of mesosoma with black and whitish hairs intermixed; face without yellow maculae or with poorly developed maculae on lower paraocular area and labrum; malar area reduced; T2–T5 with dense, yellow pubescence on large yellow areas except on medial sides of discs as two emarginations; tegula and wing veins dark brown; mesoscutellum bilobed in dorsal view.

Males

Black and whitish hairs intermixed giving a grayish appearance on vertex and mesosoma, whither on gena and on ventral surface of mesosoma; yellow maculae well-developed on most of face, dorsal surface of hind basitarsus and part of hind tibia; malar area reduced; spur of middle tibia linear; hind femur slender; pubescence of hind tibia and basitarsus scopa-like; metasoma with dense yellow hairs on large yellow areas as in the female.

Type material

Holotype male (DZUP, not studied).

Material examined (n = 8 ♀♀, 2 ♂♂)

BRAZIL – **Goiás** • 1 ♂; "Alto Paraíso de Goiás GO BRASIL; 14/11/2006; A.A. Azevedo\ Abelhas Altimontanas; Par Na Chapada dos Veadeiros; 11256–33378"; DZMG. – **Mato Grosso** • 4 ♀♀; "BRASIL, Mato Grosso. Tangará da Serra. Faz Aparecida da Serra; 14º18'36.64"S 57º44'47.00"W; Cerrado; Malaise; -X-2017, M.L.S Almeida\ C4, G4, P 300; Cerrado; Nº 474; C5 G5 P300; Cerrado; Nº 839; C4, G4, P 150; Cerrado; Nº471; C5 G5 P300; Cerrado; Nº 838"; INPA. – **Minas Gerais** • 1 ♀; "Brasilândia MG BRASIL; 22/10/1996; A.G. Damasceno\ Projeto Abelhas de Brasilândia; *P. emarginatus*; 09:00–10:00\ *Epicharis* (*Epicharitides*) *luteocincta* Moure & Seabra ♀ F.A. Silveira, det. 1997"; INPA • 1 ♂; "Brasilândia MG BRASIL; 18/10/1996; A.G. Damasceno\ Projeto Abelhas do Cerrado; *P. emarginatus*; 08:00–09:00\ *Epicharis* (*Epicharitides*) *luteocincta* Moure & Seabra ♂ F.A. Silveira, det. 1997"; INPA • 1 ♀; "Brasilândia de Minas MG BRASIL; 30/11/1999; V. Silva\ Abelhas- Cerrado Mannesmann Faz. Brejão; 5868–16144"; DZMG. – **São Paulo** • 1 ♀; "Rio Claro S. P. BRASIL; XII–62; J. Pisani\ *Epicharis luteocincta* Moure & Seabra Pe J.S. Moure 1969\ AMNH_ENT AMNH_BEE 00014517"; AMNH • 1 ♀; "IBUSP, São Paulo, SP Brasil; 15 12 1983; Col: Knoll, F.R.N Pirassununga, Sp BR\ *Epicharis* (*E.*) *luteocincta* (Moure & Seabra, 1959) F. Vivallo det. 2008\ CEPANN N° 9326"; CEPANN.

Morphology

Female (Fig. 5A–B)

Measurements. Approximate body length: 14.3 (14.1–14.5). Head width: 4.4 (4.2–4.4). Mesosoma width: 5.0 (4.8–5.1). Metasoma width: 4.8 (4.8–5). Forewing length: 10.0 (9.9–10.2).

Coloration. Integument dark brown to black except yellow on lateral sides of T1 and most of T2–T5 excluding the medial sides of the disc as two emarginations. Light brown integument on apex of mandible and on ventral surface of flagellomeres, except F1 basally. Tegula and wing veins dark brown. Wings brown and translucent,. Tarsus dark reddish brown.

Pubescence. Mostly dark brown to black. Paraocular area, apical half of labrum, gena, hypoepimeral lobe, dorsal surface of fore and middle tibia, metepisternum, metanotum and propodeum with whitish hairs. Width stripes on terga and lateral distal margins of S2–S4 with yellow hairs. Ferruginous hairs on mandible and on ventral surface of hind tibia and basitarsus. Lateral sides of clypeus, basal half of labrum and mandible with distinct, long, coarse and simple hairs (2–5 × OD). Short plumose hairs barely noticeable on basal area of mandible. Scattered simple hairs on paraocular area, frons, vertex and gena (0.5–1 × OD), longer on lower gena. Paraocular area above to alveolus level, occipital area and upper gena with dense, long and plumose hairs (0.5–2 × OD). Long and sparse plumose hairs on dorsum of mesosoma (1 × OD), longer and denser on hypoepimeral lobe, metepisternum, metanotum and propodeum (1–3 × OD), and shorter and nearly absent on lateral sides of pronotum. Ventral area with long, coarse and simple hairs, mainly on coxa. Anterior surface and lateral sides of T1 with plumose hairs as those on propodeum, nearly absent on disc. Yellowish integument of T2–T5 covered with appressed pubescence (0.5–1xOD), longer progressively towards the distal segments. T5 with long, decumbent and simple hairs on lateral sides, tomentose hairs on distal margin, almost absent on preapical area. Lateral distal margins of S2–S4 with long, dense and plumose hairs (0.5–2 × OD) and large glabrous areas medially.

Sculpture surface. Clypeal disc and basal half of labrum with inconspicuous punctation, nearly smooth. Areolate punctation on lateral sides of clypeus and on apex of labrum. Coarse and uniform punctation on paraocular areas and vertex (1–2 × puncture width), coarser and denser towards frons and occipital area near to the carina, sparser and finer on gena. Dorsum of mesosoma with coarse and uniform punctation (1–2 × puncture width), denser on metepisternum and scattered nearly absent on lateral sides of pronotum. Terga weakly imbricate. Distal area of T5 smooth. Sterna with coarse and dense punctures (0.5–1 × puncture width), with large impunctated areas on medial area.

Structures. Head broader than long (1.2–1.1: 1). Ratio of upper and lower interocular distances: 0.95–1: 1. Maximum interocular distance shorter than length of compound eye (0.7–0.8: 1). Clypeus broader than long (1.6–1.5: 1) with length almost equal to clypeocellar distance (1.1–1: 1). Labrum slightly longer than broad (1.2–1.1: 1). Interalveolar distance longer than alveolorbital distance (2.5–2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.8–0.7: 1). Lateral ocelli slightly above the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.2–1.1: 1). Frontal carina inconspicuous, extending from tip of supraclypeal carina to near median ocellus (1.9–2.2 × OD). Length of F1 longer than the length of F2 and F3 together, slightly shorter than length of F2–F4 (0.7–0.8: 0.5–0.6: 1). Vertex at the same level of the upper supraorbital tangent. Clypeus with epistomal suture and carinae poorly defined. Mesoscutellum bilobed in dorsal view.

Variation. Although the females are recognized by the absence of maculae all over the body, a faint spot on the lower paraocular area was observed in some specimens from the Brazilian State of Mato Grosso.

Male (Fig. 5C–D)

As the female, except as follows:

Measurements. Approximate body length: 14.0 (13.9–14.3). Head width: 4.2 (4–4.3). Mesosoma width: 5.0 (4.9–5.2). Metasoma width: 5.1 (4.9–5.1). Forewing length: 10.0 (9.8–10).

Coloration. Yellowish integument on most of T1 except on anterior surface and at sides of disc as two emarginations. In T2 and T3 the yellowish integument is more restricted towards distal margins and on lateral sides. Maculation as follows: on paraocular areas, from below the alveolar tangent to lower paraocular area; on ventral surface of scape; a wide triangular-like spot on clypeal disc that extends to corners of the lower lateral sides; at supraclypeal area; on labrum; on most of mandible except apex; an elliptical spot on basal margin of tibia and apical margin of fore tibia; at apex of dorsal surface of hind tibia and on hind basitarsus.

Pubescence. Gena, occipital area, mesosoma, legs except hind tibia and basitarsus, and T1 with whitish hairs. Dorsal surface of fore and middle basitarsi with yellowish hairs. Mesosoma with longer pubescence mainly on propodeum (3–5 × OD). Longer and denser hairs on yellowish areas of terga.

Sculpture surface. Lateral sides of clypeus with coarse and dense punctation (0.5–2 × puncture width). Paraocular area and frons with coarser punctation. Large impunctate areas near the ocelli. Coarser punctation on mesosoma, mainly on metepisternum.

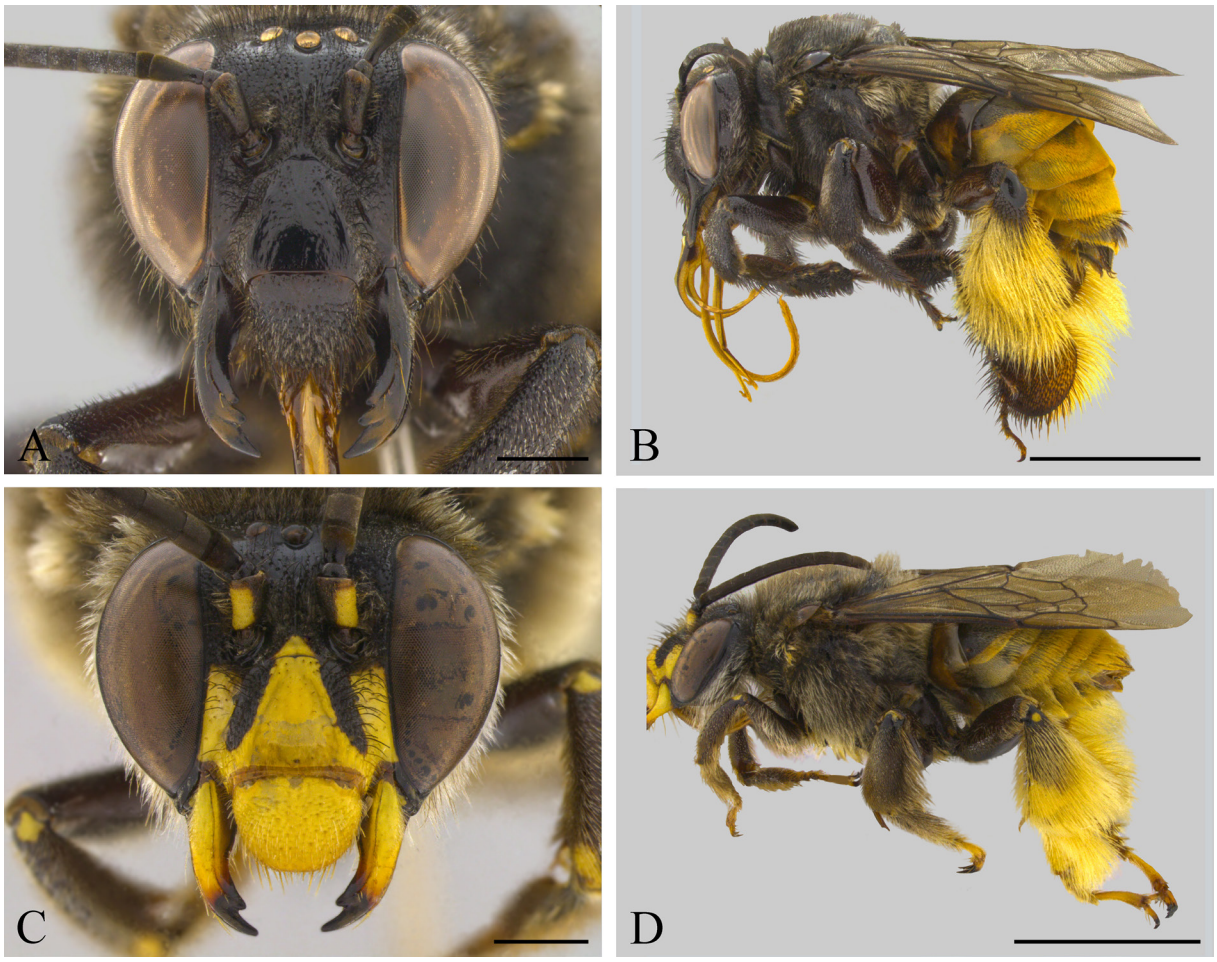

Fig. 5. *Epicharis* (*Epicharitides*) *luteocincta* Moure & Seabra, 1959. **A–B**. Female (Brazil: Itirapina; CEPANN). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: São Paulo; CEPANN). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

Structures. Head broader than long (1.2–1.1: 1). Ratio of upper and lower interocular distances: 0.8: 1. Maximum interocular distance shorter than length of compound eye (0.7: 1). Clypeus broader than long (1.5: 1), longer than clypeocellar distance (1.1: 1). Labrum slightly longer than broad (1.1: 1). Interalveolar distance longer than alveolorbital distance (2.4: 1). Interalveolar distance shorter than alveolocellar distance (0.7: 1). Lateral ocelli slightly above the upper supraorbital tangent. Interocellar distance longer than ocellocular distance (1.4: 1). Frontal carina extending from tip of supraclypeal carina to median ocellus (2.1 × OD). Length of F1 shorter than F2 (0.8: 1), F2 shorter than F3 (0.7: 1) and F3 equal to F4 (1: 1), (0.7: 0.8: 1: 1). Clypeal carinae and epistomal suture poorly defined. Malar area reduced. Length of apical tooth more than twice the length of preapical tooth. Middle trochanter cylindrical. Hind femur and tibia slender. Anterior and posterior margins of hind basitarsus sub-parallel.

Type locality

BRAZIL: Goiás: Aragarças.

Distribution (Fig. 11)

BRAZIL: Mato Grosso: Tangará da Serra*, Chapada dos Guimarães (Gaglianone 2001). **Goiás:** Aragarças (Moure & Seabra 1959; Gaglianone 2001), Alto Paraíso de Goiás*. **Minas Gerais:** Brasilândia de Minas*. **São Paulo:** Pirassununga (Gaglianone *et al.* 2011), Itirapina (Gaglianone *et al.* 2011), Rio Claro (Gaglianone 2001; Gaglianone *et al.* 2011), São Paulo (Gaglianone *et al.* 2011).

Comments

Since it was not possible to examine the holotype male of this species, the identifications were based on material previously identified by Moure, housed at AMNH. In this research we provide for the very first time the morphological description of the female based on a specimen collected near the type locality.

Both sexes of this species are very similar to those of *E. minima*, but *E. luteocincta* can be distinguished by the yellow areas covered by dense yellow hairs on the metasoma, while *E. minima* has scattered yellowish hairs on the apical terga. In addition, unlike the remaining species of the subgenus, the female of this species has no maculae, and the tibial spur of the middle leg of the male is linear.

Although Moure & Seara (1959) doubted about the validity of *E. luteocincta* as a formal species by its great similarity with *E. minima*, our results confirm that both species are clearly distinguishable and recognizable from each other. The yellow areas of the metasoma that characterize both sexes of *E. luteocincta* are not considered as maculae (taking into account the definition provided in the "Material and methods" section) because those areas are largely and densely covered by hairs and the yellow integument is slightly translucent.

This species is distributed throughout south-central Brazil, mainly in the Chacoan and Paraná biogeographic dominions (sensu Morrone 2014). Like *E. minima* and *E. obscura*, the males of this species are characterized by their similarity with their respective females.

Epicharis* (*Epicharitides*) *mesoamericana sp. nov.

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Figs 6, 12

Diagnosis

Females

Pubescence of head and mesosoma predominantly black with few whitish hairs on paraocular area, gena and propodeum; face without or with poorly developed yellow maculae on labrum and lower paraocular

area; malar area reduced; yellow maculae on mesoscutellum as two elliptical spots; metasoma with orange pubescence and distinct stripe-like yellow maculae throughout discs of T2–T5; tegula and wing veins dark brown.

Male

Unknown.

Etymology

The specific epithet refers to the subcontinent where this species occurs.

Type material

Holotype

BELIZE • ♀; "Belize: Stann Creek Dist., 4 km W of Middlesex 1 May 2009, J.S. Ascher"; AMNH.

Paratypes

BELIZE • 2 ♀♀; "Belize: Stann Creek Dist., Mama Noots Backabush Res. 2 May 2009, J.S. Ascher"; AMNH.

Description

Holotype female (Fig. 6A–B)

Measurements. Approximate body length: 15.0. Head width: 4.8. Mesosoma width: 5.0. Metasoma width: 5.2. Forewing length: 11.2.

Coloration. Head and mesosoma black, labrum and legs brown to dark brown, and metasoma orange. Integument reddish brown on ventral surface of flagellomeres except base of T1 and tarsus. Yellow maculation as follows: faint spot on corner of lower paraocular area; faint longitudinal line on disc of clypeus and supraclypeal area; at basal half of labrum, emarginated on medial area; two distinct elliptical spots (leaf shaped) on mesoscutellum, interrupted medially and towards anterior margin; irregular width stripes along T2–T5, narrower on medial area. Tegula dark brown. Wings dark brown, translucent, with dark brown veins.

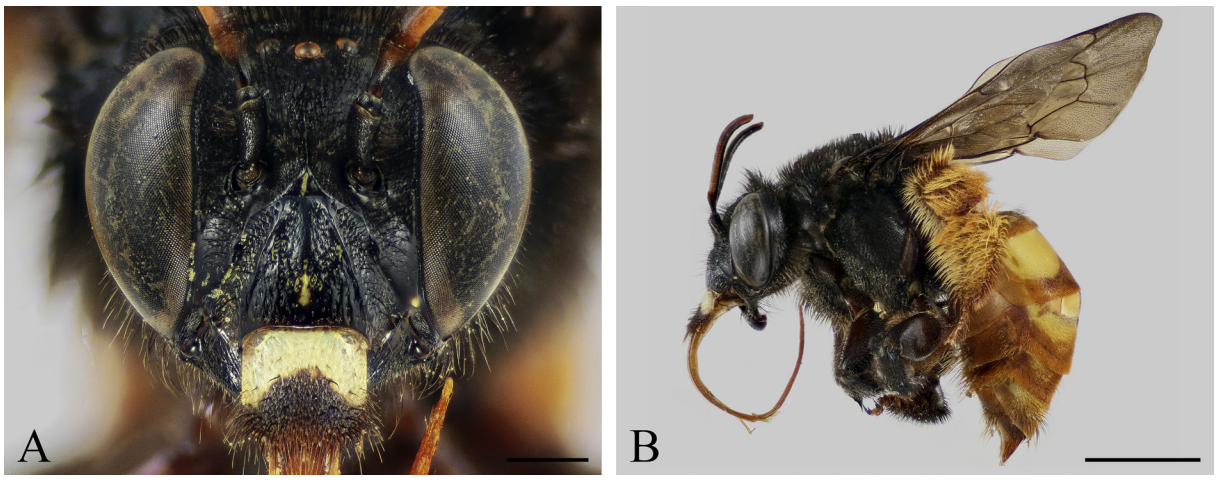

Fig. 6. *Epicharis* (*Epicharitides*) *mesoamericana* sp. nov., holotype, ♀ (Mama Noots, Stann Creek, Belize; AMNH). **A**. Head, frontal view. **B**. Habitus, lateral view. Scale bars: A = 1 mm; B = 5 mm.

Pubescence. Largely black on head and mesosoma, with whitish hairs on paraocular areas above to alveolus, lower gena, area close to occipital carina, hypoepimeral lobe, area of mesoscutum near to tegula, metepisternum, metanotum and propodeum. Ferruginous hairs on hind tibia and basitarsus. Metasoma with predominantly orange pubescence except on maculae. Lateral sides of T1 with whitish hairs and a few blackish ones on discs of T1 and T5. Longer, decumbent, coarse and simple hairs on lateral sides of clypeus and at basal half of labrum. Long, scattered simple hairs on posterior margin of mandible and gena (2–4 × OD), denser and longer on lower gena. Paraocular area and vertex with long, sparse plumose hairs, denser near to alveolus and longer towards frons and occipital area. Mesosoma with long and dense plumose hairs on dorsum and metepisternum (2–4 × OD), sparser on dorsum and lateral sides of pronotum, and denser on metepisternum and propodeum. Lateral margins of pronotum, hypoepimeral lobe and anterior area of tegula with short and dense hairs (0.2–1 × OD); longer, denser and thick hairs towards ventral surface of mesosoma. Anterior surface and lateral sides of T1 with plumose hairs as those on propodeum. Discs of terga covered by appressed pubescence except on maculae. Sparse and semi erected simple hairs on discs of T3–T5 (0.5–2 × OD), longer towards lateral sides and tomentose hairs on distal margin of T5. Long and dense simple hairs on apical margins of S2–S5 mainly on lateral sides.

Sculpture surface. Clypeus and labrum areolate, stronger on lateral sides of clypeus and on apical half of labrum. Coarse and dense punctation on frons and occipital area near to occipital carina, sparser towards paraocular area and vertex (1–2 × puncture width), and finer on gena. Dorsum of mesosoma with sparse and fine punctation barely evident (1–3 × puncture width), sparser and finer on mesoscutellum and denser on metepisternum and propodeum. Metasoma weakly imbricate except smooth on maculae and on apical medial area of sterna.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.8: 1. Maximum interocular distance shorter than length of compound eye (0.8: 1). Clypeus broader than long (1.7: 1) with less length than clypeocellar distance (0.8: 1). Labrum slightly longer than broad (1.2–1.1: 1). Interalveolar distance longer than alveolorbital distance (2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.8: 1). Lateral ocelli at the same level of the upper supraorbital tangent. Interocellar distance equal to ocellocular distance (1: 1). Frontal carina conspicuous, extending from tip of supraclypeal carina to medial ocellus (2.8 × OD). Length of F1 longer than summed length of F2 and F3 and shorter than length of F2–F4 (0.7: 0.6: 1). Vertex at the same level of the upper supraorbital line. Clypeal carinae and epistomal suture conspicuous and well-defined. Mesoscutellum rounded in lateral view.

Variation. The paratypes vary from the holotype by having the whitish pubescence more developed on the vertex and on the ventral surfaces of the mesepisternum and the metepisternum, by the faint macula on the labrum, nearly absent in some specimens, and by the irregular shape of the macula on the mesoscutellum.

Type locality

BELIZE: Stann Creek: Middlesex, Mayflower Bocawina National Park.

Distribution (Fig. 12)

Along with the type locality, this new species was also recorded at Texas A&M Soltis Center, Volcán Arenal, Alajuela Province, Costa Rica.

Comments

The combination of orange pubescence and maculae on terga differentiates this species from any other in the subgenus. The macula on mesoscutellum in *E. mesoamericana* sp. nov. also covers most part of the disc, as in *E. obscura*, but both species differ in the shape of the spot (macula as two elliptical spots

in *E. mesoamericana*; covering the disc entirely in *E. obscura*, except for a narrow perpendicular line in the middle).

The distribution of the species of *E.* (*Epicharitides*) prior to this research was restricted to South America, with most records from Brazil and to a lesser extent in Bolivia and Paraguay. However, the record of this new species broadens the distribution of the subgenus to Central America. The locality where this species was collected is characterized by having primarily Tropical evergreen broadleaf, lowland and hill forest ecosystems, areas also commonly found throughout Central America to northern South America (Mesoamerican and Pacific dominion sensu Morrone 2014).

The discovery of this species is of great relevance for the subgenus because it allows the creation of new hypotheses regarding the origin and dispersion of the lineage. Although the females exhibit the typical morphological characters found in the species belonging to *E.* (*Epicharitides*), this new species differentiates notably from the others. Additional specimens need to be examined to study the distribution range of this new species, its morphological variations and to describe the male.

Epicharis* (*Epicharitides*) *minima (Friese, 1904)
Figs 7, 11

Centris (*Epicharis*) *minima* Friese, 1904: 90 (original description).

Epicharis minima – Pedro 1994: 252 (floral records).
Epicharitides minima – Moure 1945a: 313 (new combination, morphology of adult); 1945b: 399–400 (key).
Epicharis (*Epicharitides*) *minima* – Moure & Seabra 1959: 126 (descriptive note). — Mateus 1998: 20, 42, 69, 107, 123–126, 139, 142, 145 (floral records, bionomy). — Pedro & Camargo 1999: 200 (catalogue). — Gaglianone 2001: 24–27, 42–45, 47, 50, 60, 132, 144, 150, 186 (bionomy, floral records, distribution); 2003: 282 (floral records, bionomy). — Silveira *et al.* 2002: 102 (list, distribution). — Moure *et al.* 2007: 139 (catalogue, distribution). — Rasmussen & Ascher 2008: 71 (list). — Alves-dos-Santos 2009: 304 (catalogue). — Gaglianone *et al.* 2011: 659 (list, distribution). — Andena *et al.* 2012: 1668 (floral record). — Pinto 2013: 52 (bionomy). — Martins *et al.* 2014: 89–92 (terminal taxon in molecular phylogenetic analysis, biogeographical analysis). — Martins & Melo 2015: 25, 27 (terminal taxon in molecular phylogenetic analysis).

Diagnoses

Females

The smallest bees of the genus (13–14 mm); pubescence of head and mesosoma with black and whitish hairs intermixed giving a grayish aspect; yellow maculae on face restricted to small areas, more developed on labrum and at base of mandible; clypeal carinae and supraclypeal area inconspicuous, nearly absent; malar area reduced; most of metasoma with yellow pubescence; tegula and wing veins dark brown; mesoscutellum bilobed in dorsal view.

Males

Black and whitish hairs intermixed giving a grayish appearance on head and mesosoma, whiter on gena and propodeum; distinct and well-developed yellow maculae on most of face, dorsal surface of hind basitarsus and part of hind tibia; malar area reduced; yellow pubescence on most of metasoma; hind femur slender; pubescence of hind tibia and basitarsus scopa-like; tegula and wing veins dark brown.

Type material

Syntypes female (HNHM, not studied).

Material examined (n = 15 ♀♀, 3 ♂♂)

BRAZIL – **Mato Grosso** • 1 ♀; "BRASIL, Mato Grosso. Brasnorte. Faz Herminia; 11º57'00.9"S. 58º14'48.0"W; 309m; Floresta; Malaise; 30-XI-2017; Ferreira, JVA.\ *Epicharis* (*Epicharitides*) sp. Det. T. Mahlmann, 2019\ *Epicharis*\ G1Borda Ferreira_0132"; INPA. – **Minas Gerais** • 1 ♀; "Uberlândia MG BRASIL; 31/10/1988; A.M.C. Carvalho\ *Epicharitides minima* (Friese, 1904) Det. Camargo 1981\ Doação de Solange C. Augusto EEP 21988-64723"; DZMG. – **Rondônia** • 1 ♀; "BRASIL-Rondônia Vilhena; 1990 X O. Roppa & J. Becker\ COLEÇÃO CAMPOS SEABRA"; MNRJ. – **São Paulo** • 1 ♀; "Cajuru -– SP Brasil; 30-XII–1988; M. Molacato; 880368\ *E*. (*Epicharitides*) *minima* Friese, 1904 Det. Moure, 1992"; RPSP • 1 ♀; "Faz. Sta Carlota Cajuru – SP – Brasil; hs XII–1988\ Camillo Serrano leg 881697\ *E*. (*Epicharitides*) *minima* Friese, 1904 Det. Moure, 1992"; RPSP • 1 ♀; "Faz. Sta Carlota Cajuru – SP – Brasil; hs 16-18/01.XII.1988; M. Mazucato leg; F191738\ 038\ *E*. (*Epicharitides*) cf. *minima* Friese, 1904 Det. Camargo, 1989\ *Byrsonima intermedia* Ads. Juss. Malpighiaceae 038"; RPSP • 1 ♂; "Faz. Sta Carlota Cajuru – SP – Brasil; hs 14-16/03.XII.1988 M. Mazucato leg F191976\ 062\ *E*. (*Epicharitides*) cf. *minima* Friese, 1904 Det. Camargo, 1989\ Cerrado; Pl 062; *Lippia lasiocalycina* Cham-Verbenac"; RPSP • 1 ♂; "Faz. Sta Carlota Cajuru – SP – Brasil; hs 10-12/18. XI.1988; M. Mazucato leg; F191702\ 0130\ *E*. (*Epicharitides*) cf. *minima* Friese, 1904 Det. Camargo, 1989\ Cerrado; Pl 134; *Qualea parviflora* Mart. Vochysiaceae"; RPSP • 1 ♂; "Faz. Sta Carlota Cajuru – SP – Brasil; hs 10-12/18.XI.1988; M. Mazucato leg; F191547\ 0130\ *E*. (*Epicharitides*) cf. *minima* Friese, 1904 Det. Camargo, 1989\ Cerrado; Pl 134; *Qualea parviflora* Mart. Vochysiaceae"; RPSP • 1 ♀; "Brasil, Jundiahy; 12-1902\ *Epicharis minima* ♀ 1900 Friese det.\ *Epicharis minima*"; HNHM • 1 ♀; "Brasil, Jundiahy 12-1902\ *Epicharis minima* ♀ 1900 Friese det."; HNHM • 1 ♀; "Brasil, Jundiahy; 12-1899\ *Epicharis minima* ♀ 1907 Friese det."; HNHM • 1 ♀; "Brasil, Jundiahy; 12 -1899\ Collect. Graeffe\ *Epicharis minima* ♀ 1907 Friese det."; NHMW • 1 ♀; "Brasil, Jundiahy; 12 -1899\ *Epicharis minima* ♀ 1907 Friese det.\ Typus"; NHMW • 1 ♀; "Brasil, Jundiahy; 1898\ *Centris minima* ♀ 1904 Friese det.\ Typus"; NHMW • 1 ♀; "Brasil, Jundiahy; 12. 1902\ *Centris minima* ♀ 1900 Friese det.\ Typus"; NHMW.

Morphology

Female (Fig. 7A–B)

Measurements. Approximate body length: 14 (13.8–14.1). Head width: 4.3 (4.2–4.3). Mesosoma width: 4.8 (4.8–4.9). Metasoma width: 4.8 (4.8–5). Forewing length: 9.8 (9.6–9.9).

Coloration. Integument dark brown to black, darker on head and metasoma, light brown on legs and metasoma. Ventral surface of flagellomeres brown, except at base of F1. Yellow maculation as follows: an irregular spot on lower sides of paraocular area; most of labrum, except apical area; most of mandible, except apex. Tegula, wins and veins dark brown.

Pubescence. Dark brown to black on most of face, vertex, dorsum of mesosoma, upper metepisternum and a few hairs on T5 and T6. Whitish hairs on gena, hypoepimeral lobe, lower metepisternum, fore and middle tibia, metepisternum, metanotum, propodeum and T1. Yellowish hairs on apex of labrum, mandible, ventral area of mesosoma including coxa, lateral sides of T2, basal half of T3–T5 and distal margins of S2–S5. Ferruginous on ventral surface of hind tibia and basitarsus. Lateral sides of clypeus and apical half of labrum with long, coarse, scattered and simple hairs. Long simple hairs on mandible and lower gena (2–5× OD). Vertex and occipital area near the frontal carina with long, dense and plumose hairs (1–4× OD). Sparse, long and plumose hairs on dorsum of mesosoma and metepisternum (3–4× OD), sparser almost absent on pronotum and denser on hypoepimeral lobe, metepisternum, metanotum and propodeum. Coarse, dense and long hairs on ventral surface of mesosoma. Coxa with long, dense and simple hairs mainly on ventral surface (2–4× OD). T1 with a few long and plumose hairs on anterior surface and lateral sides. Basal lateral sides of T2–T5 with appressed pubescence, covered progressively towards disc. Long, decumbent and simple hairs on distal margins of T4 and T5,

almost absent on preapical area. Long and dense hairs on distal halves of S2–S5, scattered on medial area.

Sculpture surface. Clypeal disc almost smooth, with inconspicuous punctation. Labrum weakly areolate, with coarse punctures towards apex. Paraocular area and vertex with large impunctate areas mainly near the ocelli. Sparse and inconspicuous punctures near to alveolus (2–5 × puncture width), denser and coarser towards frons. Occipital area and gena with fine and sparse punctation (2–3 × puncture width). Fine and sparse punctation on dorsum of mesosoma (3–6 × puncture width), almost absent on pronotum and denser on metepisternum. Metasoma weakly imbricate, distal margins of terga with impunctate areas. Basal halves of S2–S5 with fine and sparse punctation, denser and coarser towards apex.

Structures. Head broader than long (1.2–1.1: 1). Ratio of upper and lower interocular distances: 0.8–0.9: 1. Maximum interocular distance shorter than length of compound eye (0.7–0.8: 1). Clypeus broader than long (1.6–1.5: 1) with less length than clypeocellar distance (0.9: 1). Labrum longer than broad (1.2–1.1: 1). Interalveolar distance longer than alveolorbital distance (2.4–2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.6–0.7: 1). Lateral ocelli below the upper supraorbital tangent. Interocellar distance slightly longer than ocellocular distance (1.1: 1). Frontal carina inconspicuous.

Fig. 7. *Epicharis* (*Epicharitides*) *minima* (Friese, 1904). **A–B**. Female (Brazil: Vilhena; MNRJ). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: Cajuru; RPSP). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

Length of F1 longer than the length of F2 and F3 together, and slightly shorter than the length of F2–F4 (0.7–0.6: 0.6–0.7: 1). Vertex at the same level of the upper supraorbital tangent. Epistomal suture and clypeal carinae inconspicuous. Supraclypeal area without carina. Mesoscutellum bilobed in dorsal view.

Male (Fig. 7C–D)

As the female, except as follows:

Measurements. Approximate body length: (13.9–14.1). Head width: (4.2–4.1). Mesosoma width: (4.6–4.8). Metasoma width: (4.6–4.8). Forewing length: (9.6–9.8).

Coloration. Predominantly dark brown. Yellow maculae as follows: on paraocular area, from below alveolar tangent to lower paraocular area; on ventral surface of scape; a wide stripe on clypeal disc extending from upper margin and on lower corner of lateral sides; at labrum; on most of mandible, except apex; an elliptical spot on basal surface of fore tibia; on dorsobasal surface of hind tibia and hind basitarsus.

Pubescence. Largely whitish on gena, ventral surface of mesosoma, propodeum and legs, except basitarsus and hind tibia. Lateral sides of clypeus and paraocular area with long, sparse and plumose hairs (2–4 × OD) denser near alveolus. Longer and denser hairs on occipital area and gena (2–5 × OD). Propodeum and T1 with longer and denser plumose hairs (3–5 × OD).

Sculpture surface. Weakly areolate on clypeal disc and labrum. Fine and sparse punctation on lateral sides of clypeus (2–4 × puncture width). Paraocular area with coarse and sparse punctation (2–5 × puncture width), denser towards frons. Large impunctate areas near the ocelli. Dorsum of mesosoma and metepisternum with coarser and denser punctation (1–2 × puncture width).

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.9–0.95: 1. Maximum interocular distance shorter than length of compound eye (0.6–0.7: 1). Clypeus broader than long (1.6–1.5: 1) with length equal to clypeocellar distance (1: 1). Labrum longer than broad (1.2–1.1: 1). Interalveolar distance longer than alveolorbital distance (2.6–2.5: 1). Interalveolar distance shorter than alveolocellar distance (0.7–0.6: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance slightly longer than ocellocular distance (1.1: 1). Frontal carina inconspicuous. Length of F1 shorter than F2 (0.6: 1), F2 shorter than F3 (0.8: 1) and F3 slightly shorter than F4 (0.9: 1), (0.5: 0.7: 0.9: 1). Carina of clypeus conspicuous and epistomal suture poorly defined. Malar area reduced. Apical tooth about twice as long as preapical tooth. Middle trochanter cylindrical. Hind femur and tibia slender. Anterior and posterior surfaces of hind basitarsus sub-parallel.

Type locality

BRAZIL: São Paulo: Ribeirão Preto.

Distribution (Fig. 11)

BRAZIL: Amapá: Serra do Navio (Gaglianone 2001). **Rondônia:** Vilhena (Gaglianone 2001). **Mato Grosso:** Brasnorte*, Nova Mutum (Gaglianone 2001). **Minas Gerais:** Uberlândia*. **São Paulo:** Batatais (Gaglianone 2001; Gaglianone *et al*. 2011), Ribeirão Preto (Friese 1904; Moure & Seabra, 1959; Gaglianone 2001; Gaglianone *et al*. 2011), Cajuru (Pedro 1994; Gaglianone 2001; Gaglianone *et al*. 2011), Luiz Antônio (Mateus 1998; Gaglianone 2001; Gaglianone *et al*. 2011), Parque Estadual Vassununga (Andena *et al*. 2012), Jataí (Mateus 1998; Gaglianone 2003; Pinto 2013), Jundiaí*. **BOLIVIA: Cochabamba:** Tarata (Moure & Seabra 1959).

Comments

According to the information provided by Friese (1904), the original description of this species was based on numerous specimens collected in Ribeirão Preto, Brazil, two of them belonging to the HNHM collection. We studied material from the aforementioned collection, but we did not find any specimen from Ribeirão Preto. Much of the material that Heinrich Friese studied throughout his scientific career can also be found in AMNH, NHMW and ZMB (Rasmussen & Ascher 2008) but unfortunately the type series was not found in any of those collections.

Herein, we provide for first time the morphological description of the male of *E. minima* based on specimens from the Brazilian state of São Paulo. As it was mentioned in the diagnosis, this species is characterized by being the smallest bee of the genus. In addition, it can be identified by the near absence of carinae on the face and the presence of yellowish hairs on the distal half of most terga and sterna. Its distribution is mainly known in central west Brazil. Our results extend its distribution range to the Mato Grosso and Rondônia States.

Epicharis* (*Epicharitides*) *obscura Friese, 1899
Figs 8, 11

Epicharis obscura Friese, 1899: 40 (original description).
Epicharis maculata f. *interrupta* Schrottky, 1908: 96 (original description).
Epicharis maculata f. *parvula* Schrottky, 1908: 96 (original description, comparative note with *Epicharis grandior* Friese, 1899 [= *E. picta* Smith, 1874]).

Epicharis obscura – Friese 1900: 119–120 (description, distribution). — Schrottky 1902a: 559–561, 564 (key, morphology of adult, distribution). — Bertoni 1911: 138 (nesting biology); 1918: 220 (distribution). — Sazima & Sazima 1989: 108–110 (floral record). — Buzato 1990: 16, 19–21, 48 (floral records, bionomy, figure of adult). — Franco 1991: 17, 23, 25, 54 (floral record, bionomy, figure of adult). — Varassin & Sazima 2012: 108–109 (floral record, bionomy). — Sigrist & Sazima 2014: 1012–1013 (floral record, bionomy).
Centris (*Epicharis*) *obscura* – Friese 1901: 241, 263, 345 (list, description of the male, distribution).
Epicharitides obscura – Moure 1945a: 312–313 (new combination, morphology of adult); 1945b: 399–400 (distribution, diagnosis, key). — Laroca *et al*. 1993: 160 (nesting biology).
Epicharis (*Epicharitides*) *obscura* – Moure & Seabra 1959: 119, 125 (cited, comparative note with *E. rufescens*). — Pedro & Camargo 1999: 200 (catalogue). — Gaglianone 2001: 186 (distribution, floral records); 2005: 192 (floral records). — Silveira *et al*. 2002: 102 (list, distribution). — Rocha-Filho 2004: 4 (cited). — Sigrist & Sazima 2004: 38 (floral records). — Andena *et al*. 2005: 84 (list). — Steiner *et al*. 2006: 6 (list). — Moure *et al*. 2007: 139 (catalogue, distribution). — Rasmussen & Ascher 2008: 80 (list). — Gaglianone *et al*. 2011: 659 (list, distribution). — Imperatriz-Fonseca *et al*. 2011: 10 (list, floral records). — Menezes 2011: 25–26, 30–31 (floral record, bionomy). — Mello *et al*. 2012: 4–5 (bionomy). — Werneck**.** 2012: 55 (cited). — Pinheiro *et al*. 2018: 418–419 (bionomy, floral record).
Epicharis maculata f. *interrupta* – Moure *et al*. 2007: 139 (taxonomic decision for synonymy). — Rasmussen *et al*. 2009: 29 (list).
Epicharis maculata f. *parvula* – Moure *et al*. 2007: 139 (taxonomic decision for synonymy). — Rasmussen *et al*. 2009: 35 (list).

Diagnoses

Females

Pubescence mostly black with whitish hairs on gena, area of mesoscutum near tegula and propodeum; face with yellow maculae poorly developed, mainly on lower paraocular areas and labrum; malar area

sub-rectangular; yellow maculae on entire disc of mesoscutellum; metasoma without distinct yellow maculae or with short spots on lateral sides of T3 and T4; tegula and wing veins dark brown.

Males

Head and mesosoma with black and whitish hairs intermixed giving a grayish appearance; yellow maculae well-developed on face and mesoscutellum; malar area sub-rectangular; lateral sides of T2–T5 with yellow to testaceous maculae, lateral sides of T2 with a sub-rectangular spot; tegula and veins of wings dark brown; middle trochanter flat with a small projection and hind femur slender; pubescence of hind tibia and basitarsus scopa-like.

Type material

Lectotype (here designated)

BRAZIL • ♀; "Kammerlacher\ *Epicharis obscura* ♀ [Handwritten] det. Friese 1898 n. sp\ Lectotype *Epicharis obscura* Friese, 1899 des. F. Vivallo, 2017 [Blue label]"; NHMW.

Paralectotype

BRAZIL • 1 ♀; "Brasil S. Leopoldina 1897\ *Epicharis obscura* [Handwritten] 1910 Friese det.\ Am. Mus. Nat. Hist. Dept. Invert. Zool. No. 26418 [Handwritten]\ Type [Red label]\ *Epicharitides obscura* Friese [Handwritten] Det. By H.F. Schwarz"; AMNH.

Epicharis maculata* f. *interrupta

Holotype female (ZMB, not studied).

Epicharis maculata* f. *parvula

Holotype female (ZMB, not studied).

Material examined (n = 13 ♀♀, 3 ♂♂)

BRAZIL • 1 ♀; "Brasilien\ *Epicharis obscura* 1900 Friese det."; HNHM. – **Espírito Santo** • 1 ♂; "Esp. Santo Staud.; 98\ *Epicharis obscura* ♂ det. Friese 1898"; HNHM. – **Minas Gerais** • 1 ♀; "Florestal MG BRASIL; 05/12/2001 E.A.B. Almeida\ CEDAF 7767-23417"; DZMG • 1 ♀; "Sabará MG BRASIL; 10/03/2001 R.B. Martines/Abelhas da Zona Metalúrgica MG; Ch. Do Lessa; 8000-24403"; DZMG. – **Rio de Janeiro** • 1 ♀; "Sumidouro RJ BRASIL; 26/03/2011; R.L. Guaritá/Monitoram.; Fauna Furnas MG e RJ 20936-59993\ *Epicharis* (*Epicharitides*) *obscura* ♀ Friese, 1899 R.R. Ferrari det. 2011"; DZMG. – **São Paulo** • 1 ♀; "CAMPINAS, SP MATA DA FAZ. STA. GENEBRA; 05/04/1985\ 101\ 860013\ *Epicharis* (*Epicharitides*)\ *Epicharis obscura* Friese, 1899 det. Gaglianone, 2000"; RPSP • 2 ♀♀; "CAMPINAS, SP MATA DA FAZ. STA. GENEBRA; 05/III/1990\ *Epicharis obscura* (Friese, 1899) Det. Camargo 1990\ *E*. (*Epicharitides*) *obscura* Friese, 1899 Det. Moure, 1992"; RPSP • 1 ♀; "CAMPINAS, SP MATA DA FAZ. STA. GENEBRA; 17/03/1980\ 145\ 860012\ *Epicharis* (*Epicharitides*) *obscura*\ *Epicharis grandior* Friese, 1899 det. Gaglianone, 2000"; RPSP • 1 ♀; "Mogi das Cruzes, SP Brasil; 03.XII.2012; Leg. G.D. Cordeiro\ *Epicharis* (*Epicharitides*) *obscura* Friese, 1899 F. Vivallo det, 2014\ 293"; CEPANN. – **Sergipe** • 2 ♀♀; "Itabaiana, SE, Brasil Serra de Itabaiana; 06/I/2001 Leg. Michelette, ERF"; RPSP.

Morphology

Female (Fig. 8A–B)

Measurements. Approximate body length: 15.2 (14.9–15.3). Head width: 4.8 (4.7–4.9). Mesosoma width: 5.1 (4.9–5.1). Metasoma width: 5.3 (5.2–5.4). Forewing length: 11.2 (11–11.2).

Coloration. Predominantly dark brown to black, lighter brown on apex of labrum and mandible, legs, lateral sides of T1 and S1. Brown integument on ventral surface of flagellomeres, except basal half of

F1. Maculation as follows: an irregular elliptical spot on corner of lower paraocular area; on basal half of labrum, emarginated on medial area; an elliptical spot on upper malar area; an irregular stripe near to dorsolateral angle of pronotum; a faint spot on dorsal surface of tibia basally; on disc of mesoscutellum, finely interrupted medially; small spots on basal lateral sides of T3 and T4. Tegula, wings and veins dark brown. Tarsus reddish brown.

Pubescence. Dark brown to black with whitish hairs intermixed giving a grayish aspect on paraocular area, vertex, dorsal surface of fore tibia, on mesoscutum near the tegula and lateral sides of T3–T5. Whiter on gena, hypoepimeral lobe, metepisternum, metanotum and propodeum. Ferruginous hairs on apex of labrum, mandible and ventral surface of basitarsus and hind tibia. Long, decumbent, scattered and simple hairs on lateral sides of clypeus and lower gena (2–5 × OD), denser on apical half of labrum. Paraocular area near the alveolus with dense, short and plumose hairs (0.5–1 × OD), sparser towards frons and vertex. Long, dense and plumose hairs on vertex and occipital area near the carina (2–5 × OD), shorter on gena. Sparse and plumose hairs on dorsum and lateral sides of mesosoma (2–3 × OD), sparser and shorter on pronotum, longer on propodeum. Ventral surface of mesosoma with long, semi erected and coarse hairs. Anterior surface of coxa with finer hairs. Terga covered with appressed hairs. Anterior surface of T1 with long, scattered and plumose hairs (1–2 × OD). Long, scattered and simple hairs on lateral sides of T3–T5 and distal margin of T5 (1–3 × OD), being longer progressively towards distal segments. Apical half of sterna with long, dense and simple hairs, mainly on lateral sides, remaining half nearly glabrous.

Sculpture surface. Clypeus and labrum areolate, more evident on lateral sides of clypeus and on apical half of labrum. Coarse and sparse punctation on paraocular areas and vertex (2–5 × puncture width), coarser towards frons and denser on occipital area and gena. Mesoscutum with coarse and scattered punctation (2–5 × puncture width), denser on metepisternum and sparser nearly absent on propodeum and mesoscutellum. Terga weakly imbricate. Preapical area of T5 smooth. Coarse and sparse punctures through medial area of sterna, denser towards distal margins and on lateral sides.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.7–0.8: 1. Maximum interocular distance shorter than length of compound eye (0.7–0.6: 1). Clypeus broader than long (1.5: 1) with length equal to clypeocellar distance (1: 1). Labrum longer than broad (1.2–1.1: 1). Interalveolar distance longer than alveolorbital distance (2.4–2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.7–0.8: 1). Lateral ocelli at the same level of the upper supraorbital tangent. Interocellar distance equal than ocellocular distance (1: 1). Frontal carina extending from tip of supraclypeal carina to median ocellus (1.8–1.6 × OD). Length of F1 equal to summed length of F2 and F3 and shorter than length of F2–F4 (0.5–0.6: 0.5–0.6: 1). Vertex below the upper supraorbital tangent. Clypeal carinae conspicuous, lower half of epistomal suture poorly evidenced. Mesoscutellum rounded in lateral view, slightly flat.

Variation. Faint spots nearly absent on corner of lower paraocular area. Maculae on labrum reduced. An exemplar from the Brazilian State of Sergipe has more developed maculae: faint longitudinal stripe on clypeus and supraclypeal area; wider maculae on corner of paraocular area; stripes on T2–T5. Gena, paraocular area and ventral surface of mesosoma with mostly whitish pubescence.

Male (Fig. 8C–D)

As the female, except as follows:

Measurements. Approximate body length: 15.0 (15–15.2). Head width: 4.8 (4.8–4.9). Mesosoma width: 5.0 (4.9–5.1). Metasoma width: 5.1 (5–5.2). Forewing length: 11.0 (10.9–11.1).

Coloration. Yellow maculation as follows: on paraocular area, from alveolar tangent to lower paraocular area, bifurcated upwards; on ventral surface of scape and basal half of F1, barely evident; an irregular triangle shape on lower clypeal disc, finely extending towards upper margin; at supraclypeal area; labrum; on macular area; on most of mandible, except near the base as longitudinal stripes and apex; an irregular spot on basal margin of fore tibia; on disc of mesoscutellum; an irregular sub-rectangular spot on lateral sides of T2; a small spot on lateral sides of T3–T6.

Pubescence. Black and whitish hairs intermixed giving a grayish appearance on gena, mesosoma, legs (except hind tibia and basitarsus) and T1. Dorsal surface of fore and middle basitarsi covered by whitish hairs. Basal lateral sides of clypeus, disc of labrum and base of mandible nearly glabrous. Dorsum of mesosoma and propodeum with longer, denser and plumose hairs (3–5 × OD). Disc of T1 with longer and denser hairs than those on propodeum. Appressed hairs on T3 restricted to apical half, almost absent on basal half.

Sculpture surface. Coarser and denser punctation on lateral sides of clypeus (0.2–2 × puncture width), disc weakly areolate on basal surface. Paraocular area with fine and scattered punctures (2–5 × puncture width), denser and coarser towards frons and almost absent near the ocelli. Mesosoma with coarser punctures, mostly on metepisternum.

Fig. 8. *Epicharis* (*Epicharitides*) *obscura* Friese, 1899. **A–B**. Female (Brazil: Mogi das Cruzes; CEPANN). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Male (Brazil: Santa Teresa; HNHM). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.6–0.7: 1. Maximum interocular distance shorter than length of compound eye (0.7–0.8: 1). Clypeus broader than long (1.8–1.7: 1) with length equal to clypeocellar distance (1: 1). Labrum longer than broad (0.8: 1). Interalveolar distance longer than alveolorbital distance (2.6–2.5: 1). Interalveolar distance shorter than alveolocellar distance (0.7: 1). Interocellar distance longer than ocellocular distance (1.2–1.1: 1). Frontal carina inconspicuous (1.9–1.8 × OD). Length of F1 equal to F2 (1: 1), F2 shorter than F3 (0.8: 1) and F3 slightly shorter than F4 (0.9: 1), (0.8: 0.8: 0.9: 1). Clypeal carinae and epistomal suture conspicuous. Malar area sub-rectangular. Length of apical tooth more than twice the length of the preapical tooth. Middle trochanter flat with a small triangular projection. Hind femur and tibia slender. Anterior and posterior surfaces of hind basitarsus sub-parallel.

Type localities

Epicharis obscura: **BRAZIL: Espírito Santo:** Santa Leopoldina. *Epicharis maculata* f. *interrupta* and *E. maculata* f. *parvula*: **PARAGUAY: Distrito Capital:** Asunción.

Distribution (Fig. 11)

BRAZIL: Sergipe: Itabaiana*. **Minas Gerais:** Ibiá (Gaglianone 2001), Florestal*, Sabará*, Pocinhos do Rio Verde (Gaglianone 2001). **Espírito Santo:** Santa Teresa (Gaglianone 2001; Varassin & Sazima 2012), Santa Leopoldina (Friese 1899; Schrottky 1902a; Gaglianone 2001), São João de Petrópolis (Gaglianone 2001). **Rio de Janeiro:** Sumidouro*, Reserva Biológica União (Menezes 2011), Rio de Janeiro (Gaglianone 2001). **São Paulo:** Corumbataí (Andena *et al*. 2005), Teodoro Sampaio (Gaglianone 2001; Gaglianone *et al*. 2011), Campinas (Sazima & Sazima 1989; Buzato 1990; Franco 1991; Gaglianone 2001; Sigrist & Sazima 2004; Gaglianone *et al*. 2011; Sigrist & Sazima 2014), São Paulo (Moure 1945b; Gaglianone 2001; Gaglianone *et al*. 2011), Mogi das Cruzes*. **Paraná:** Parque Estadual Serra do Mar (Pinheiro *et al*. 2018). **PARAGUAY: Distrito Capital:** Asunción (Schrottky 1908). **Alto Paraná:** Presidente Franco (Bertoni 1918).

Comments

According to Friese (1899), the type series of *Epicharis obscura* consists of two females from "São Leopoldina" (Santa Leopoldina, Brazil), one of them housed at NHMW. Additionally, Moure *et al*. (2007) indicated that the other female of the type series was housed at ZMB, but it is actually deposited at AMNH.

The forms *E. maculata interrupta* and *E. maculata parvula* were cited by Moure *et al*. (2007) as junior synonyms of *E. obscura*. Unfortunately, we cannot confirm this interpretation because the type specimens used by Schrottky were not found during the development of this research.

Most records of *E. obscura* are in the Brazilian States of São Paulo and Minas Gerais (Parana biogeographic domain sensu Morrone 2014), extending northward to Sergipe State. Considering the information cited above about the Schrottky's type material, the record from Asunción (Paraguay) remains doubtful.

Epicharis* (*Epicharitides*) *rufescens Moure & Seabra, 1959
Figs 9, 12

Epicharis (*Epicharitides*) *rufescens* Moure & Seabra, 1959: 123 (original description).

Epicharis (*Epicharitides*) *rufescens* – Gaglianone 2001: 187 (distribution). — Silveira *et al*. 2002: 102 (list, distribution). — Moure *et al*. 2007: 139 (catalogue, distribution).

Diagnoses

Females

Pubescence predominantly testaceous; yellow maculae well-developed on face, mostly on paraocular areas; area malar sub-rectangular; posterior margin of mesoscutellum with a yellow macula; T1–T4 with appressed yellow to testaceous hairs mainly on medial area of disc; tegula and wing veins reddish brown; basitibial plate light brown.

Males

Pubescence mostly yellowish to testaceous with whitish hairs on gena and legs; yellow maculae on face more developed than those on female; malar area sub-rectangular; yellow maculae on most of posterior margin of mesoscutellum; apical halves of T2–T5 with yellow to testaceous appressed hairs; tegula and wing veins reddish brown; hind femur robust.

Type material

Holotype female (DZUP, not studied). Paratype female (MNRJ, studied). Paratype male (MNRJ, studied).

Material examined (n = 1 ♀, 1 ♂)

BRAZIL – **Pará** • 1 ♀, 1 ♂; "COLEÇÃO CAMPOS SEABRA\ OBIDOS Pará BRASIL; IV-1955 J. Brazilino\ PARATYPE *E*. (*Epicharitides*) *rufescens* J.S. Moure 56"; MNRJ †.

Morphology

Female (Fig. 9A–B)

Measurements. Approximate body length: 13.5. Head width: 4.4. Mesosoma width: 4.7. Metasoma width: 4.9. Forewing length: 11.0.

Coloration. Integument largely dark brown to black. Light reddish-brown on mandible, pronotum, legs including basitibial plate and metasoma. Dark yellowish on apical halves of T2–T5, except lateral sides of disc as two emarginations. Ventral surface of scape, pedicel, F1 and F2 reddish brown. Maculation as follows: wide stripe on paraocular area near the margin of compound eye, from alveolar tangent to lower paraocular area, wider on lower area; longitudinal line on clypeal disc; at supraclypeal area, finely interrupted medially; a stripe on apical margin of scape; on basal half of labrum, medially emarginated; on most of malar area, mainly on anterior area; on most of dorsal surface of mandible, except apex; a faint irregular spot on basal margin of fore tibia; an irregular stripe near the dorsolateral angle of pronotum; an irregular spot on anterior margin of tegula; a wide transversal and irregular stripe on mesoscutellum. Tegula and tarsi reddish brown. Wings and veins dark brown.

Pubescence. Predominantly testaceous to yellowish with whitish hairs on paraocular area, basal lateral sides of clypeus, dorsal surface of mandible, gena, fore tibia, dorsal surface of basitarsus and ventral surface of metepisternum. Ferruginous hairs on mandible and ventral surface of hind tibia and basitarsus. Clypeal disc smooth, lateral sides with short, scattered and simple hairs (0.5–1 × OD). Labrum with dense, short and simple hairs on apical half, longer towards lateral and apical margins (1–4 × OD), almost absent on basal half. Dense, long plumose hairs on paraocular area near the alveolus, vertex and occipital area (1–4 × OD). Lower gena with appressed pubescence mainly on area near the margin of compound eyes, scattered and shorter towards upper gena. Dense, long and plumose hairs on mesosoma (2–3 × OD), sparser on disc of metepisternum and nearly absent on lateral sides of pronotum. Long, coarse, dense and simple hairs on ventral surface of mesosoma, finer on mesepisternum and anterior surface of coxa. Discs of T1–T4 with appressed pubescence mainly on yellow areas. Anterior surface and disc of T1 with scattered and plumose hairs as those on propodeum. Long, decumbent, dense and

simple hairs on preapical margin of T5 (3–5 × OD), with tomentose pubescence on distal margin. Long, dense and simple hairs on posterior surface of S2–S5 (1–4 × OD), sparser on medial area.

Sculpture surface. Lower half of clypeus weakly areolate, upper half with fine, circular and sparse punctation (1–3 × puncture width) coarser at lateral sides. Labrum weakly areolate, more evident towards apex. Paraocular area with fine, circular and scattered punctation (2–5 × puncture width), coarser on frons and finer and denser on vertex and occipital area (0.5–2 × puncture width). Gena with sparse and fine punctures barely evident. Dorsum of mesosoma with fine and dense punctation (1–2 × puncture width), coarser on metepisternum and nearly absent on lateral sides of pronotum. Terga weakly imbricate, lateral sides of T1 and apical area of T5 smooth. Medial area of S2–S5 with coarse, circular and sparse punctation (2–4 × punctation width), denser and finer towards apical margin, nearly absent towards base.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.8: 1. Maximum interocular distance shorter than length of compound eye (0.8: 1). Clypeus broader than long (1.6: 1) with more length than clypeocellar distance (1.1: 1). Labrum longer than broad (1.2: 1). Interalveolar distance longer than alveolorbital distance (2.3: 1). Interalveolar distance shorter than alveolocellar distance (0.8: 1). Lateral ocelli above the upper supraorbital tangent. Interocellar distance

Fig. 9. *Epicharis* (*Epicharitides*) *rufescens* Moure & Seabra, 1959. **A–B**. Paratype, ♀ (Brazil: Óbidos; MNRJ). **A**. Head, frontal view. **B**. Habitus, lateral view. **C–D**. Paratype, ♂ (Brazil: Óbidos; MNRJ). **C**. Head, frontal view. **D**. Habitus, lateral view. Scale bars: A, C = 1 mm; B, D = 5 mm.

equal to ocellocular distance (1: 1). Frontal carina extending from supraclypeal carina to median ocellus (1.4× OD). Length of F1 equal to length of F2 and F3 and shorter than length of F2–F4 (0.6: 0.6: 1). Vertex at the same level of the upper supraorbital tangent. Epistomal suture and clypeal carinae conspicuous. Mesoscutellum rounded in lateral view.

Male (Fig. 9C–D)

As the female, except as follows:

Measurements. Approximate body length: 12.2. Head width: 3.9. Mesosoma width: 4.3. Metasoma width: 4.4. Forewing length: 11.2.

Coloration. Legs and lateral sides of T1 lighter reddish brown. Maculae as follows: on paraocular area, from alveolar tangent to lower paraocular area; on ventral surface of scape, pedicel and base of F1, barely noticeable; a triangular shape on lower margin of clypeal disc, finely prolonged towards upper margin; at supraclypeal area; on labrum, malar area and most of mandible, except apex; an irregular spot on basal margin of fore and middle tibiae; on most of ventral surface of fore and middle trochanters; a wide stripe on posterior margin of mesoscutellum; an obscured stripe on basal lateral sides of terga.

Pubescence. White on ventral area of mesosoma and legs. Dense and plumose hairs on occipital area, mesosoma and T1.

Sculpture surface. Lower half of clypeal disc weakly areolate and upper half with fine and scattered punctation (1–4× puncture width), denser on lateral sides. Upper paraocular area with sparser punctation (2–5× puncture width) and impunctate areas near the alveolus. Mesosoma with coarser punctation, mainly on metepisternum.

Structures. Head broader than long (1.2: 1). Ratio of upper and lower interocular distances: 0.9: 1. Maximum interocular distance shorter than length of compound eye (0.7: 1). Clypeus broader than long (1.8: 1) with length equal to clypeocellar distance (1: 1). Width of labrum equal to length (1: 1). Interalveolar distance longer than alveolorbital distance (2.8: 1). Interalveolar distance shorter than alveolocellar distance (0.8: 1). Lateral ocelli slightly above the upper supraorbital tangent. Interocellar distance slightly longer than ocellocular distance (1.1: 1). Frontal carina inconspicuous (1.5× OD). Length of F1 longer than F2 (1.2: 1), F2 shorter than F3 (0.7: 1) and F3 equal to F4 (1: 1), (0.9: 0.7: 1: 1). Clypeal carinae conspicuous and epistomal suture barely evident. Malar area sub-rectangular. Apical tooth about twice as long as preapical tooth. Middle trochanter conical. Hind femur and tibia robust. Anterior and posterior surfaces of hind basitarsus curved.

Type locality

BRAZIL: Pará: Óbidos.

Distribution (Fig. 12)

Only known from the type locality.

Comments

Epicharis rufescens is only known from its type specimens, all of them collected in Óbidos, northern Brazil. The morphological descriptions here provided are more detailed with respect to the original description and they are based on the paratypes that were housed at MNRJ before being destroyed in the fire. At first glance, the specimens of this species look like aberrant Amazonic forms of *E. duckei* by their unusual coloration. However, the combination of characters cited above allows recognizing *E. rufescens* as a distinct species.

It is necessary to collect more specimens of this species to study its morphological variation and distribution range, mainly the variation related to the maculae because we evidenced some differences in their format and development taking into account the information provided in the original description.

Key to the species of Epicharis (Epicharitides) Moure, 1945

Females

1. Mesoscutellum with well-defined yellow maculae 2
– Mesoscutellum dark brown to black, without yellow maculae 6

2. Yellow macula covering entirely the disc of mesoscutellum or most of disc as two elliptical spots; yellow maculae poorly developed or only present on few areas of face (only on lower paraocular area and labrum) 3
– Yellow macula on posterior margin of mesoscutellum as a longitudinal irregular spot; distinct yellow maculae on many areas of face (mandible, clypeus and paraocular, malar, and supraclypeal areas) 4

3. Metasoma with testaceous to orange pubescence; T2–T5 with yellow maculae as wide spots throughout the discs, narrower on medial area; pubescence of mesepisternum entirely black (Fig. 6) ..... ***Epicharis mesoamericana*** sp. nov.
– Metasoma with dark brown to black pubescence; T3 and T4 with yellow maculae as irregular spots on lateral sides; pubescence of mesepisternum mostly black with whitish hairs on ventral surface (Fig. 8A–B) ..... ***Epicharis obscura*** Friese, 1899

4. Metasoma with testaceous to ferruginous pubescence as irregular stripes, without yellow maculae (Fig. 9A–B) ..... ***Epicharis rufescens*** Moure & Seabra, 1959
– Metasoma with pubescence predominantly dark brown to black; yellow maculae on T1–T5 5

5. Lateral sides of T2 with sub-rectangular yellow maculae extending finely towards the disc; maculae on T3–T5 as irregular stripes throughout disc; tegulae reddish and translucent; wing veins reddish brown; pubescence of mesepisternum predominantly whitish (Fig. 2A–B) ..... ***Epicharis duckei*** Friese, 1901
– Irregular yellow maculae on T2–T5 increasing in size laterally; tegulae and wing veins dark brown; pubescence of metepisternum mostly dark brown to black with whitish hairs on ventral surface (Fig. 4A–B) ..... ***Epicharis lia*** sp. nov.

6. Metasoma with mostly yellowish pubescence, without yellow maculae; tegulae and wing veins dark brown; mesoscutellum bilobed in posterior view 7
– Metasoma with predominantly dark brown to black pubescence, with yellow maculae on lateral sides of T2–T5; tegulae and wing veins reddish brown; mesoscutellum rounded in lateral view ... 8

7. Punctation on paraocular area, frons and vertex fine and scattered, with large impunctated areas; clypeal carinae inconspicuous; supraclypeal area without carina; metasoma dark brown to black with short, sparse and yellowish hairs on T2–T5, denser on lateral sides and towards the distal terga (Fig. 7A–B) ..... ***Epicharis minima*** (Friese, 1904)
– Punctation dense and coarse on paraocular area and vertex, denser on frons; clypeal carinae and supraclypeal area conspicuous; integument of T2–T5 mostly yellow with dense yellow pubescence, except on medial basal margin and medial sides of discs as two deep emarginations (Fig. 5A–B) ... ***Epicharis luteocincta*** Moure & Seabra, 1959

8. Pubescence of head and mesosoma whitish; malar area sub-rectangular; hind elaiospathe with hook-shaped hairs located posteriorly to primary anterior comb; yellow maculae on face well-developed (Fig. 1A–B) .....***Epicharis cockerelli*** Friese, 1900
– Pubescence of head and mesosoma mostly dark brown to black except on propodeum; malar area reduced; hind elaiospathe without hook-shaped hairs; yellow maculae on face less developed (Fig. 3A–B) .....***Epicharis iheringi*** Friese, 1899

Males

*The males of *Epicharis lia* sp. nov. and *E. mesoamericana* sp. nov. are unknown.

1. Mesoscutellum with a well-defined yellow macula 2
– Mesoscutellum dark brown to black, without maculae 4

2. Yellow macula covering completely the disc of mesoscutellum; middle trochanter flattened with a small triangular projection; head and mesosoma with whitish and black hairs intermixed giving a grayish appearance (Fig. 8C–D) .....***Epicharis obscura*** Friese, 1899
– Yellow macula on posterior margin of mesoscutellum as a longitudinal stripe; middle trochanter conical, without projection; pubescence of head and dorsum of mesosoma mostly yellowish 3

3. Metasoma with testaceous to ferruginous pubescence mainly on distal areas as irregular stripes, without yellow maculae (Fig. 9C–D) .....***Epicharis rufescens*** Moure & Seabra, 1959
– Metasoma with yellowish to whitish pubescence and yellow maculae on T2–T6 as wide stripes throughout disc, narrower medially (Fig. 2C–D) .....***Epicharis duckei*** Friese, 1901

4. T2–T6 with yellow pubescence and without yellow maculae; tegulae and wing veins dark brown; dorsal surface of hind tibia and basitarsus with yellow pubescence and yellow maculae at the apex 5
– Terga with whitish or black pubescence and yellow maculae as wide stripes on discs of T3–T6; tegulae and wing veins reddish brown; dorsal surface of hind tibia and basitarsus with whitish pubescence, without yellow maculae 6

5. Metasoma dark brown to black with short, sparse and yellowish hairs on T2–T6, denser on lateral sides and on distal terga; middle tibial spur leaf-shaped (elongated medially and narrowed at base and apex) (Fig. 7C–D) .....***Epicharis minima*** (Friese, 1904)
– Integument of T2–T5 mostly yellow with dense yellow pubescence, except on medial basal margin and medial sides of discs as two deep emarginations; spur of middle tibia linear (Fig. 5C–D) ....***Epicharis luteocincta*** Moure & Seabra, 1959

6. Yellow maculae on T1 and T2 as wide stripes throughout the discs, narrower on medial area; lateral distal margins of S2–S4 with short, dense and simple hairs, scattered almost absent towards medial area; hind femur robust; anterior and posterior margins of hind basitarsus curved (Fig. 1C–D) ....***Epicharis cockerelli*** Friese, 1900
– Yellow maculae on lateral sides of T1 as short stripes; T2 with yellow sub-rectangular spots; distal half of S2–S4 with long, dense and simple hairs curved towards medial area of disc; hind femur slender; anterior and posterior margin of hind basitarsus subparallel (Fig. 3C–D) ....***Epicharis iheringi*** Friese, 1899

Discussion

A total of nine species were recognized in the taxonomic revision, two of which are new to science. The compilation of distributional records made in this research expanded the previously known distributions of the species of the subgenus, including the discovery of the first species of this lineage occurring in Central America. Most of these records correspond to places related to low mountain forests, such as the lowland forest of Central America, the Colombian, Brazilian and Peruvian Amazon, and the Brazilian Atlantic Forest. The interpretation of these records suggests that the subgenus could also be present in Mexico, Ecuador, and in northern South America because those areas belong to the biogeographic regions where species of the subgenus have been recorded (e.g., Mesoamerican and Boreal Brazilian

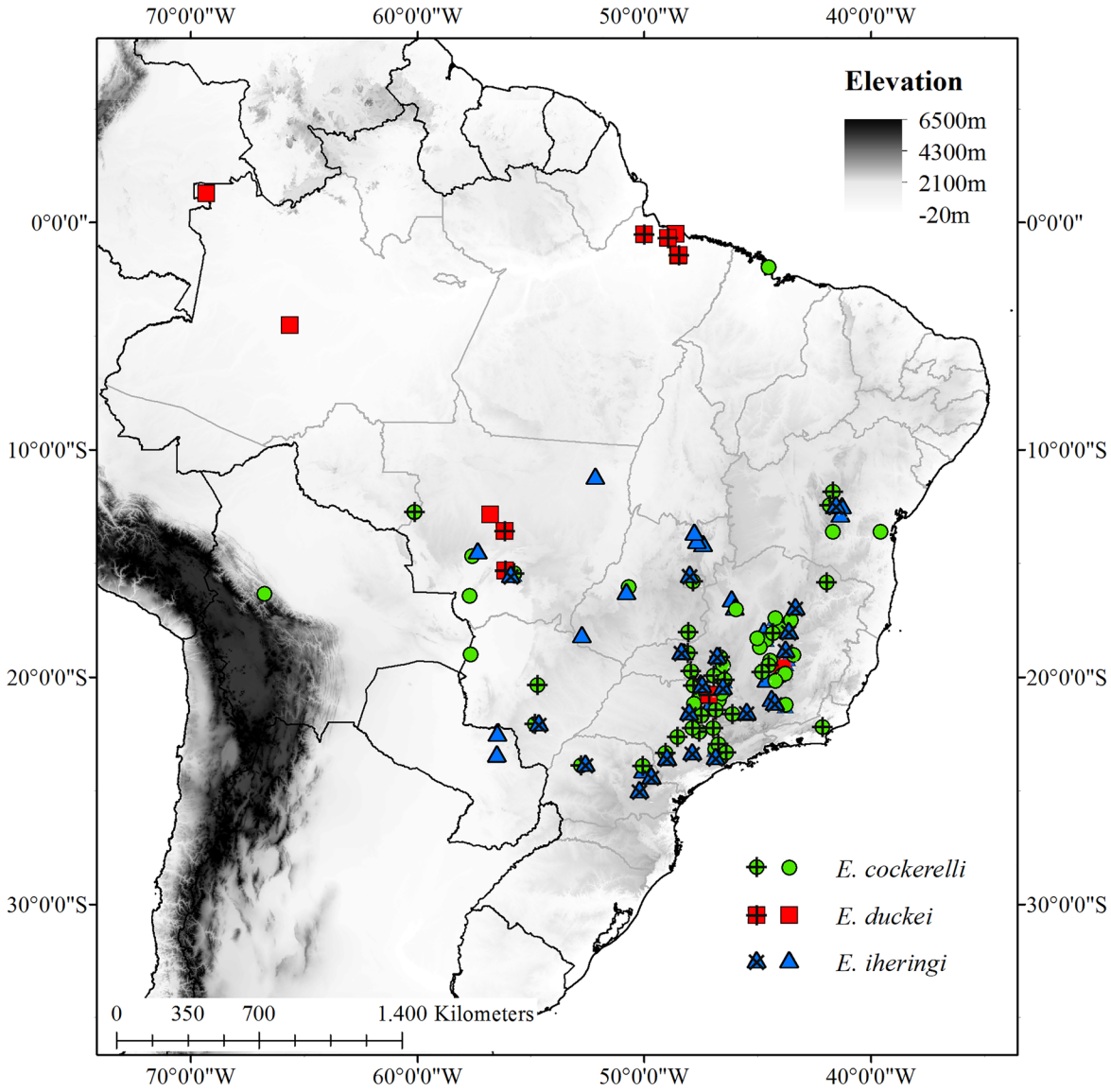

Fig. 10. Distribution records for *Epicharis cockerelli* Friese, 1900, *E. duckei* Friese, 1901 and *E. iheringi* Friese, 1899. Symbols with a cross represent records from literature.

dominion sensu Morrone 2014). Unfortunately, it is not yet clear whether the distribution of the species of this subgenus is correlated with the distribution of their oil-offering floral hosts (see Table 1). This research opens interesting questions about the biogeographical history of the group and about which events influenced the ancestral and current distribution of the species of this subgenus. A phylogenetic and biogeographic study could lead to the resolution of these hypotheses.

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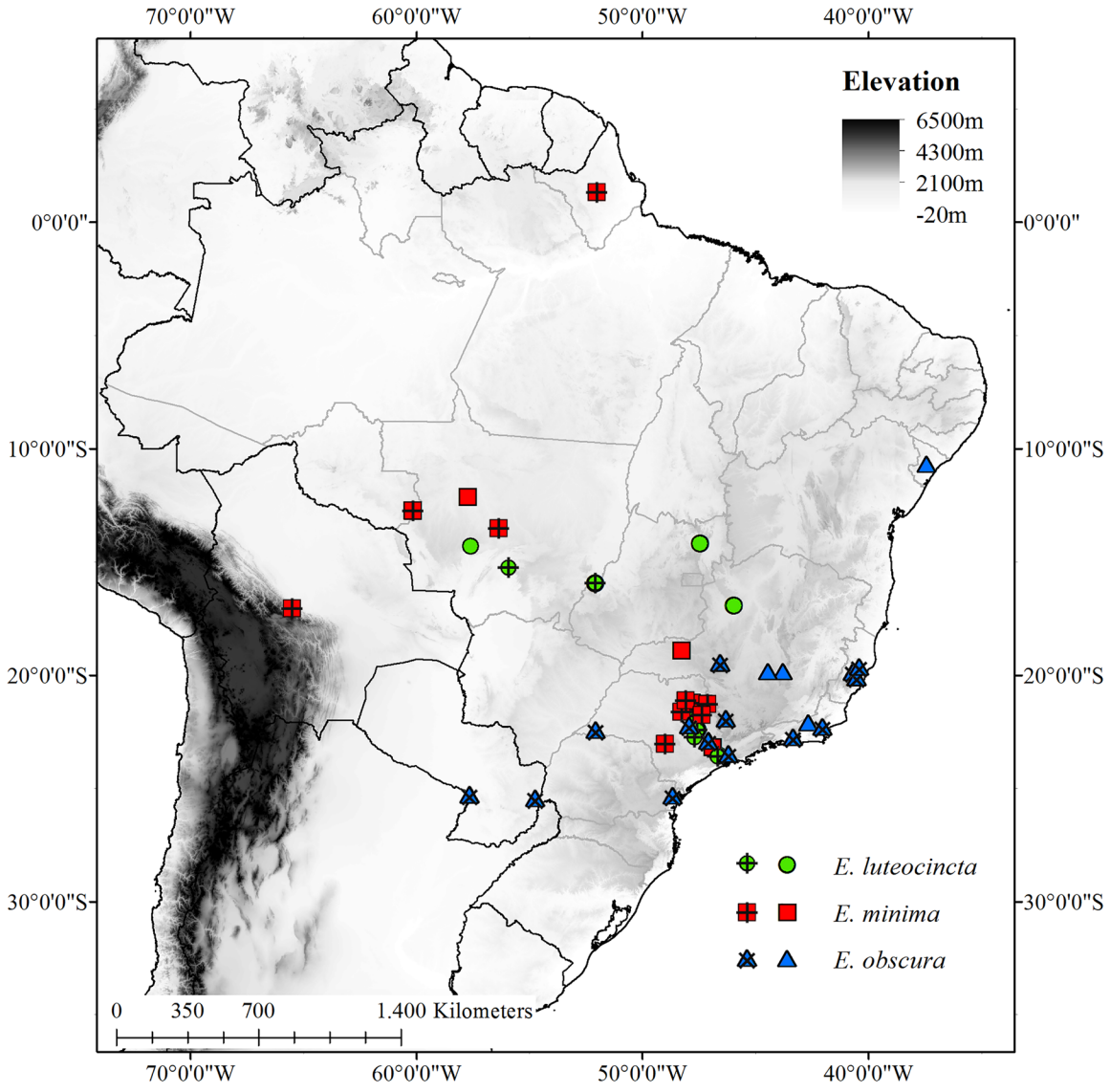

Fig. 11. Distribution records for *Epicharis luteocincta* Moure & Seabra, 1959, *E. minima* (Friese, 1904) and *E. obscura* Friese, 1899. Symbols with a cross represent records from literature.

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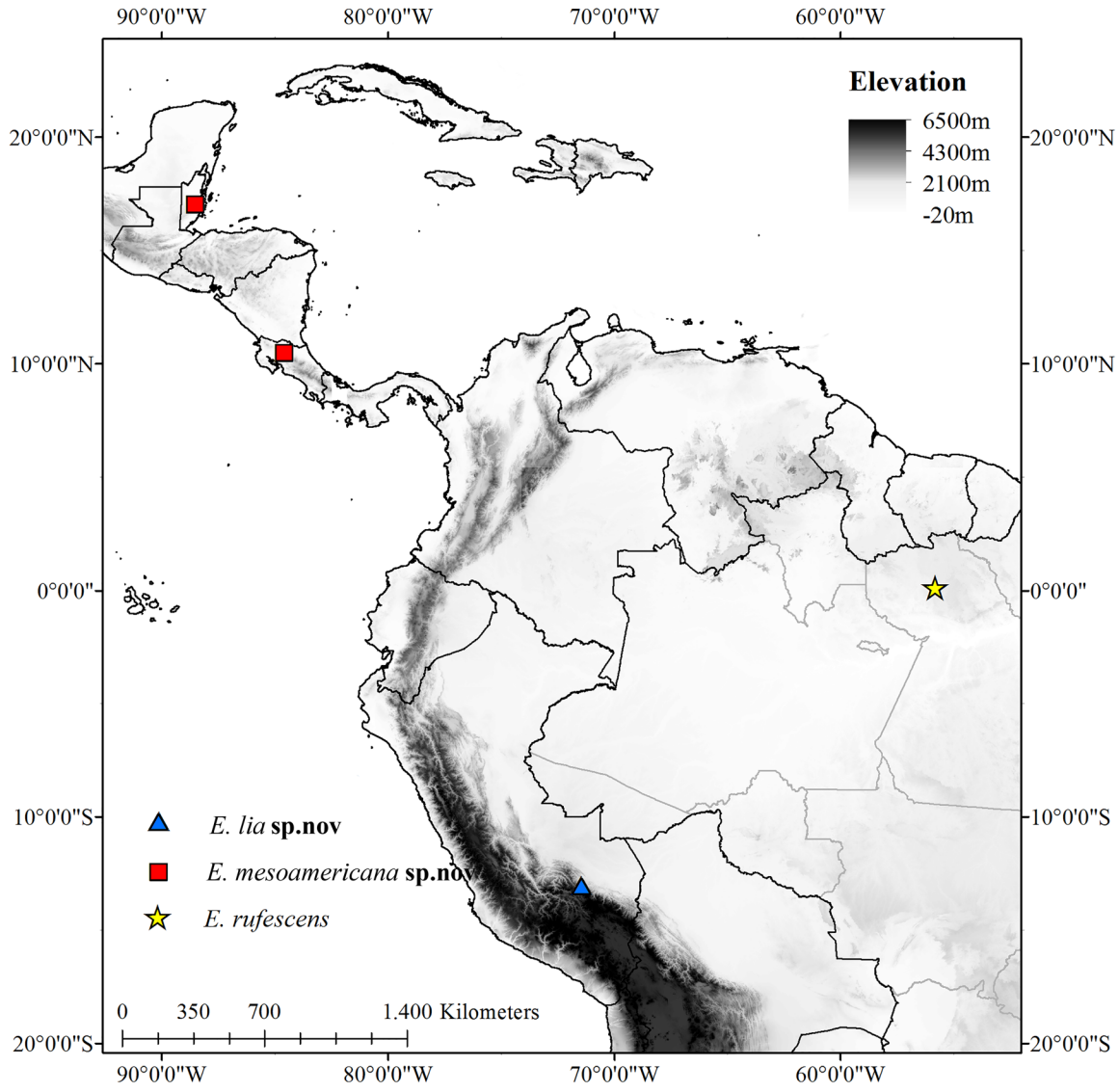

Fig. 12. Distribution records for *E. lia* sp. nov., *E. mesoamericana* sp. nov. and *E. rufescens* Moure & Seabra, 1959.

Table 1 (continued on next three pages). Floral records of the species of the subgenus *Epicharis* (*Epicharitides*) Moure, 1945. [1] Cited as *Mascagania cordiflora*. [2] Cited as *Centris duckei*. [3] *Chamaecrista semaphora* (H.S.Irwin & Barneby) H.S.Irwin & Barneby, species name unresolved according to IPNI. [4] Cited as *Chamaechistra* sp. [5] Cited as *Memora peregrine*. [6] Cited as *Palicourea xanthofila*. [7] Classification according to Gray Crad Index (GCI). * Not found in IPNI data set.

Species	Floral record	Family	References
Epicharis cockerelli	*Baccharis dracunculifolia* DC.	Asteraceae	Schrottky (1901)
	Banisteriopsis malifolia (Nees & Mart.) B.Gates	Malpighiaceae	Ferreira (2013)
	Banisteriopsis campestris (A. Juss.) Little	Malpighiaceae	Cappellari (2011)
	Byrsonima basiloba A. Juss.	Malpighiaceae	Cappellari (2011)
	Byrsonima coccolobifolia Kunth	Malpighiaceae	Amorim (2009) Amorim & De Marco (2011) Cappellari (2011) Gottsberger (1986)
	Byrsonima crassa Nied.	Malpighiaceae	Pedro (1994)
	Byrsonima intermedia A.Juss.	Malpighiaceae	Almeida (2002) Andena *et al*. (2005) Andena *et al*. (2012) Gaglianone (2001) Gaglianone (2003) Gottsberger (1986) Imperatriz-Fonseca *et al*. (2011) Mateus (1998) Oliveira *et al*. (2007) Pedro (1994)
	Byrsonima laxiflora Griseb.	Malpighiaceae	Cappellari (2011)
	Byrsonima rigida A.Juss.	Malpighiaceae	Cappellari (2011)
	Byrsonima sericea DC.	Malpighiaceae	Aguiar *et al*. (2017a) Aguiar *et al*. (2017b) Menezes (2011) Rosa (2009)
	Caesalpinia peltophoroides Benth.	Caesalpiniaceae	Del Lama & Peruquetti (2006)
	Chamaecrista debilis (Vogel) H.S.Irwin & Barneby	Caesalpiniaceae	Imperatriz-Fonseca *et al*. (2011)
	Chamaecrista desvauxii (Collad.) Killip var. *glauca* (Hassl.) H.S.Irwin & Barneby	Caesalpiniaceae	Gottsberger & Silberbauer-Gottsberger (1988)
	Eugenia punicifolia (Kunth) DC.	Myrtaceae	Andena *et al*. (2012)
	Heteropterys umbellata A.Juss.	Malpighiaceae	Pinto (2013)
	Malpighia emarginata DC.	Malpighiaceae	Giannini *et al*. (2014) Sazan *et al*. (2014) Vilhena & Augusto (2007) Vilhena *et al*. (2012)
	Mascagnia cordifolia Griseb.	Malpighiaceae	Imperatriz-Fonseca *et al*. (2011)[1]

Table 1 (continued). Floral records of the species of the subgenus *Epicharis* (*Epicharitides*) Moure, 1945. [1]Cited as *Mascagania cordiflora*. [2]Cited as *Centris duckei*. [3]*Chamaecrista semaphora* (H.S.Irwin & Barneby) H.S.Irwin & Barneby, species name unresolved according to IPNI. [4]Cited as *Chamaechistra* sp. [5]Cited as *Memora peregrine*. [6]Cited as *Palicourea xanthofila*. [7]Classification according to Gray Crad Index (GCI). [*] Not found in IPNI data set.

Species	Floral record	Family	References
Epicharis cockerelli	*Memora peregrina* (Miers) Sandwith	Bignoniaceae	Gaglianone (2001) Andena *et al*. (2012) This study
	Palicourea rigida Kunth	Rubiaceae	Andena *et al*. (2005) Cardoso *et al*. (2017) Mateus (1998)
	Periandra mediterranea (Vell.) Taub.	Fabaceae	Imperatriz-Fonseca *et al*. (2011)
	Psychotria carthagenensis Jacq.	Rubiaceae	Consolaro (2004)
	Psychotria trichophoroides Müll.Arg.	Rubiaceae	Sá *et al*. (2016)
	Pterodon emarginatus Vogel	Leguminosae	This study
	Qualea multiflora Mart.	Vochysiaceae	Gaglianone (2001) Morais *et al*. (2020)
	Qualea parviflora Mart.	Vochysiaceae	Imperatriz-Fonseca *et al*. (2011) Oliveira & Gibbs (2000) Morais *et al*. (2020)
	Styrax camporum Pohl	Styracaceae	Andena *et al*. (2005)
	Vochysia thyrsoidea Pohl	Vochysiaceae	Oliveira & Gibbs (2000)
Epicharis duckei	*Bertholletia excelsa* O.Berg	Lecythidaceae	Pereira *et al*. (2014)
	Byrsonima sp.	Malpighiaceae	Ducke (1902a)[2]
	Polygala spectabilis DC.	Polygalaceae	Ducke (1901b)[2] Friese (1901)[2]
	Sabicea aspera Aubl.	Rubiaceae	Ducke (1901a)[2]
Epicharis iheringi	*Banisteriopsis campestris* (A.Juss.) Little	Malpighiaceae	Barônio & Torezan-Silingardi (2017)
	Banisteriopsis malifolia (Nees & Mart.) B.Gates	Malpighiaceae	Gaglianone (2001) Gaglianone (2003)
	Byrsonima crassa Nied.	Malpighiaceae	Barros (1992) Pedro (1994)
	Byrsonima umbellata Mart. ex A.Juss.	Malpighiaceae	Barros (1992)
	Byrsonima intermedia A.Juss.	Malpighiaceae	Pedro (1994) Mateus (1998) Gaglianone (2001) Gaglianone (2003) Carvalho & Oliveira (2010) This study
	Byrsonima laxiflora Griseb.	Malpighiaceae	Barros (1992)
	Byrsonima subterranea Brade & Markgr.	Malpighiaceae	Barros (1992)

Table 1 (continued). Floral records of the species of the subgenus *Epicharis* (*Epicharitides*) Moure, 1945. [1]Cited as *Mascagania cordiflora*. [2]Cited as *Centris duckei*. [3]*Chamaecrista semaphora* (H.S.Irwin & Barneby) H.S.Irwin & Barneby, species name unresolved according to IPNI. [4]Cited as *Chamaechistra* sp. [5]Cited as *Memora peregrine*. [6]Cited as *Palicourea xanthofila*. [7]Classification according to Gray Crad Index (GCI). [*] Not found in IPNI data set.

Species	Floral record	Family	References
Epicharis iheringi	*Byrsonima verbascifolia* Rich. ex Juss.	Malpighiaceae	Barros (1992)
	Calea hispida Baker	Asteraceae	Amaral-Neto (2013)
	Cassia semaphora (H.S.Irwin & Barneby) H.S.Irwin & Barneby	Fabaceae	This study[3]
	Chamaecrista sp.[4]	Caesalpiniaceae	Mateus (1998)
	Chrysolaena lithospermifolia (Hieron.) H.Rob.	Asteraceae	Amaral-Neto (2013)
	Didymopanax vinosum (Cham. & Schltdl.) Marchal	Araliaceae	Mateus (1998)
	Jacaranda oxyphylla Cham.	Bignoniaceae	Amaral-Neto (2013)
	Lippia lupulina Cham.	Verbenaceae	Gonçalves & Melo (2005)
	Memora peregrina (Miers) Sandwith	Bignoniaceae	Gaglianone (2001) Imperatriz-Fonseca *et al*. (2011)[5]
	Merremia macrocalyx (Ruiz & Pav.) O'Donell	Convolvulaceae	Neves *et al*. (2006)
	Oxalis physocalyx Zucc.	Oxalidaceae	Mateus (1998)
	Palicourea coriacea K.Schum.	Rubiaceae	Gaglianone (2001)
	Palicourea rigida Kunth	Rubiaceae	Gaglianone (2001) Mateus (1998)
	Palicourea sp.[6] [*]	Rubiaceae	Mateus (1998)
	Peixotoa reticulata Griseb.	Malpighiaceae	Gaglianone (2001) Gaglianone (2003)
	Pterodon emarginatus Vogel	Leguminosae	This study
	Qualea cordata Spreng.	Vochysiaceae	Fischer & Gordo (1993)
	Qualea multiflora Mart.	Vochysiaceae	Gaglianone (2001)
	Qualea parviflora Mart.	Vochysiaceae	Imperatriz-Fonseca *et al*. (2011) Oliveira & Gibbs (2000)
	Rhabdocaulon lavanduloides Epling	Lamiaceae	Amaral-Neto (2013)
	Stigmaphyllon lalandianum A.Juss.[*]	Malpighiaceae	Gaglianone (2001)
	Turnera sp.	Turneraceae	Oliveira *et al*. (2006)
	Vernonia onopordioides Baker	Asteraceae	Mateus (1998)
	Vochysia pygmaea Bong.	Vochysiaceae	This study
	Vochysia rufa Mart.	Vochysiaceae	This study
Epicharis luteocincta	*Pterodon emarginatus* Vogel	Leguminosae	This study
Epicharis mesoamericana sp. nov.	*Byrsonima crassifolia*	Malpighiaceae	This study

Table 1 (continued). Floral records of the species of the subgenus *Epicharis* (*Epicharitides*) Moure, 1945. [1]Cited as *Mascagania cordiflora*. [2]Cited as *Centris duckei*. [3]*Chamaecrista semaphora* (H.S.Irwin & Barneby) H.S.Irwin & Barneby, species name unresolved according to IPNI. [4]Cited as *Chamaechistra* sp. [5]Cited as *Memora peregrine*. [6]Cited as *Palicourea xanthofila*. [7]Classification according to Gray Crad Index (GCI). [*] Not found in IPNI data set.

Species	Floral record	Family	References
Epicharis minima	*Byrsonima intermedia* A.Juss.	Malpighiaceae	Gaglianone (2001) Gaglianone (2003) Mateus (1998) Pedro (1994) This study
	Lippia lasiocalycina Cham.	Verbenaceae	This study
	Qualea parviflora Mart.	Vochysiaceae	This study
	Talisia angustifolia Radlk.	Sapindaceae	Andena *et al*. (2012)
Epicharis obscura	*Aechmea lingulata* (L.) Baker	Bromeliaceae	Varassin & Sazima (2012)
	Andira anthelmia (Vell.) J.F.Macbr.	Fabaceae[7]	Imperatriz-Fonseca *et al*. (2011) Wilms (1995)
	Banisteriopsis adenopoda (A.Juss.) B.Gates	Malpighiaceae	Sigrist & Sazima (2004)
	Banisteriopsis muricata (Cav.) Cuatrec.	Malpighiaceae	Sazima & Sazima (1989) Sigrist & Sazima (2004)
	Byrsonima sericea DC.	Malpighiaceae	Menezes (2011)
	Campomanesia phaea (O.Berg) Landrum	Myrtaceae	Cordeiro (2015)
	Dichorisandra hexandra (Aubl.) C.B.Clarke	Commelinaceae	Sigrist & Sazima (2014)
	Dichorisandra incurva Mart.	Commelinaceae	Sigrist & Sazima (2014)
	Heteropterys aceroides Griseb.	Malpighiaceae	Sazima & Sazima (1989)
	Mendoncia puberula Mart.	Acanthaceae	Buzato (1990)
	Prestonia coalita (Vell.) Woodson	Apocynaceae	Franco (1991)
	Stigmaphyllon lalandianum A. Juss.[*]	Malpighiaceae	Sigrist & Sazima (2004)
	Swartzia simplex Spreng.	Fabaceae	Pinheiro *et al*. (2018)
Epicharis (*Epicharitides*) spp.	*Arrabidaea brachypoda* Bureau	Bignoniaceae	Yanagizawa (1983) Yanagizawa & Maimoni-Rodella (2007)
	Byrsonima intermedia A.Juss.	Malpighiaceae	Zambão (2011)
	Cybistax antisyphilitica (Mart.) Mart.	Bignoniaceae	Bittencourt *et al*. (2011)

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