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Taxonomic revision and molecular phylogenetics of the *Idarnes incertus* species-group (Hymenoptera, Agaonidae, Sycophaginae)

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Sycophaginae is a group of non-pollinating fig wasps considered closely related to the fig pollinators (Agaoninae, Tetrapusiinae, and Kradibiinae) in the most recent phylogenetic analyses. They occur in all tropical regions and are associated with *Ficus* subgenera *Urostigma* and *Sycomorus*. From six described genera of Sycophaginae, two are native and confined to the Neotropics, namely *Idarnes* Walker, 1843 and *Anidarnes* Bouček, 1993 . *Idarnes* is divided into three morphologically distinct groups that were proven to be monophyletic by the last molecular phylogenetic analyses. In this paper we reviewed the *Idarnes incertus* species-group and provided detailed morphological analyses and illustrations for the species belonging to this group. Three previously described species were reanalysed: *I. brasiliensis* **comb. nov.** (Mayr 1906) , *I. hansoni* Bouček, 1993, and *I. incertus* (Ashmead, 1900). Seventeen new species are described by Farache and Rasplus: *I. albiventris* **sp. n.**, *I. amazonicus* **sp. n.**, *I. amacayacuensis* **sp. n.**, *I. americanae* **sp. n.**, *I. aureonigrus* **sp. n.**, *I. badiovertex* **sp. n.** *I. brevis* **sp. n.**, *I. brunneus* **sp. n.**, *I. comptoni* **sp. n.**, *I. cremersiae* **sp. n.**, *I. dimorphicus* **sp. n.**, *I. flavicrus* **sp. n.**, *I. gibberosus* **sp. n.**, *I. maximus* **sp. n.**, *I. nigriventris* **sp. n.**, *I. pseudoflavus* **sp. n.**, and *I. williamsi* **sp. n.** We provided keys for the identification of the species as well as for recognising the different species-groups of *Idarnes* and a closely related genus (*Sycophaga* Westwood, 1840). Additionally, phylogenetic relationships using four molecular markers were inferred and discussed in the light of *Ficus* taxonomy and host specificity.

Taxonomic revision and molecular phylogenetics of the *Idarnes incertus* species-group (Hymenoptera, Agaonidae, Sycophaginae).

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Abstract

Sycophaginae is a group of non-pollinating fig wasps considered closely related to the fig pollinators (Agaoninae, Tetrapusiinae, and Kradibiinae) in the most recent phylogenetic analyses. They occur in all tropical regions and are associated with *Ficus* subgenera *Urostigma* and *Sycomorus*. From six described genera of Sycophaginae, two are native and confined to the Neotropics, namely *Idarnes* Walker, 1843 and *Anidarnes* Bouček, 1993. *Idarnes* is divided into three morphologically distinct groups that were proven to be monophyletic by the last molecular phylogenetic analyses. In this paper we reviewed the *Idarnes incertus* species-group and provided detailed morphological analyses and illustrations for the species belonging to this group. Three previously described species were reanalysed / *brasiliensis* **comb. nov.** (Mayr 1906), *I. hansoni* Bouček, 1993, and *I. incertus* (Ashmead, 1900). Seventeen new species are described by

Farache and Rasplus: *I. albiventris* **sp. n.**, *I. amazonicus* **sp. n.**, *I. amacayacuensis* **sp. n.**, *I. americanae* **sp. n.**, *I. aureonigrus* **sp. n.**, *I. badiovertex* **sp. n.** *I. brevis* **sp. n.**, *I. brunneus* **sp. n.**, *I. comptoni* **sp. n.**, *I. cremersiae* **sp. n.**, *I. dimorphicus* **sp. n.**, *I. flavicrus* **sp. n.**, *I. gibberosus* **sp. n.**, *I. maximus* **sp. n.**, *I. nigriventris* **sp. n.**, *I. pseudoflavus* **sp. n.**, and *I. williamsi* **sp. n.** We provided keys for the identification of the species as well as for recognising the different species-groups of *Idarnes* and a closely related genus (*Sycophaga* Westwood, 1840). Additionally, phylogenetic relationships using four molecular markers were inferred and discussed in the light of *Ficus* taxonomy and host specificity.

Introduction

Fig trees (*Ficus*, Moraceae) host diverse assemblages of wasps that use the fig inflorescences (syconia or figs) to reproduce and develop. Fig pollinators (Agaoninae, Tetrapusiinae, and Kradibiinae) form a very specialized clade of wasps that enter the fig trough a small pore enclosed by bracts, called ostiole. They lay eggs in the ovaries of pistilate flowers (Galil & Eisikowitch 1969) and pollinate. Several other lineages of chalcid wasps use the fig to oviposit but do not pollinate, and are referred to as non-pollinating fig wasps (NPFW). These wasps exhibit variable life history traits (Elias et al. 2008; Pereira et al. 2007; Tzeng et al. 2008). They are gallers, parasitoids, cleptoparasites or even facultative or obligatory seed predators (Pereira et al. 2007; Wang et al. 2014).

The Sycophaginae are NPFW that occur in all tropical regions. They are associated with *Ficus* subgenera *Urostigma* and *Sycomorus* (Cruaud et al. 2011a; Wiebes 1966). Six genera and ca. 74 described species belong to the Sycophaginae (Cruaud et al. 2011b; Farache et al. 2013; Farache & Rasplus 2014; Farache & Rasplus 2015). However, the overall diversity of the Sycophaginae is estimated to ca. 700 species (Cruaud et al. 2011b).

Bouček (1988) assigned all NPFW subfamilies (namely Epichrysomallinae, Otitesellinae, Sycoecinae, Sycophaginae and Sycoryctinae), and pollinators to Agaonidae, mostly based on the morphology of the postgenal bridge. However, molecular phylogenetic analyses and a re-evaluation of the postgenal bridge morphology evidenced this grouping as non-monophyletic (Rasplus et al. 1998). Heraty et al. (2013) recovered Sycophaginae sister to the pollinating fig wasps (Agaonidae) and proposed the inclusion of Sycophaginae in Agaonidae; all other fig wasp subfamilies were assigned to Pteromalidae. The only known fossil of Sycophaginae is an *Idarnes*

63 species that was probably associated with small to medium figs of *Ficus* section *Americanae*
64 (Farache et al. 2016).
65 Life history traits and oviposition behaviour are variable in Sycophaginae. Most species
66 oviposit through the fig wall and induce galls in pistilate flowers. They also may oviposit in galls
67 induced by other wasps and develop as cleptoparasites or parasitoids. Other species (a clade
68 within *Sycophaga*) enter the fig through the ostiole as pollinators do, and induce galls on pistilate
69 flowers (Cook & Rasplus 2003; Cook & Segar 2010; Cruaud et al. 2011b; Elias et al. 2012; Galil
70 et al. 1970).
71 Two genera of Sycophaginae are associated with *Ficus* in the Neotropical region, namely
72 *Anidarnes* Bouček, 1993 and *Idarnes* Walker, 1843 (Bouček 1993; Rasplus & Soldati 2005).
73 They are strictly associated with *Ficus* section *Americanae*. *Idarnes* is the most diverse NPFW
74 genus in the Neotropics. Twenty-three species are recognised as belonging to *Idarnes* (Bouček
75 1993; Cruaud et al. 2011b; Gordh 1975), but the overall diversity of the genus is estimated to
76 nearly 300 species (Cruaud et al. 2011b). Some Old-World species were classified under *Idarnes*,
77 however they all belong to *Sycophaga* Westwood, 1840 (= *Apocryptophagus* Ashmead, 1904)
78 (Bouček 1993; Cruaud et al. 2011b; Gordh 1975) and consequently, *Idarnes* is restricted to the
79 Neotropics. Concerning nomenclature, *Idarnes* should be treated as masculine as well as
80 *Anidarnes* and other derived names (Farache et al. 2013). The name probably refers to an
81 eminent Persian commander, *Hydarnes*, who was given command of the "Immortals" and fought
82 the Greeks in the battle of Thermopylae, 480 BC.
83 Three morphological species-groups of *Idarnes* are recognised, namely *I. carme*, *I.*
84 *flavicollis* and *I. incertus* species-groups. They exhibit clear morphological differences (Bouček
85 1993) and contrasted life history traits. Species belonging to the *I. incertus* species-group are
86 gall-makers and oviposit before pollination, while *I. flavicollis* species-group species oviposit at
87 the same time as pollinators. The species belonging to the *I. carme* species-group species
88 oviposit after pollination and are cleptoparasites and may feed on pollinator larvae (Elias et al.
89 2008; Elias et al. 2012).
90 The purpose of this paper is to provide a taxonomic revision of the *Idarnes incertus*
91 species-group. Described species are re-analysed, and 17 species are described from samples
92 collected in Brazil, Costa Rica and Colombia. All species are illustrated and an identification key
93 is provided. Phylogenetic relationships including thirteen species of *Idarnes incertus* species-

group and eight outgroups were inferred using multiple genes, and their relationships were discussed in the light of the taxonomy of their host *Ficus*.

Materials & Methods

Specimen collection and morphological study.

Figs were sampled before maturity and transferred to tissue bags until wasp emergence. Wasps were killed using ethyl acetate or freezing and stored in 70% ethanol. Geographical coordinates and altitude were recorded in the field using a GPS device or estimated using label information.

Specimens were dehydrated through an ethanol and HMDS series (Heraty & Hawks 1998) or critical point dried (Gordh & Hall 1979) using BALTEC CPD 030'. Insects were card-mounted following Noyes (1982). Morphological terminology follows Gibson (1997). Measurements were taken using Leica application suite V3.6. Abbreviations for measurements used in the text include: POL = distance between lateral ocelli; OOL = distance between one posterior ocellus and adjacent composite eye.

Multi-entry online keys were produced using Lucid ® v. 3.3 and are available [illegible]igweb (van Noort & Rasplus 2016) and as supplementary material 3.

The electronic version of this article in Portable Document Format (PDF) will represent a published work according to the International Commission on Zoological Nomenclature (ICZN), and hence the new names contained in the electronic version are effectively published under that Code from the electronic edition alone. This published work and the nomenclatural acts it contains have been registered in ZooBank, the online registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) can be resolved and the associated information viewed through any standard web browser by appending the LSID to the prefix http://zoobank.org/. The LSID for this publication is: *urn:lsid:zoobank.org:pub:22286699-8306-4931-8D7F-7BF05EB2B304*. The online version of this work is archived and available from the following digital repositories: PeerJ, PubMed Central and CLOCKSS.

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125 **BMNH:** The Natural History Museum, London, U.K.
126 **CBGP:** Centre de Biologie pour la Gestion des Populations, Montferrier-sur-Lez, France.
127 **EBCR:** Escuela de Biologia, Universidad de Costa Rica, San José, Costa Rica
128 **MZSP:** Museu de Zoologia da Universidade de São Paulo, São Paulo, Brazil.
129 **NMW:** Naturhistorisches Museum, Wien, Austria.
130 **SAMC:** Iziko South African Museum, Cape Town, South Africa.
131 **RPSP:** Universidade de São Paulo, Ribeirão Preto, Brasil.
132 **USNM:** National Museum of Natural History, Washington D.C., U.S.A.
133
134 *Illustrations.* Images of specimens were produced with a Leica MZ16 stereoscope
135 connected to a digital camera and a computer workstation running *Leica Application Suite* (LAS)
136 V3.6 imaging software. Image series comprising about 15-20 focal planes were merged to
137 produce a single image with increased depth of field.
138 Some specimens were dissected, mounted and sputter-coated with gold for scanning
139 electron microscopy (SEM), which was performed with a Zeiss EVO 50 microscope. SEM
140 images of species with few specimens were obtained without gold coat with a low vacuum
141 protocol.
142
143 *Molecular protocols and phylogenetic analyses*
144 In this study, we amplified one nuclear protein-coding region (F2 copy of elongation
145 factor-1α, *EF-1α*), two mitochondrial protein-coding regions (Cytochrome Oxydase I, *COI* and
146 Cytochrome B, *CytB*), and two regions of the *rRNA 28S* (D2-D3 and D4-D5 expansion regions).
147 DNA extraction, PCR conditions, and sequencing protocols follow Cruaud et al. (2010) and
148 Cruaud et al. (2011a). Forward and reverse strands for each fragment were assembled using the
149 software Geneious v.6.1.8. All the sequences were deposited in GenBank (Supplementary
150 material 1). Our dataset consisted of 33 terminals, comprehending 25 specimens for 13 ingroup
151 species belonging to the *Idarnes incertus* species-group and eight outgroup species, representing
152 all other *Idarnes* species-groups, all known Sycophaginae genera, and an Epichrysomallinae
153 genus (Pteromalidae).
154 Sequence alignment for all markers was performed using MAFFT v. 7 (Katoh & Standley
155 2013) and the L-INS-i algorithm, and visually inspected. In protein coding genes, we checked

protein translations to detect frameshift mutations and premature stop codons using MEGA 4 (Kumar et al. 2008). The most appropriate model of sequence evolution for each data subset most likely to have experienced similar evolutionary processes (*mitochondrial genes, EF-1α*, *rRNA 28S*) was identified using Akaike information criterion (Akaike 1973) as implemented in jModeltest v. 2.1.7 (Darriba et al. 2012; Guindon & Gascuel 2003). Since we used multiple loci to infer phylogenetic relationships, we established different partitions for each locus included in the analyses, allowing parameters to vary among partitions.

Phylogenetic analyses were performed using maximum likelihood (ML) and Bayesian methods, conducted on the CIPRES Science Gateway (Miller et al. 2010).

Partitioned ML analyses were performed using RAxML v 8 (Stamatakis 2014), and the GTRCAT approximation was used for performing associated bootstrapping (1000 replicates). Bootstrap percentage (ML_{BP}) > 95% was considered as strong support and a ML_{BP} < 70% as weak.

Bayesian phylogenetic analyses were conducted using MrBayes v. 3.2.2 (Ronquist et al. 2012). We assumed across-partition heterogeneity in model parameters by considering the parameter m. Parameter values were initiated with default priors; branch lengths were estimated using default exponential priors. The optimization of the posterior probability was achieved using Metropolis-coupled Markov chain Monte Carlo (MCMC). To improve mixing of the cold chain and avoid converging on local optima, we executed two independent runs including a cold chain and three incrementally heated chains for each run. The heating parameter was set to 0.02 in order to allow more frequent swapping between cold and heated chains. The runs were executed for 10 million generations, and values were sampled every 1000 generations. A NEXUS file including gene alignment and MrBayes block is included as supplementary material 4. We also ensure the convergence between parameters from the two chains by analysing estimates and frequency distributions of each parameter using Tracer v. 1.5 (Rambaut et al. 2013). We examined the plot of overall model likelihood against generation number to find the point where the likelihood started to fluctuate around a constant value, and applied a 10% relative burn-in. The results were based on the pooled samples from the stationary phases of the two independent runs. Posterior probabilities (PP) > 0.95 were considered as strong support.

Results

187

188 *Morphological definition, and key to genera and species-groups*

189 *Idarnes* is the sister group of *Sycophaga,* a diversified Old World genus mostly associated
190 with *Ficus* subgenenus *Sycomorus,* but two species are associated with *F.* subg. *Urostigma*
191 (Cruaud et al. 2011a; Cruaud et al. 2011b). *Idarnes carme* species-group is sister to a clade
192 grouping *I. flavicollis* species-group and *I. incertus* species-group.

193 *Sycophaga* and all *Idarnes* species-groups can be identified using the following key:

194

195 **1** Body smooth, sculpturation shallow. Notauli, axillulae, frenal sulcus and other sutures
196 without obvious crenulation. Head flattened dorsoventrally (Fig. 1A). Oviposits
197 internally in figs .....
198 .....Old World, ***Sycophaga*** **Westwood, 1840 (part)**

199

200 **---** Body sculpture at least slightly reticulate. Notauli, axillulae, frenal sulculs and other
201 sutures at least slightly crenulate. Head globose or subglobose in lateral view (Fig. 1B).
202 Oviposits through the fig wall **2**

203

204 **2** Malar sulcus present (Fig. 1B). Antenna with two anelli **and** postmarginal vein longer than
205 stigmal vein.....Old World.....
206 .....***Sycophaga*** (part, formerly ***Apocryptophagus***)

207 **---** Malar sulcus absent. Antenna with one anellus **or**, if two anelli (*I. flavicollis* and *I. incertus*
208 species-groups) postmarginal vein shorter than stigmal vein (only exception known is
209 the fossil species *Idarnes thanatos* Farache & Rasplus, 2016). New World***Idarnes.*** **3**

210

211 **3** Body mostly without metallic tinge (Figs 2, 3). Ovipositor sheaths shorter than body
212 length. Funicular segments transverse.....***I. incertus*** **species-group**

213 **---** Body with metallic tinge, ovipositor as long as body or longer. Funicular segments nearly
214 as long than wide or longer than wide **4**

215

216 **4** Postmarginal vein shorter than stigmal vein. Head sculpture homogeneous. Antennae with
217 2 anelli (Fig. 1C). Mandibles tridentate. Clypeal margin bilobed (Fig. 1D) (trilobed in *I.*

micheneri Gordh 1975).....

..... ***I. flavicollis* species-group**

--- Postmarginal vein longer than stigmal. Head sculpture stronger near vertex Antennae with one anellus (Fig. 1E). Mandibles bidentate. Clypeal margin usually straight or unilobed (excepted one undescribed species)(Fig. 1)..... ***I. carme* species-group**

The *I. incertus* species-group shares similarities with *Anidarnes* Bouček, 1993 - another neotropical Sycophaginae genus - but can be distinguished by the following characters: (1) antennae are usually inserted closer to the clypeal margin than to the median ocellus, or at most at the same distance, whereas in *Anidarnes* they are inserted closer to the median ocellus; (2) ovipositor without the median constriction apomorphic of *Anidarnes* (to the exception of *A. dissidens* Farache & Rasplus 2013). metascutellum is at least 3x as wide as long in *incertus* species-group whereas at most it is 2x as wide as long, or trapezoidal, in *Anidarnes* (sometimes the metascutellum is inconspicuous in both groups). A key to the genera of neotropical fig wasps is provided by Bouček (1993) and Rasplus & Soldati (2005).

***Idarnes incertus* species-group**

1993 Bouček, Z., *Journal of Natural History* 27: 200-203 – species-group treatment for *Idarnes*.

Description

Females. Body length 1.3–2.8 mm. Ovipositor length 0.4–1.6mm. Body colour yellow to black, metallic tinge mostly absent. Wings hyaline. Head transverse (1.2–1.4x as wide as high). Face sculpture reticulate. Malar sulcus absent. Maxillary and labial palpi composed at most of two or three segments, the last one frequently reduced and setae-like. Clypeal margin bilobed. Frontal depression (scrobal cavity) shallow, rarely including median ocellus. Supraclypeal area delimited laterally by subantennal grooves. Antennae inserted closer to clypeal margin than to median ocellus (sometimes nearly equidistant from them). Toruli separated by one torulus diameter or less, but never closer than 0.5x torulus diameter. Antenna with 12-13 antennomeres (11–12

flagellomeres; one or two anelli) and a very small terminal protuberance. Clava not well delimited. Vertex slightly concave. POL 2.2–3.8x OOL. Mesosoma slightly curved dorsally. Pronotum 0.7–1.0x as long as mesoscutum. Notauli complete and usually crenulate. Mesoscutellum 1.1–1.5x as long as wide near transscutal articulation. Metascutellum transverse, at most as long as frenum, sometimes inconspicuous. Postmarginal vein very short, at most 0.5x stigmal vein length. Ovipositor shorter than body length, and 0.8–3x as long as hind tibia.

Males. Similar to female, sometimes showing tinge/colour variation. Flagellomeres usually shorter, more transverse. Wings medially infuscated with dense pilosity, especially at the costal and apical margin, and near marginal vein. Pronotum longer than in females.

Remarks. *Idarnes* is treated here as masculine as explained in Farache et al. (2013).

Key to species

The key is mainly based on female characters, therefore *I. brasiliensis* (Mayr 1906) was not included since only one male could be analysed.

1 Body completely black or dark brown (Figs 2I, 3D, E), including pronotum (Figs 8I, 9D, E) and propodeum (Figs 10I, 11D, E). **2**

--- Body not completely black. Pronotum yellow at least laterally (as in Figs 2C, H, 3C), or propodeum yellow (as Figs 10D, 11A, J) **4**

2 Mesoscutum and scutellar-axillar complex strongly curved in lateral view (Fig. 3D). Supraclypeal area narrower than torulus (Fig. 5D). Frenal sulcus crenulate and conspicuous (Fig. 13D). Metascutellum nearly as long as, or longer than frenum (Fig. 13D). *F. americana* subsp. *andicola*..... ..... ***I. gibberosus* sp.n.**

--- Mesoscutum and scutellar-axillar complex not strongly curved in lateral view (Figs 2I, 3E). Supraclypeal area as wide as, or wider than torulus (Fig. 4I, 5E). Frenal sulcus not crenulate (Figs 12I, 13E). Metascutellum inconspicuous (Figs 12I, 13E). **3**

3 Frons becoming yellowish near clypeus. Supraclypeal area as wide as torulus (Fig. 4I). Antenna with two anelli (Fig. 6I). Postmarginal vein nearly absent (Fig. 14I). *F. hartwegii* ..... ***I. comptoni* sp. n.**

--- Frons completely black. Supraclypeal area wider than torulus (Fig. 5E). Antenna with one anellus (Fig. 7E). Postmarginal vein nearly as long as 1/2 stigmal vein length (Fig. 15E). *F. hartwegii* ..... ***I. hansoni* Bouček, 1993**

4 Head and mesosoma brown black in lateral view; pronotum yellow (Figs 2C, D, H), at least laterally, or propodeum yellow dorsally (Figs 10D, F, 11A) **5**

--- Head and mesosoma predominantly yellow in lateral view (at least in females) (*e.g.* Figs 2A, B, E) **9**

5 Axillula reticulated, without longitudinal striae (Fig. 13C). Notauli not crenulate (Fig. 13C). *F. americana* ..... ***I. flavicrus* sp.n.**

--- Axillula longitudinally striated (Figs 12C, D, H, 13A). Notauli at least slightly crenulated (Figs 12C, D, H, 13A). **6**

6 Propodeum dorsally yellow (Figs 10D, 11A). Frenal sulcus conspicuous (Figs 12D, 13A) **7**

--- Propodeum dorsally brown (Figs 10C, H). Frenal sulcus inconspicuous (Figs 12C, H). **8**

7 Pronotum brown laterally. Legs brown. Ovipositor 1.1-1.3x hind tibia length (Fig. 2D). *F. americana* & *F. costaricana* ..... ***I. americanae* sp.n.**

--- Pronotum yellow laterally. Legs predominantly yellow. Ovipositor 1.5x hind tibia length (Fig. 3A). *F. cremersi* ..... ***I. cremersiae* sp. n.**

8 Hind coxae yellow (Fig. 2C). Propodeal median line absent (Fig. 12C). *F. americana* subsp. *guianensis* form *mathewsii* ..... ***I. amazonicus* sp.n.**

--- Hind coxae brown (Fig. 2H). Propodeal median line present as a faint longitudinal reticulation (Fig. 12H). *F. colubrinae* ..... ***I. brunneus* sp.n.**

9 Ovipositor nearly 2.5x as long as hind tibia or longer (Figs 2A, E, 3G) **10**

--- Ovipositor as long as or shorter than 2x hind tibia (*e.g.* Figs 2B, F, 2G) **12**

10 Metasoma laterally yellow (Fig. 2A), dorsally with brown black transversal stripes. Frenal sulcus conspicuous (Fig. 12A). *F. aurea* form *isophlebia*..... ..... ***I. albiventris* sp.n.**

Metasoma black (Figs 2E, 3G). Frenal sulcus inconspicuous (Figs 12E, 13G)..**11**

11 Scutellar-axillar complex dorsally black (Fig. 11G). Supraclypeal area narrower than torulus (Fig. 3G). Propodeal anterior margin medially angulose (Fig. 11G). First funicular segment with 12–17 multiporous late sensillae (Fig. 7G). *F. obtusifolia* ***I. maximus* sp.n.**

Mesosoma dorsally yellow (Fig. 10E). Anterior margin of propodeum medially concave (Fig. 12E). Supraclypeal area wider than torulus (Fig. 4E). First funicular segment with 7–11 multiporous plate sensillae (Fig. 6E). *F. popenoei*. ..***I. aureonigrus* sp.n.**

12 First funicular segment with more than four multiporous plate sensillae (*e.g.* Figs 6G, 7B, I, J). **13**

First funicular segment with four our less multiporous plate sensillae (Figs 6B, F). Colombia, *F. pertusa* **18**

13 Ovipositor as long as, or shorter than hind tibia (Figs 2G, 3B).....**14**

Ovipositor longer than hind tibia.....**15**

14 Metasoma laterally yellow (Fig. 2G). Males with the same colour as female. Subantennal groove as long as torulus (Fig. 4G). Supraclypeal area wider than torulus (Fig. 4G). *F. citrifolia* .....***I. brevis* sp.n.**

Metasoma entirely black (Fig. 3B). Male body colour predominantly black. Subantennal groove longer than torulus (Fig. 5B). Supraclypeal area as wide as torulus (Fig. 5B). *F. citrifolia* .....***I. dimorphicus* sp.n.**

15 Ovipositor 1.8–2x as long as hind tibia (Figs 3H, I). Supraclypeal area narrower than torulus (Figs 5H, I). **16**

Ovipositor 1x to 1.5x as long as hind tibia (Figs 3F, J). Supraclypeal area as wide as torulus or wider (Fig. 5J). **17**

16 Metasoma ventrally yellow (Fig. 3I). Distance from torulus to median ocellus 1.4x distance from torulus to oral margin (Fig. 5I). Antennae with one anellus. *F. crocata* ***I. pseudoflavus* sp.n.**

Metasoma ventrally brown-black (Fig. 3H). Distance from torulus to median ocellus 0.9x distance from torulus to oral margin (Fig. 3H). Antennae with 2 anelli. *F. aurea* form *isophlebia* .....***I. nigriventris sp.n.***

17 Scutellar-axillar complex smoky yellow, propodeum more yellow (Fig. 11J). Metasoma

brown black Fig. 3J. .....*F. americana* subsp. *americana*
.....***I. williamsi* sp.n.**

--- Scutellar-axillar complex yellow, nearly same colour as propodeum (Fig. 11F). Metasoma brown black, first tergite and ventral region yellow. *F. citrifolia* .....
.....***I. incertus* (Ashmead, 1900)**

18 Head and mesosoma dorsally brown, slightly metallic green (Fig. 8F). Frenal sulcus inconspicuous (Fig. 12F).....***I. badiovertex* sp. n.**

--- Head and mesosoma yellow (Fig. 8B). Frenal sulcus conspicuous (Fig. 12B)
.....***I. amacayacuensis* sp. n.**

Species description

***Idarnes albiventris* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:8061097A-9783-4A71-8C5B-017C24BD48B5

(Figs 2A, 4A, 6A, 8A, 10A, 12A, 14A)

Type material. Holotype: ♀, **COSTA RICA: Heredia:** Santo Domingo, 8.435083º, -83.413833º, 12.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* RAS02809 (CBGP).

Paratypes. **COSTA RICA: Heredia:** Santo Domingo, 8.435083º, -83.413833º, 8♀ 4 ♂, 12.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* nº JRAS02809 (5♀ 4♂ CBGP, 1♀ BMNH, 2♀ MZSP, 1♀ SAMC); **Limón:** 12 Km SW Bribri, 9.559778º, -82.9135º, 6♀ 3♂ 21.IV.2010, Cruaud A. & Rasplus J.Y., ex. *Ficus isophlebia*, nº JRAS02829 (3♀ 3♂ CBGP, 3♀ RPSP), Puerto Viejo de Talamanca, 9.637585º, -82.708600, 10♀ 4 ♂, 14.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* nº JRAS02824_02 (7♀ 2♂ CBGP, 3♀ 2♂ RPSP).

Etymology. The specific name refers to the coloration of the metasoma, especially in ventral view.

Diagnosis. Body predominantly yellow orange. Margin of metasomal tergites brown. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.3x distance

from torulus to oral margin. Metascutellum inconspicuous to approximately 0.5x as long as frenum. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Ovipositor sheaths 2.7–2.9x as long as hind tibia.

Female.

Size and colour. Body length 2.2–2.3 mm. Ovipositor length 1.3–1.4 mm. Head, mesosoma, and antennae yellow orange. Legs more yellow. Metasoma yellow, margin of tergites brown.

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.3x distance from torulus to oral margin. POL 2.5x OOL. Scape 2.2–2.3x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular segment 0.7–0.8x as long as wide, with 7–8 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.1x as long as wide near transscutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus crenulate and conspicuous. Metascutellum inconspicuous to approximately 0.5x as long as frenum. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein 0.7x as long as marginal vein, with 1–2 adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 2.7–2.9x as long as hind tibia.

Male. Similar to female, flagellomeres shorter.

Host plant. *Ficus aurea* Nuttal, form *isophlebia* (Standley) Berg. *Ficus isophlebia* was synonymized with *F. aurea*, however the differences observed between entities within the *F. aurea* species complex led C. C. Berg to recognize four informal entities within the species (Berg 2007). Taking into account the morphological differences observed in the host-plants (*Ficus aurea* form *isophlebia* and *Ficus aurea* form *aurea*), the fact that these forms are sympatrically pollinated by different pollinator species and that non-pollinating communities associated to these forms are composed of different species (JYR, unpublished data), including different species of the *Idarnes incertus* species-group, we suspect that these forms of *Ficus aurea* may be in fact different but closely related *Ficus* species.

404

405 ***Idarnes amacayacuensis*** **Farache & Rasplus, sp. n.**

406 urn:lsid:zoobank.org:act:48D01597-E7B0-41AC-8A7E-DCE21AA97EE6

407 (Figs 2B, 4B, 6B, 8B, 10B, 12B, 14B)

408

409 **Type material.** Holotype: ♀, **COLOMBIA: Leticia:** PN Amacayacu, -3.30°, -70.14°, 130m,

410 20.XI.1993, Lachaise D., ex *Ficus pertusa* (CBGP).

411

412 Paratypes: **COLOMBIA: Leticia:** PN Amacayacu, -3.30°, -70.14°, 130m, 6♀, 5♂, 20.XI.1993,

413 Lachaise D., ex *Ficus pertusa* (4♀ 4♂ CBGP, 2♀ 1♂ RPSP).

414

415 **Etymology**. The specific name refers to the type locality, the Amacayacu National Natural Park

416 in Colombia.

417

418 **Diagnosis**. Head, antennae, mesosoma, and legs yellow. Metasoma dark brown. Metascutellum

419 inconspicuous. Propodeal median line traceable at least in the anterior half of propodeum.

420 Ovipositor sheaths 1.6x as long as hind tibia.

421

422 **Female**.

423 *Size and colour.* Body length 1.5 mm. Ovipositor length 0.5 mm. Head, antennae, mesosoma,

424 and legs yellow. Metasoma dark brown.

425 *Head.* Supraclypeal area narrower than torulus. Subantennal groove as long as torulus. Distance

426 from torulus to median ocellus 1.3x distance from torulus to oral margin. POL 3.8x OOL. Scape

427 1.9x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular

428 segment 0.7x as long as wide, with 1–3 multiporous plate sensillae.

429 *Mesosoma.* Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly

430 curved in lateral view. Notauli crenulate. Mesoscutellum 1.2x as long as wide near transcutal

431 articulation. Axillula with longitudinal striae. Frenal sulcus barely crenulate, conspicuous.

432 Metascutellum inconspicuous. Propodeal anterior margin medially angulose. Propodeal median

433 line traceable at least in the anterior half of propodeum. Stigmal vein 0.9–1x as long as marginal

434 vein. Stigmal vein without adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal

vein length.

Metasoma. Ovipositor sheaths 1.6x as long as hind tibia.

Male. Similar to female. Body colour paler.

Host plant. *Ficus pertusa* Linnaeus f.

***Idarnes amazonicus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:6F44A1B2-73CC-4267-9F02-AF4E7FF600BC

(Figs 2C, 4C, 6C, 8C, 10C, 12C, 14C)

Type material. Holotype: ♀, **BRAZIL: Amazonas:** São Gabriel da Cachoeira, Igarapé da Cachoeirinha, -3.09853º -59.97624º, 19.XI.2007, Santos O.A., ex *Ficus mathewsii* nº JRAS02147_03 (MZSP).

Paratypes. **BRAZIL: Amazonas:** São Gabriel da Cachoeira, Igarapé da Cachoeirinha, -3.09853º -59.97624º, 2♀, 19.XI.2007, Santos O.A., ex *Ficus mathewsii* nº JRAS02147_03 (1♀ CBGP, 1♀ RPSP).

Etymology. The specific name refers to the type locality

Diagnosis. Body predominantly brown black. Pronotum and propodeum slightly yellow. Legs yellow, femora slightly brown. Supraclypeal area as wide as torulus, or slightly wider. Subantennal groove slightly longer than torulus. Torulus as distant from median ocellus as from oral margin. Metascutellum inconspicuous to about 0.5 x as long as frenum. Ovipositor sheaths 1.3x as long as hind tibia.

Female.

Size and colour. Body length 1.4–1.5 mm. Ovipositor length 0.4 mm. Predominantly brown black. Lower face yellow. Scape and pedicel yellow, pedicel slighly brown. Pronotum laterally yellow. Propodeum slightly yellow near its posterior margin. Legs yellow, femora slightly brown.

Head. Supraclypeal area as wide as torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 1x distance from torulus to oral margin. POL 2.5x OOL. Scape 1.7x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular segment 0.7x as long as wide, with 6–9 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli with shallow crenulation. Mesoscutellum 1.5x as long as wide near transscutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus barely crenulate and inconspicuous. Metascutellum inconspicuous to approximately 0.5 x as long as frenum. Anterior margin of propodeum medially concave. Propodeal median line inconspicuous. Stigmal vein 0.7x as long as marginal vein, with three adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 1.3x as long as hind tibia.

Male. Unknown.

Host plant. *Ficus americana* Aublet subsp. *guianensis* (Desvaux) Berg form *mathewsii* (Miquel) Berg.

***Idarnes americanae* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:0FF58956-AEB0-45C4-8AF9-3BB4C8EF2465

(Figs 2D, 4D, 6D, 8D, 10D, 12D, 14D)

Type material. Holotype: ♀, **COSTA RICA: La Fortuna:** Arenal, 10.49916º -84.71019º, 18.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus americana* nº JRAS02841_01 (CBGP).

Paratypes. **COSTA RICA: Heredia:** Santo Domingo, 8.43º -83.41º, 4♀, 3♂, 15.XI.2002, Hanson P., ex. *Ficus costaricana* nº JRAS01364 (3♀ 2♂ CBGP, 1♀ 1♂ RPSP); **La Fortuna:** Arenal, 10.49916º -84.71019º, 4♀, 3♂, 18.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus americana* nº JRAS02841_01 (2♀ 2♂ CBGP, 1♀ 1♂ MZSP, 1♀ BMNH).

Etymology. The specific name refers to the *Ficus* section to which *Idarnes* is associated with.

Diagnosis. Body colour and legs predominantly brown. Pronotum and propodeum mostly yellow. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.2x distance from torulus to oral margin. Mesoscutum medially with longitudinal striae. Metascutellum nearly 0.5x as long as frenum or shorter. Ovipositor sheaths 1.1–1.3x as long as hind tibia.

Female.

Size and colour. Body length 1.9–2.1 mm. Ovipositor length 0.5–0.6 mm. Predominantly brown. Scape yellow. Pedicel yellow brown, flagellum brown. Pronotum laterally yellow. Lateral panel of metanotum brown black. Propodeum yellow. Legs brown, forecoxae and tarsi yellow. Foretibia yellow brown.

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.2x distance from torulus to oral margin. POL 3.4x OOL. Scape 2.3x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular segment 0.7x as long as wide, with 7–9 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate, medially with longitudinal striae. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.3x as long as wide near transscutal articulation. Axillula with longitudinal striae. Frenal sulcus crenulate and conspicuous. Metascutellum nearly 0.5x as long as frenum or shorter. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein as long as marginal vein, with 2-3 adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 1.1–1.3x as long as hind tibia.

Male. Body predominantly yellow. Lateral panel of metanotum yellow brown. Metasoma brown, yellow at the margin of tergites. Flagellomeres shorter than in female.

Host plant. *Ficus americana* subsp. *americana* Aublet and *Ficus costaricana* (Liebmann) Miquel.

***Idarnes aureonigrus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:57B16D6D-A205-4F3A-B53E-E58399809FEC

(Figs 2E, 4E, 6E, 8E, 10E, 12E, 14E)

Type material. Holotype: ♀, Costa Rica, 8 Km W Guapiles 10.20650º -83.86173º, 13.IV.2010, *ex. Ficus popenoei*, nº JRAS02812_2, Cruaud A. & Rasplus, J.Y. leg. (CBGP). Paratypes: **COSTA RICA: Limón:** 8 Km N Gualipes, 10.20650º -83.86173º, 5♀, 4♂, 13.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus popenoei* nº JRAS02812_02 (3♀ 3♂ CBGP, 1♀ 1♂ RPSP, 1♀ MZSP).

Etymology. The specific name refers to the body colour.

Diagnosis. Head and mesosoma yellow orange. Metasoma brown black. Supraclypeal area slightly wider than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.0–1.1x distance from torulus to oral margin. Metascutellum inconspicuous. Ovipositor sheaths 2.4–2.5x as long as hind tibia.

Female.

Size and colour. Body length 2 mm. Ovipositor length 1.1–1.2 mm. Head and mesosoma yellow orange. Antennae and legs yellow orange. Lateral panel of metanotum brown black. Propodeum more yellow. Metasoma brown black.

Head. Supraclypeal area slightly wider than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.0–1.1x distance from torulus to oral margin. POL 2.5x OOL. Scape 2.2x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular segment 0.8x as long as wide, with 7–11 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate, crenulation very shallow. Mesoscutellum 1.4x as long as wide near transscutal articulation. Axillula reticulate. Frenal sulcus barely crenulate and inconspicuous. Metascutellum inconspicuous. Propodeal anterior margin medially concave. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein as long

as marginal vein, with 2–4 adstigmal setae. Postmarginal vein nearly absent, shorter than 1/5x stigmal vein length.

Metasoma. Ovipositor sheaths 2.4–2.5x as long as hind tibia.

Male. Similar to female. Body colour paler. Flagellomeres shorter. Scape wider.

Host plant. *Ficus popenoei* Standley.

***Idarnes badiovertex* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:28673472-103B-4576-A41E-4851E4194771

(Figs 2F, 4F, 6F, 8F, 10F, 12F, 14F)

Type material. Holotype: ♀, **COLOMBIA: Leticia:** PN Amacayacu, -3.30° -70.14°, 130m, 20.XI.1993, Lachaise D., ex *Ficus pertusa* (CBGP).

Paratypes: **COLOMBIA: Leticia:** PN Amacayacu, -3.30° -70.14°, 130m, 16♀, 1♂, 20.XI.1993, Lachaise D., ex *Ficus pertusa* (13♀ 1♂ CBGP, 3 ♀ RPSP).

Etymology. The specific name refers to the brown colororation of the top of the head.

Diagnosis. Head yellow, dorsally brown. Mesosoma dorsally brown black, axillulae slightly metallic green. Propodeum yellow. First funicular segment with 1–2 multiporous plate sensillae. Ovipositor sheaths ca. 1.8x as long as hind tibia.

Female.

Size and colour. Body length 1.3 mm. Ovipositor length 0.7 mm. Head and mesosoma yellow. Antennae yellow. Head dorsally brown, slightly metallic green. Mesosoma dorsally brown black, axillulae slightly metallic green. Propodeum dorsally yellow. Legs yellow. Metasoma brown.

Head. Supraclypeal area as wide as torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.4x distance from torulus to oral margin. POL 3x OOL. Scape 1.7–1.8x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular

segment 0.5x as long as wide, with 1–2 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli with shallow crenulation. Mesoscutellum 1.4x as long as wide near transcutal articulation. Axillula with longitudinal striae. Frenal sulcus smooth and faint. Metascutellum inconspicuous. Propodeal anterior margin medially angulose. Propodeal median line inconspicuous. Stigmal vein 0.5x as long as marginal vein, with 3-4 adstigmal setae. Postmarginal vein nearly absent, shorter than 1/5x stigmal vein length.

Metasoma. Ovipositor sheaths ca. 1.8x as long as hind tibia.

Male. Similar to female. Body colour paler than female.

Host plant. *Ficus pertusa* Linnaeus f.

***Idarnes brasiliensis* (Mayr, 1906) (comb. nov.)**

(Figs in supplementary material 2)

1906 Mayr, G. *Entomologische Zeitung Wien* 25:185. Description (♀♂) (Comb. *Sycophila brasiliensis*).

Type material. Lectotype (here designated) **BRAZIL: Santa Catarina:** Blumenau, 1♂, [no date], Fritz Müller, ex *Ficus doliaria* (=*F. gomelleira*) (NMW).

Diagnosis (♂)**.** Body colour predominantly yellow orange. Mesosoma 1.4x as long as wide. Axillula longitudinally striated. Frenal sulcus inconspicuous. Metascutellum inconspicuous. Propodeal median line present, conspicuous. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Female: Described by Mayr (1906), but we could not find any female specimens at NMW.

Host plant. *Ficus gomelleira* Kunth & Bouché.

Remarks: There is only one male specimen collected by Mayr at NMW, minuten-mounted and decapitated. Despite the absence of head, the following characters ascertain its position within the *Idarnes incertus* species-group: (1) Winged male, (2) body colour, (3) postmarginal vein compared to stigmal, (4) shape of mesoscutellum and (4) striated axillulae.

***Idarnes brevis* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:06317A88-E1C5-48AB-83FB-66E79424360C

(Figs 2G, 4G, 6G, 8G, 10G, 12G, 14G)

Type material. Holotype: ♀, **COSTA RICA: San José:** Santiago de Puriscal, 9.84132° -84.31540°, 2.I.2007, Fernandez, ex *Ficus citrifolia* nº JRAS01954_02 (CBGP).

Paratypes. **COSTA RICA: Alajuela:** San Ramon, Piedades Sur 10.11° -84.53°, 23♀, 16♂, 5.I.2008, Vasquez J., ex *Ficus citrifolia* nº JRAS03857 (20♀ 15 ♂ CBGP, 3♀ 1♂ RPSP); **Heredia:** Santo Domingo, 9.988886° -84.083926°, 5♀, X.2005, Hanson P., ex *Ficus hemsleyana* (= *F. citrifolia*) nº JRAS01530_02 (1♀ CBGP, 2♀ RPSP**,** 1♀ MZSP, 1♀ SAMC); **San José:** Santiago de Puriscal, 9.84132° -84.31540°, 1♀, 7♂, 2.I.2007, Fernandez, ex *Ficus citrifolia* nº JRAS01954_02 (1♀ 7♂ CBGP), Univ. San José, Est. Fabio B. Moreno, 9.944526° -84.091639°, 3♀, 5.III.2008, Rasplus J.Y. & Ramírez W., ex *Ficus hemsleyana* (= *F. citrifolia*) nº JRAS02284_03 (CBGP).

Etymology. The specific name refers to the short ovipositor.

Diagnosis. Predominantly yellow orange. Metasoma dorsally brown black, mostly at the margin of tergites. Supraclypeal area wider than torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. First funicular with 12–15 multiporous plate sensillae. Ovipositor sheaths 0.8–0.9x as long as hind tibia.

Female.

Size and colour. Body length 2.1–2.3 mm. Ovipositor length 0.4–0.5 mm. Predominantly yellow orange. Metasoma dorsally brown black, mostly at the margin of tergites.

Head. Supraclypeal area wider than torulus. Subantennal groove nearly as long as torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. POL 3.1x OOL. Scape 2.2–2.5x as long as pedicel. Antenna with two anelli. First funicular segment 0.7–0.8x as long as wide, with 12–15 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.3x as long as wide near transscutal articulation. Axillula with longitudinal striae. Frenal sulcus conspicuous, barely crenulate or crenulate. Metascutellum nearly as long as, or longer than frenum. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of sclerite. Stigmal vein 0.9x as long as marginal vein, with two adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 0.8–0.9x as long as hind tibia.

Male. Similar to female. Predominant body colour paler, yellow white. Metasoma dorsally brown, or sometimes completely brown. Flagellum very short, nearly as long as scape + pedicel.

Host plant. *Ficus citrifolia* Miller.

***Idarnes brunneus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:67D1DC74-C6AF-4E66-9897-1DC515D4F253

(Figs 2H, 4H, 6H, 8H, 10H, 12H, 14H)

Type material. Holotype: ♀, **COSTA RICA: Limón:** near Bananito, 9.838917º -83.048111º, 15.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus colubrinae* nº JRAS02832_05 & JRAS02833 (CBGP).

Paratypes. **COSTA RICA: Limón:** 3 km W Guacimo, 10.211873° -83.716842°, 1♀, 2.III.2008, Rasplus J.Y. & Ramírez W., ex *Ficus colubrinae* nº JRAS02282_03 (CBGP), near Bananito, 9.838917º -83.048111º, 17♀, 7♂, 15.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus colubrinae* nº JRAS02832_05 & JRAS02833 (12♀ 3♂ CBGP, 2♀ 1♂ RPSP, 1♀ 1♂ MZSP, 1♀ 1♂ BMNH, 1♀ 1♂ SAMC).

Etymology. The specific name refers to the predominant body colour.

Diagnosis. Body colour predominantly dark brown. Pronotum laterally yellow. Legs yellow, femora and coxae yellow brown. Supraclypeal area as wide as torulus, or slightly narrower. Subantennal groove as long as torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. Metascutellum nearly 0.5x as long as frenum to inconspicuous. Ovipositor sheaths 1.5x as long as hind tibia.

Female.

Size and colour. Body length 1.3–1.6 mm. Ovipositor length 0.5 mm. Predominantly dark brown. Scape yellow. Pedicel and flagellum yellow brown. Lower face yellow. Pronotum laterally yellow. Legs yellow, femora and coxae yellow brown.

Head. Supraclypeal area as wide as torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. POL 2.9x OOL. Scape 2.1x as long as pedicel. Antenna with two anelli (character difficult to see). First funicular segment 0.7–0.8x as long as wide, with 5–9 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulated. Mesoscutellum 1.2x as long as wide near transscutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus barely crenulate and inconspicuous. Metascutellum nearly 0.5x as long as frenum to inconspicuous. Anterior margin of propodeum medially concave. Propodeal median line present as a faint longitudinal reticulation. Stigmal vein 0.9x as long as marginal vein, with 2–3 adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 1.5x as long as hind tibia.

Male. Similar to female. Funiciular segments, pronotum and legs yellow.

Host plant. *Ficus colubrinae* Standley.

***Idarnes comptoni* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:3D938DAE-2869-40B2-888B-041FC96A7FDB
(Figs 2I, 4I, 6I, 8I, 10I, 12I, 14I)

Type material. Holotype: ♀, **COSTA RICA: Puntarenas:** 8km N Ciudad Neily, 8.435083º -83.413833º, 23.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus hartwegii* nº JRAS02861 (CBGP).

Paratypes: **COSTA RICA: Puntarenas:** 8km N Ciudad Neily, 8.435083º -83.413833º, 4♀, 1♂, 23.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus hartwegii* nº JRAS02861 (2 ♀ 1 ♂ CBGP, 2 ♀ RPSP).

Etymology. The species is dedicated to our friend and colleague, Dr Stephen G. Compton, for his great contribution to the study of fig wasps and figs.

Diagnosis. Body colour mostly brown. Frons more yellow near clypeus. Supraclypeal area as wide as torulus. Flagellum with 2 anelli. Propodeum dorsally yellow. Postmarginal vein nearly absent. Legs predominantly yellow. Axillula longitudinally striate to reticulate.

Female.

Size and colour. Body length 1.1 mm. Ovipositor length 0.5 mm. Body colour mostly brown. Scape and pedicel yellow. Flagellomeres yellow brown. Frons more yellow near clypeus. Head and mesosoma with faint metallic luster. Tibiae and tarsi yellow.
Head. Supraclypeal area as wide as torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 1x distance from torulus to oral margin. POL 4x OOL. Scape 2x as long as pedicel. Antenna with two anelli. First funicular segment 0.6x as long as wide, with 3–4 multiporous plate sensillae.
Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli mostly without crenulation. Mesoscutellum 1.1x as long as wide near transcutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus barely crenulate, inconspicuous. Metascutellum inconspicuous. Propodeal anterior margin medially concave. Propodeal median line present as a faint longitudinal reticulation. Stigmal vein 0.6x as

743 long as marginal vein, with 3 adstigmal setae. Postmarginal vein nearly absent, shorter than 1/5x
744 stigmal vein length.
745 *Metasoma.* Ovipositor sheaths 1.8x as long as hind tibia.
746
747 **Male**. Similar to female except sexual characters.
748
749 **Host plant.** *Ficus hartwegii* (Miquel) Miquel.
750
751 ***Idarnes cremersiae* Farache & Rasplus, sp. n.**
752 urn:lsid:zoobank.org:act:5F8B227F-7568-4965-BBA4-41C8AEE08EB3
753 (Figs 3A, 5A, 7A, 9A, 11A, 13A, 15A)
754
755 **Type material.** Holotype: ♀, **FRENCH GUIANA:** savanne roche, route de Kourou à
756 Sinnamary, 5.115317º -52.783200º, 16.V.2011, Conchou L., ex *Ficus cremersii*, nº JRAS03711
757 (CBGP).
758
759 Paratypes: **FRENCH GUIANA:** savanne roche, route de Kourou à Sinnamary, 5.115317º -
760 52.783200º, 2♀, 2♂, 16.V.2011, Conchou L., ex *Ficus cremersii*, nº JRAS03711 (1♀ 1♂ CBGP,
761 1♀ 1♂ RPSP).
762
763 **Etymology**. The specific name refers to the host plant.
764
765 **Diagnosis**. Head yellow, brown in dorsal view. Mesosoma predominantly brown. Pronotum in
766 lateral view and prepectus mostly yellow. Axillula longitudinally striate to reticulate. Ovipositor
767 sheaths 1.5x as long as hind tibia.
768
769 **Female**.
770 *Size and colour.* Body length 1.8 mm. Ovipositor length 0.6 mm. Head yellow, brown in dorsal
771 view. Scape yellow, pedicel and flagellomeres yellow brown. Mesosoma predominantly brown.
772 Pronotum in lateral view and prepectus mostly yellow. Axillulae slightly metallic green.
773 Propodeum yellow. Legs predominantly yellow, slightly brown. Metasoma brown black.

Head. Supraclypeal area as wide as torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 1x distance from torulus to oral margin. POL 2.8x OOL. Scape 2.2x as long as pedicel. Flagellum with 2 anelli. First funicular segment 0.6x as long as wide, with 8–11 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli with shallow crenulation. Mesoscutellum 1.2x as long as wide near transcutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus barely crenulate, conspicuous. Metascutellum nearly 0.5x as long as frenum or shorter, inconspicuous. Propodeal anterior margin medially concave. Propodeal median line present, conspicuous. Stigmal vein 0.7x as long as marginal vein, with 1 adstigmal seta. Postmarginal vein nearly absent, shorter than 1/5x stigmal vein length.

Metasoma. Ovipositor sheaths 1.5x as long as hind tibia.

Male. Similar to female but body mostly pale yellow and wings medially infuscate.

Host plant. *Ficus cremersii* Berg.

***Idarnes dimorphicus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:6C619C93-7DB1-437B-B4B9-0100C0F3886E

(Figs 3B, 5B, 7B, 9B, 11B, 13B, 15B)

Type material. Holotype: ♀, **BRAZIL: São Paulo:** Gália, -22.30241º -49.62102º, 696m, 9.VII.2009, Farache F.H.A., ex *Ficus citrifolia* nº FHAF00183_05 (MZSP).

Paratypes. **BRAZIL: Amazonas:** Manaus, -3.06°, -60.11°, 2♀, 23.VIII.2006, Santos, O.A., ex *Ficus citrifolia* nº FHAF00119_02 (RPSP), Manaus, -3.061583º -60.109444º, 30m, 2♀, 3♂, 6.X.2011, Farache F.H.A. & Costa P.C., ex *Ficus citrifolia* nº FHAF00235_06 (RPSP), Manaus, Ponta Negra, Hotel Tropical, -3.06°, -60.11°, 6♀, 2♂, 23.VIII.2006, Santos O.A., ex *Ficus citrifolia* nº JRAS02136_02 (3♀ 1♂ RPSP, 3♀ 1♂ CBGP); **Rondônia:** Porto Velho, Estrada Belmont, -8.66937º, -63.91303º, 69m, 19♀, 3♂, 28.VIII.2012, Farache F.H.A. & Costa P.C., ex *Ficus citrifolia* nº FHAF00329_02 (14♀ 1♂ CBGP, 5♀ 2♂ RPSP); **São Paulo:** Gália, -

22.39544º, -49.78056º, 656m, 5♀, 22.IX.2008, Cerezini M.T. & Farache F.H.A., ex *Ficus citrifolia* nº FHAF00065_07 (RPSP), Gália, -22.3748º, -49.6911º, 676m, 5♀, 25.IX.2008, Farache F.H.A. & Pereira R.A.S., ex *Ficus citrifolia* nº FHAF00064_04 (CBGP), Gália, -22.30241º, -49.62102º, 696m, 1♀, 9♂, 9.VII.2009, Farache F.H.A., ex *Ficus citrifolia* nº FHAF00183_05 (RPSP), Ribeirão Preto, -21.29459º, -47.90941º, 4♀, 4♂, 12.VII.2010, Farache F.H.A., ex *Ficus citrifolia* nº FHAF00198_01 (1♀ 1♂ MZSP, 3♀ 3♂ RPSP), Ribeirão Preto, -21.19216º, -47.78117º, 10♀, 1♂, 23.IV.2009, Cerezini M.T. & Teixeira L.M.R., ex *Ficus citrifolia* nº FHAF00099_03 (1♀ 1♂ MZSP, 9♀ RPSP), Teodoro Sampaio, -22.3867º, -52.3106º, 445m, 5♀, 3♂, 14.IX.2008, Farache F.H.A., ex *Ficus citrifolia* nº FHAF00171_04 (1♀ 1♂ BMNH, 1♀ 1♂ SAMC, 1♀ 1♂ MZSP, 2♀ RPSP).

Etymology. The specific name refers to the colour dimorphism observed between males and females.

Diagnosis. Head and mesosoma predominantly yellow orange. Metasoma black. Predominant colour of males brown black. Supraclypeal area as wide as torulus. Subantennal groove longer than torulus. Distance from torulus to median ocellus 1–1.1x the distance from torulus to oral margin. Metascutellum nearly 0.3–1.0x as long as frenum. Anterior margin of propodeum medially angulose. Ovipositor sheaths 0.9–1x as long as hind tibia.

Female.

Size and colour. Body length 1.7–2.1 mm. Ovipositor length 0.4–0.5 mm. Head and mesosoma yellow orange. Vertex dark orange, black in ocellar margin. Antennae and legs paler. Metasoma black. Ovipositor sheaths 0.9–1x as long as hind tibia.

Head. Supraclypeal area as wide as torulus. Subantennal groove as long as, or slightly longer than torulus Distance from torulus to median ocellus 1–1.1x distance from torulus to oral margin. POL 2.5–3x OOL. Scape 2–2.5x as long as pedicel. Antenna with two anelli. First funicular segment 0.7–0.9x as long as wide, with 9–14 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.2–1.3x as long as wide near transscutal articulation. Axillula with longitudinal striae. Frenal sulcus barely crenulate and

conspicuous. Metascutellum nearly 0.3–1.0x as long as frenum. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein 1.3x as long as marginal vein, with 2–3 adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 0.9–1x as long as hind tibia.

Male. Body predominantly brown black. Legs distally yellow. Antennae yellow brown.

Host plant. *Ficus citrifolia* Miller.

***Idarnes flavicrus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:4DFA1180-913B-48E1-B228-1ACE7F4603F0

(Figs 3C, 5C, 7C, 9C, 11C, 13C, 15C)

Type material. Holotype: ♀, **COSTA RICA: La Fortuna:** Arenal, 10.49916º -84.71019º, 18.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus americana* nº JRAS02841_01 (CBGP).

Paratypes: **COSTA RICA: La Fortuna:** Arenal, 10.49916º -84.71019º, 1♀, 2♂, 18.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus americana* nº JRAS02841_01 (1♀ 2♂ CBGP).

Etymology. The specific name refers to the yellow legs contrasting with the dark brown body.

Diagnosis. Head yellow orange. Mesosoma and metasoma predominantly brown black. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1–1.2x distance from torulus to oral margin. Notauli nearly without crenulation. Axillula reticulate, without longitudinal striae. Frenal sulcus smooth and inconspicuous. Metascutellum inconspicuous. Wing with with four adstigmal setae. Ovipositor sheaths 2–2.1x as long as hind tibia.

Female.

Size and colour. Body length 1.8 mm. Ovipositor length 0.7–0.8 mm. Head yellow orange. Scape and pedicel yellow. Flagellum yellow brown. Mesosoma bown black. Pronotum laterally yellow. Legs yellow. Metasoma brown black

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1–1.2x distance from torulus to oral margin. POL 2.9x OOL. Scape 2.3x as long as pedicel. Antenna with two anelli. First funicular segment 0.8–0.9x as long as wide, with approximately six multiporous plate sensillae.

Mesosoma. Mesoscutum slightly reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli nearly without crenulation. Mesoscutellum 1.1x as long as wide near transscutal articulation. Axillula reticulate, without longitudinal striae. Frenal sulcus smooth and inconspicuous. Metascutellum inconspicuous. Anterior margin of propodeum medially concave. Propodeal median line present as a faint longitudinal reticulation. Stigmal vein 0.5x as long as marginal vein, with four adstigmal setae. Postmarginal vein short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 2–2.1x as long as hind tibia.

Male. Body colour predominantly yellow. Vertex yellow brown. Mesosoma dorsally yellow brown, particularly brown at mesoscutum and scutellar-axillar complex. Mesosoma brown black.

Host plant. *Ficus americana* subsp. *americana* Aublet.

***Idarnes gibberosus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:20EC9435-6547-4FFA-AC77-9205B471F40C

(Figs 3D, 5D, 7D, 9D, 11D, 13D, 15D)

Type material. Holotype: ♀, **COLOMBIA: Cundinamarca:** Bogota, Ciudad Universitaria, 4.638568º -74.089985º, 2620m, 3.III.2006, Jansen-G. S., ex *Ficus andicola* nº JRAS01682_02 (CBGP).

Paratype. ♀, **COLOMBIA: Cundinamarca:** Bogota, Ciudad Universitaria, 4.638568º -74.089985º, 2620m, 3.III.2006, Jansen-G. S., ex *Ficus andicola* nº JRAS01682_02 (CBGP).

Etymology. The specific name refers to the mesoscutum, which is particularly curved in lateral view.

Diagnosis. Body predominantly black. Supraclypeal area narrower than torulus. Subantennal groove longer than torulus. Distance from torulus to median ocellus 0.8x distance from torulus to oral margin. Mesoscutum and scutellar-axillar complex strongly curved in lateral view. Metascutellum nearly as long as, or longer than frenum. Ovipositor sheaths 2x as long as hind tibia.

Female.

Size and colour. Body length 1.8 mm. Ovipositor length 0.9 mm. Predominantly black. Scape brown, pedicel and flagellum yellow. Legs brown black. Tibia, tarsi, proximal portion of femur, trochanter and trochantellus yellow.

Head. Supraclypeal area narrower than torulus. Subantennal groove longer than torulus. Distance from torulus to median ocellus 0.8x distance from torulus to oral margin. POL 2.5x OOL. Scape 2.3x as long as pedicel. Antenna with two anelli. First funicular segment 0.7–0.8x as long as wide, with 8–9 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate. Mesoscutum and scutellar-axillar complex strongly curved in lateral view. Notauli sparsely crenulate. Mesoscutellum 1.2x as long as wide near transscutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus crenulate and conspicuous. Metascutellum nearly as long as, or longer than frenum. Anterior margin of propodeum medially angulose. Propodeal median line present, conspicuous. Stigmal vein as long as marginal vein, with two adstigmal setae. Postmarginal vein nearly as long as 1/2x stigmal vein length.

Metasoma. Ovipositor sheaths 2x as long as hind tibia.

Male. Not known.

Host plant. *Ficus americana* subsp. *andicola* (Standley) Berg.

***Idarnes hansoni* Bouček, 1993**

(Figs 3E, 5E, 7E, 9E, 11E, 13E, 15E)

1993 Bouček, Z., *Journal of Natural History* 27: 202-203, Fig. 38. Description (♀♂).

Type material. Holotype: ♀, **COSTA RICA: San José:** Zarcero, Llano Bonito, XII.1987, Hanson P., ex *Ficus* (BMNH, examined).

Paratypes. **COSTA RICA: Guanacaste**: N.P. Santa Rosa, 1♀, I.1987, Gauld, I (BMNH); **San José:** Zarcero, Llano Bonito, 4♀, XII.1987, Hanson P., ex *Ficus* (BMNH), Zurqui de Moravia, 1600m, 1♀, 2♂, 7-9.IX.1991, Hanson P., ex *Ficus brenesii* (= *F. hartwegii*) (EBCR, USNM, BMNH)

Diagnosis. Body predominantly brown black. Supraclypeal area wider than torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. Metascutellum inconspicuous. Anterior margin of propodeum not angulose medially. Ovipositor sheaths 1.4–1.5x as long as hind tibia.

Description: See supplementary material 2

Host plant. *Ficus hartwegii* (Miquel) Miquel. *Ficus brenesii* Standl. is considered a junior synonym of *F. hartwegii* (Miq.).

Remarks. One paratype analysed (Guanacaste, N. P. Santa Rosa, January 1987, I. Gauld leg. (BMNH) actually belongs to an undescribed species. Since only one specimen is known and because we have no host information, we decided not to describe it waiting for more information and specimens. This species can be distinguished from *I. hansoni* by the following characters: (1) head, pronotum, and propodeum yellow brown, (2) propodeal median line present and conspicuous, (3) anterior margin of propodeum slightly angulose medially.

***Idarnes incertus* (Ashmead, 1900)**

(Figs 3F, 5F, 7F, 9F, 11F, 13F, 15F)

1900 Ashmead, W.H., *Transactions of the Entomological Society of London* 33:253 Description (♀ ♂) (Comb.: *Sycophila incerta*).

1993 Bouček, Z., *Journal of Natural History* 27: 202, Fig. 37. Lectotype designation. (Comb.: *Idarnes incerta*).

Type material. Lectotype. ♀, **USA:** Florida: Coconut Grove (USNM).
Paralectotypes: **ST. VINCENT:** 2♀, Smith H.H. (USNM). **USA: Florida:** Florida city, 1♂, V.1989, Nadel H., ex *Ficus citrifolia* (BMNH)

Diagnosis. Body predominantly yellow orange. Metasoma dorsally brown black, first tergite yellow. Supraclypeal area as wide as torulus. Subantennal groove as long as torulus. Distance from torulus to median ocellus 1x distance from torulus to oral margin. Frenal sulcus smooth. Metascutellum nearly 0.5x as long as frenum to inconspicuous. Postmarginal vein nearly absent, shorter than 1/5x stigmal vein length. Ovipositor sheaths 1.4x as long as hind tibia.

Description: See supplementary material 2

Host plant. *Ficus aurea* form *aurea* Nuttal and *Ficus citrifolia* Miller

Remarks. Several specimens collected in Guadeloupe (38♀, 7♂, JRAS01219 & JRAS01220, CBGP, RPSP) are probably closely related to *Idarnes incertus*, yet, subtle morphological differences can be observed between these specimens and the type specimens from Florida. Consequently, *Idarnes incertus* may constitute a complex of species associated with *Ficus aurea* and *F. citrifolia* in Florida and in the Caribbean islands. Therefore this species may deserve thorough phylogeographical analyses using large sampling before a better species delimitation.

***Idarnes maximus* Farache & Rasplus, sp. n.**
urn:lsid:zoobank.org:act:BA9EEC28-FD78-45B6-953A-11274C64995E

(Figs 3G, 5G, 7G, 9G, 11G, 13G, 15G)

Type material. Holotype: ♀, **BRAZIL: São Paulo:** Gália, -22.2949º, -49.64812º, 31.III.2008, Farache F.H.A., ex *Ficus obtusifolia* nº FHAF00015_02 (MZSP).

Paratypes. **BRAZIL: São Paulo:** Araraquara, Road to Fazenda Salto Grande, -21.804685° -48.203512°, 634m, 7♀, 7♂, 30.VII.2012, Farache F.H.A., ex *Ficus obtusifolia* nº FHAF00323_01 (3♀ 3♂ RPSP, 1♀ 1♂ CBGP, 1♀ 1♂ MZSP, 1♀ 1♂ BMNH, 1♀ 1♂ SAMC), Gália, -22.2949º -49.64812º, 5♀, 1♂, 31.03.2008, Farache F.H.A., ex *Ficus obtusifolia* nº FHAF00015_02 (3♀ 1♂ CBGP, 2♀ RPSP), Gália, -22.37042º -49.65974º, 1♀, 31.III.2008, Farache F.H.A., ex *Ficus obtusifolia* nº FHAF00011_12 (RPSP), Gália, -22.37852º -49.71912º, 3♀, 9.VII.2009, Teixeira L.M.R. & Medeiros M.D.F., ex *Ficus obtusifolia* nº FHAF00155_17 (RPSP), Gália, Road SP331, -22.37042º, -49.65974º, 680m, 19♀, 20♂, 6.IX.2009, Pereira R.A.S., ex *Ficus obtusifolia* nº FHAF00201_05 (RPSP), Garça, -22.2916º -49.74199º, 666m, 24♀, 5♂, 20.XI.2008, Teixeira L.M.R., ex *Ficus obtusifolia* nº FHAF00070_04 (RPSP), Ribeirão Preto, Bosque Municipal Fábio Barreto, -21.1734° 47.8018°, 550m, 1♀, 2.VII.2006, Farache F.H.A. & do Ó V.T., ex *Ficus obtusifolia* nº FHAF00134_03 (RPSP).

Etymology. The specific name refers to the large body size of this species.

Diagnosis. Head and mesosoma predominantly yellow orange in lateral view. Mesonotum and lateral panel of metascutum predominantly black in dorsal view. Metasoma brown black. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.2x distance from torulus to oral margin. First funicular with 12–17 multiporous plate sensillae. Ovipositor sheaths 2.7–2.8x as long as hind tibia.

Female.

Size and colour. Body length 2.4–3.0 mm. Ovipositor length 1.4–1.6 mm. Head and mesosoma predominantly yellow orange in lateral view. Vertex brown, black near ocelli. Antennae yellow. Pronotum slightly brown. Mesonotum and lateral panel of metascutum predominantly black in

dorsal view. Legs yellow orange. Mesepimeron black. Mesepisternum ventrally brown black. Metasoma brown black.

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.2x distance from torulus to oral margin. POL 2.2x OOL. Scape 2.3x as long as pedicel. Antenna with two anelli. First funicular segment 0.9x as long as wide, with 12–17 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.2x as long as wide near transscutal articulation. Axillula with longitudinal striae. Frenal sulcus barely crenulate and faint. Metascutellum nearly 0.5-1.0x as long as frenum. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein 0.8x as long as marginal vein, with two adstigmal setae. Postmarginal vein as long as 1/3–1/2x stigmal vein length.

Metasoma. Ovipositor sheaths 2.7–2.8x as long as hind tibia.

Male. Similar to female but head yellow brown to brown, especially at frons and near vertex in some specimens.

Host plant. *Ficus obtusifolia* Kunth

***Idarnes nigriventris* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:0BE190F5-9E67-45CE-9533-30F65905294E

(Figs 3H, 5H, 7H, 9H, 11H, 13H, 15H)

Type material. Holotype: ♀, **COSTA RICA: Heredia:** Santo Domingo, 8.435083º -83.413833º, 12.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* nº JRAS02809 (CBGP).

Paratypes. **COSTA RICA: Heredia:** Santo Domingo, 8.435083º -83.413833º, 3♀ 1 ♂, 12.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* nº JRAS02809 (CBGP); **Limón:** 12 Km SW Bribri, 9.559778º -82.9135º, 6♀ 2♂ 21.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia*, nº JRAS02829 (2♀ 2♂ CBGP, 1♀ MZSP, 1♀RPSP, 1♀ BMNH, 1♀ SAMC), Puerto

Viejo de Talamanca, 9.637565 -82.708577, 3♀ 2♂, 14.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus isophlebia* nº JRAS02824_02 (2♀ 1♂ CBGP, 1♀ 1♂ RPSP).

Etymology. The specific name refers to the colouration of the metasoma.

Diagnosis. Head and mesosoma predominantly yellow orange. Metasoma brown black, first tergite yellow. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. Metascutellum nearly 0.5x as long as frenum or shorter. Ovipositor sheaths 1.9–2.2x as long as hind tibia.

Female.

Size and colour. Body length 1.7–2.1 mm. Ovipositor length 0.8–0.9 mm. Head and mesosoma yellow orange. Antennae and legs paler. Metasoma brown black, first tergite yellow.

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. POL 2.8x OOL. Scape 2.3x as long as pedicel. Antenna with two anelli. First funicular segment 0.7x as long as wide, with 5–7 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli with shallow crenulation. Mesoscutellum 1.1x as long as wide near transscutal articulation. Axillula with longitudinal striae. Frenal sulcus crenulate and conspicuous. Metascutellum nearly 0.5x as long as frenum or shorter. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein 0.9x as long as marginal vein, with two adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length.

Metasoma. Ovipositor sheaths 1.9–2.2x as long as hind tibia.

Male. Similar to female, except sexual characters.

Host plant. *Ficus aurea* Nuttal form *isophlebia* (Standley) Berg.

***Idarnes pseudoflavus* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:5E9EB253-0BCD-4EA4-A788-0FEED5DE482D

(Figs 3I, 5I, 7I, 9I, 11I, 13I, 15I)

Type material. Holotype: ♀, **COSTA RICA: San José:** Pérez Zeledón, 9.337597° -83.641458°, 26.II.2008, Rasplus J.Y., ex *Ficus goldmanii* (= *F. crocata*) nº JRAS02182_02 (CBGP).

Paratypes. **COSTA RICA: Puntarenas:** Herradura, 9.65788º -84.63541º, 3♀, 1♂, 19.IV.2010, Cruaud A. & Rasplus J.Y., ex *Ficus goldmanii* (= *F. crocata*) nº JRAS02843_01 (CBGP); **San José:** Pérez Zeledón, 9.337597° -83.641458°, 68♀, 17♂, 26.II.2008, Rasplus J.Y., ex *Ficus goldmanii* (= *F. crocata*) nº JRAS02182_02 (63♀ 12♂ CBGP, 1♀ 1♂ MZSP, 2♀ 2♂ RPSP, 1♀ 1♂ BMNH, 1♀ 1♂ SAMC).

Etymology. The specific name refers to the predominant body colour.

Diagnosis. Head and mesosoma predominantly yellow orange. Metasoma yellow brown to black. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.4x distance from torulus to oral margin. Metascutellum inconspicuous. Ovipositor sheaths 1.8x as long as hind tibia.

Female.

Size and colour. Body length 2–2.3 mm. Ovipositor length 0.8–0.9 mm. Head, mesosoma, antennae and legs predominantly yellow orange. Pronotum laterally yellow. Lateral panel of metanotum brown. Propodeum yellow. Mesepisternum, mesepimeron and mesocoxa slightly brown. Metasoma dorsally brown black, laterally yellow, and ventrally brown-yellow.

Head. Supraclypeal area narrower than torulus. Subantennal groove shorter than torulus. Distance from torulus to median ocellus 1.4x distance from torulus to oral margin. POL 2.9x OOL. Scape 2.3–2.6x as long as pedicel. Antenna with one anellus. First funicular segment 0.6–0.8x as long as wide, with 7–13 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.3x as long as wide near transscutal

articulation. Axillula with longitudinal striae. Frenal sulcus crenulate. Metascutellum inconspicuous. Anterior margin of propodeum medially angulose. Propodeal median line traceable at least in the anterior half of propodeum. Stigmal vein 0.9x as long as marginal vein, with two adstigmal setae. Postmarginal vein very short, as long as 1/3x stigmal vein length. *Metasoma.* Ovipositor sheaths 1.8x as long as hind tibia.

Male. Similar to female but the predominant body colour is paler, yellow white. Metasoma brown black except the first and second tergites, which are yellow.

Host plant. *Ficus crocata* (Miquel) Miquel.

***Idarnes williamsi* Farache & Rasplus, sp. n.**

urn:lsid:zoobank.org:act:470B1ABF-F6C6-4C8B-BBE5-69ABD5548EA8

(Figs 3J, 5J, 7J, 9J, 11J, 13J, 15J)

Type material. Holotype: ♀, **COSTA RICA: Guanacaste:** Pequeña Helvetia, Hotel de los Heroes, 10.475466° -84.830086°, 5.III.2008, Rasplus J.Y. & Ramirez W., ex *Ficus perforata* (= *F. americana* subsp. *americana*) nº JRAS02177_03 (CBGP).

Paratypes: **COSTA RICA: Guanacaste:** Pequeña Helvetia, Hotel de los Heroes, 10.475466° -84.830086°, 11♀, 15♂, 5.III.2008, Rasplus J.Y. & Ramirez W., ex *Ficus perforata* (= *F. americana* subsp. *americana*) nº JRAS02177_03 (6♀ 10♂ CBGP, 2♀ 2♂ RPSP, 1♀ 1♂ MZSP, 1♀ 1♂ BMNH, 1♀ 1♂ SAMC).

Etymology. The specific name is dedicated to our friend and colleague, Dr. William Ramírez, for his great contribution to the study of fig wasps and figs. The specimens belonging to this species were collected thanks to his valuable help and great knowledge of the figs of Costa Rica.

Diagnosis. Head and mesosoma yellow brown. Mesoscutellum, frenum and axillula smoky yellow to brown. Propodeum yellow. Metasoma brown black. Supraclypeal area wider than torulus. Subantennal groove as long as, or slightly longer than torulus. Distance from torulus to

median ocellus 0.9x distance from torulus to oral margin. Metascutellum inconspicuous. Ovipositor sheaths 1.3–1.4x as long as hind tibia.

Female.

Size and colour. Body length 1.7–1.8 mm. Ovipositor length 0.5 mm. Head and mesosoma yellow brown. Antennae and legs yellow orange. Vertex slightly brown. Mesoscutellum, frenum and axillula slightly brown. Propodeum yellow. Metasoma brown black.

Head. Supraclypeal area wider than torulus. Subantennal groove as long as, or slightly longer than torulus. Distance from torulus to median ocellus 0.9x distance from torulus to oral margin. POL 3x OOL. Scape 1.8–2.2x as long as pedicel. Antenna with two anelli. First funicular segment 0.6–0.7x as long as wide, with 5–8 multiporous plate sensillae.

Mesosoma. Mesoscutum reticulate to punctate reticulate. Mesoscutum and scutellar-axillar complex not strongly curved in lateral view. Notauli crenulate. Mesoscutellum 1.2x as long as wide near transscutal articulation. Axillula longitudinally striate to reticulate. Frenal sulcus barely crenulate and inconspicuous. Metascutellum inconspicuous. Anterior margin of propodeum medially concave. Propodeal median line present as a faint longitudinal reticulation. Stigmal vein 0.8x as long as marginal vein, with three adstigmal setae. Postmarginal vein nearly absent, shorter than 1/5x stigmal vein length.

Metasoma. Ovipositor sheaths 1.3–1.4x as long as hind tibia.

Male. Similar to female but mesosoma paler, yellow white in some regions. Head smoky, yellow brown.

Host plant. *Ficus americana* subsp. *americana* Aublet.

Phylogenetic analyses

Our final alignment consisted of 4021 bp (*COI* = 1466 bp; *CytB* = 712 bp; *EF* = 517 bp; *rRNA28S* = 1326 bp); of these, 3,462 bp were variable. Alignment of protein coding genes revealed no stop codons or frame shifts. Models chosen by AIC for each partition were GTR + Γ (*mtDNA & 28S rRNA*), and K80+ Γ (*EF-1α*).

The trees reconstructed using ML and Bayesian methods showed the same topology (Fig. 16). *Idarnes incertus* species-group was recovered monophyletic (PP = 1; ML_{BP} = 100%) and divided in two main clades (clade 1 and clade 2; Fig. 16). The first clade is well resolved and composed by five species; *I. brunneus* was recovered sister to *I. comptoni* (PP = 1; ML_{BP} = 100%), and *I. amazonicus* was sister to *I. aureonigrus* and *I. williamsi* (PP = 1; ML_{BP} = 100%). The deeper nodes within the second clade were not well resolved, yet we could retrieve a well supported clade formed by *I. pseudoflavus*, *I. brevis*, and *I. dimorphicus* (PP = 1; ML_{BP} = 100%) but the relationships among these tree species were uncertain. Also, *I. incertus* was retrieved as sister to *I. albiventris* + *I. nigriventris* (PP = 1; ML_{BP} = 100%). The position of *I. maximus* and *I. gibberosus* were not well established (Fig. 16). *Idarnes maximus* was recovered sister to *I. brevis* + *I. dimorphicus* + *I. pseudoflavus* with relatively high Bayesian posterior probability support (PP = 0.97) but low maximum likelihood booststrap support (ML_{BP} 52%), while *I. gibberosus* was recovered as sister to the clade *I. albiventris* + *I. incertus* + *I. nigriventris* with medium Bayesian posterior probability support (PP = 0.9) yet low ML_{BP} support (ML_{BP} = 63%)

Discussion

The *Idarnes incertus* species-group is clearly distinct from the remaining *Idarnes*. Indeed, species rarely exhibit metallic tinge and their ovipositor is always shorter than the body length, whereas the remaining *Idarnes* exhibit metallic colour and the ovipositor is always longer than body. Species belonging to the *I. incertus* species-group are globally similar, and the main differences between species concern the body coloration and the relative length of the ovipositor. According to recent phylogenetic analyses, the *I. incertus* species-group appears to be a recent radiation within Sycophaginae (Cruaud et al. 2011a; Cruaud et al. 2011b) and the morphological similarity of the species may be partly linked to their recent divergence (~20–10 Ma, during the Miocene; Cruaud et al. 2011a).

Species of the *Idarnes incertus* species-group are usually species-specific with the exception of *I. americanae,* that was found associated with *F. americana* and *F. costaricana* (both species occurring in Costa Rica), and *I. incertus* that is associated with *F. aurea* and *F. citrifolia* in Florida.

Several fig species host more than one species of the *I. incertus* species-group:

1) Four species are associated with *Ficus americana,* namely *I. americanae, I. flavicrus, I. gibberosus,* and *I. williamsi.* The former two species occurred together within figs of *F. americana* subsp. *americana* in Costa Rica, while *I. williamsi* occurred in the same subspecies, but in different samples. *Idarnes gibberosus* occurred in figs of *F. americana* subsp. *andicola* in Colombia. *Ficus aurea* hosted three species; the co-occurring *I. albiventris* and *I. nigriventris* in Costa Rica and *I. incertus* in Florida.
2) *Ficus citrifolia* hosts different species in different parts of its distribution range: *I. dimorphicus* occurs in South America (Brazil: Amazonas, Rondônia, and São Paulo), while *I. brevis* occurs in *F. citrifolia* in Costa Rica, and *I. incertus* in Florida.
3) *Ficus hartwegii* is the host plant of *I. comptoni* and *I. hansoni* in Costa Rica.
4) Finally, *Ficus pertusa* hosts *I. amacayacuensis* and *I. badiovertex.*

These patterns strongly suggest that the diversification of the *I. incertus* species-group within *Ficus* do not follow a "one-to-one rule" of diversification as discussed for pollinators (Rasplus 1996). Our results clearly show that host shifts between *Ficus* species and diversification on the same *Ficus* host are frequent. Our phylogenetic analyses show one case of diversification within the same host species. Indeed, species associated with the *Ficus aurea* complex (*I. albiventris* + *I. incertus* + *I. nigriventris*) formed a strongly supported monophyletic clade and were morphologically closely related. On the other hand, species associated with the *F. americana* complex (*I. amazonicus*, *I. gibberosus*, and *I. williamsi*) belong to different clades, which strongly suggests that host shift happened. Patterns of diversification within host species were also observed in *Anidarnes* for which sister species occurred on the same host complexes, *i.e. F. aurea* and *F. americana* complexes (Farache et al. 2013). This suggests the existence of different diversification patterns among genera even when they show similar life histories and belong to a same subfamily.

Here we recognized three previously described species belonging to *Idarnes incertus* species-group. Additionally, 17 species new to science are recognized and described. Most species were collected in Costa Rica (13 spp.), and some from Brazil (4 spp.) and Colombia (3 spp.). Sampling efforts in Brazil and Costa Rica are comparable, and therefore this shows that

the group is probably more diversified in lower latitudes. The high number of new species found in this study highlights the lack of taxonomic information on the Neotropical fig wasps. Despite an increasing number of phylogenetic studies including these wasps (Cruaud et al. 2011a; Cruaud et al. 2010; Cruaud et al. 2011b; Cruaud et al. 2012; Heraty et al. 2013; Munro et al. 2011) just a few recent (*i.e.* 20th century onwards) taxonomic papers are available on non-pollinating and pollinating wasps (Bouček 1993; Farache et al. 2013; Jansen-Gonzalez & Sarmiento 2008; Schiffler et al. 2002; Wiebes 1995).

This study yields taxonomic and phylogenetic frameworks for a group of *Idarnes*, which represents an important part of the Sycophaginae diversity (ca. 33% of the spp.). This contribution is an important step to a well-established taxonomic foundation for Agaonidae, and we hope it will subsidize further investigations addressing taxonomy, evolution, and host specificity in fig wasps.

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Figures

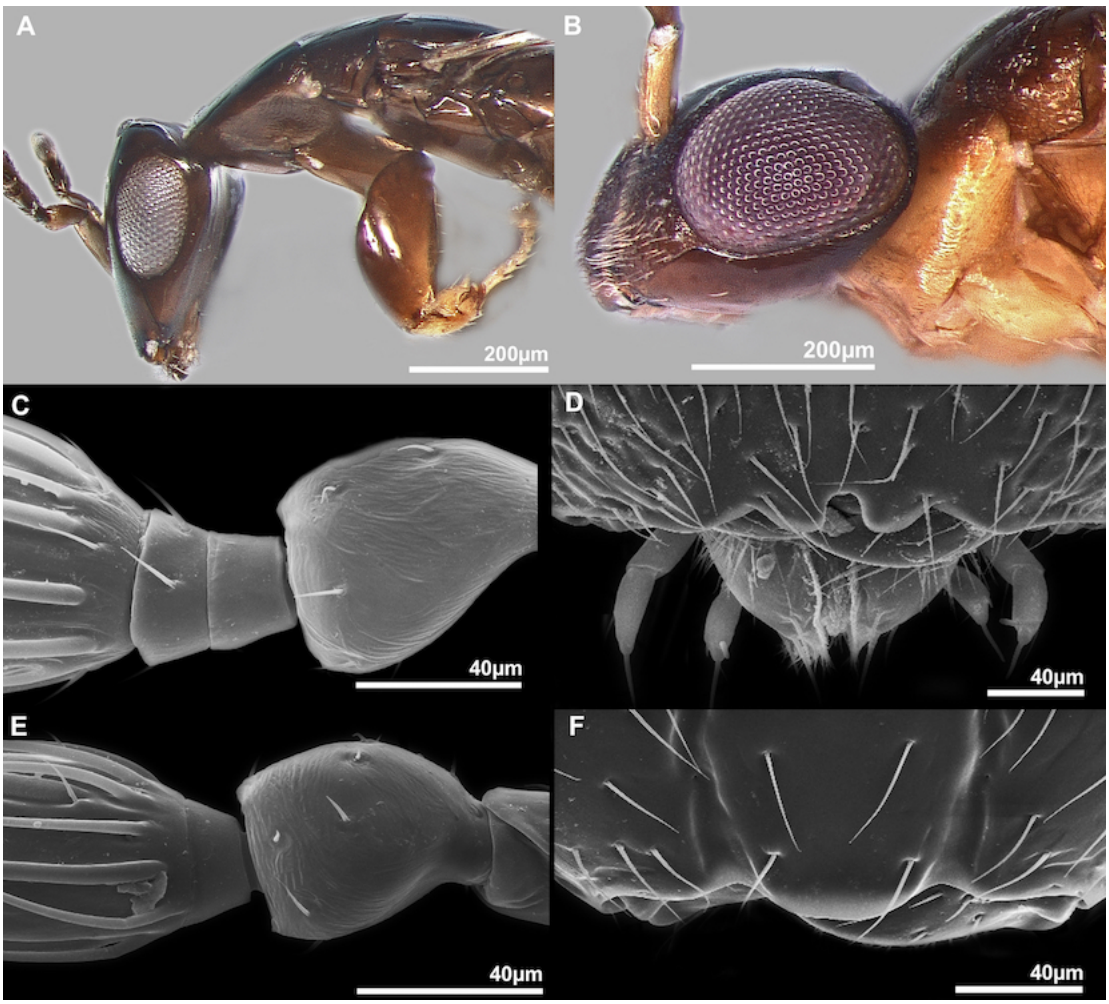


Fig. 1: Sycophaginae morphology. A, *Sycophaga sycomori,* Lateral view of head and mesosoma; B, *Sycophaga testacea*. Lateral view of head; C, *Idarnes flavicollis* sp. group, detail of antenna; D, *Idarnes flavicollis* sp. group, detail of clypeus; E, *Idarnes* sp. *carme* sp. group., detail of antenna; F, *Idarnes* sp. *carme* sp. group, detail of clypeus.

1417

1418 Fig. 2: *Habitus* in lateral view, *Idarnes incertus* sp. group, females. A, *I. albiventris* sp. n.; B, *I.*
1419 *amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I. aureonigrus* sp. n.;
1420 F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni* sp. n. Scale = 500
1421 µm.

1422

1423 Fig. 3: *Habitus* in lateral view, *Idarnes incertus* sp. group, females. A, *I. cremersiae* sp. n.; B, *I.*
1424 *dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček, 1993,
1425 Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I. nigriventris* sp.
1426 n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 500 µm.

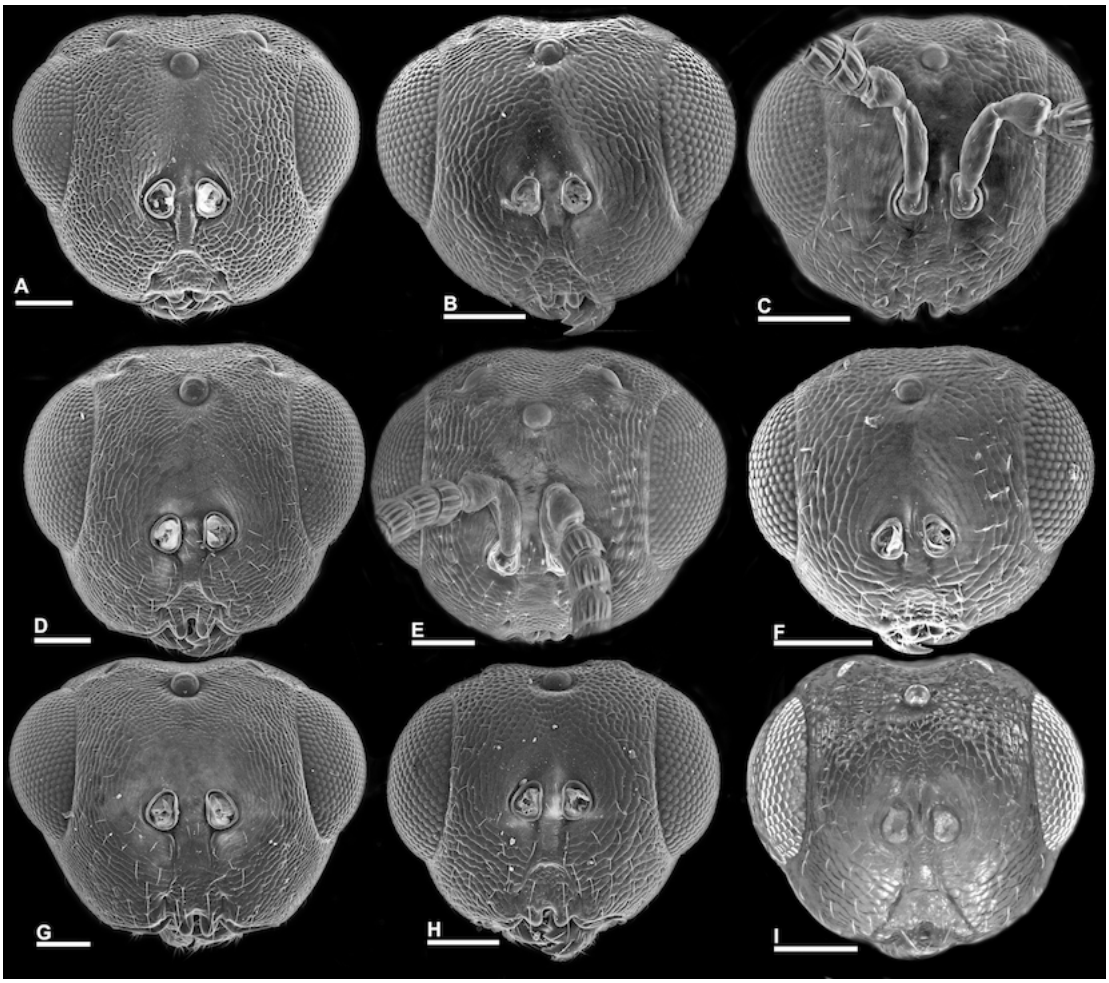


Fig. 4: Head in frontal view, *Idarnes incertus* sp. group, females. A, *I. albiventris* sp. n.; B, *I. amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I. aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni* sp. n. Scale = 100 µm.

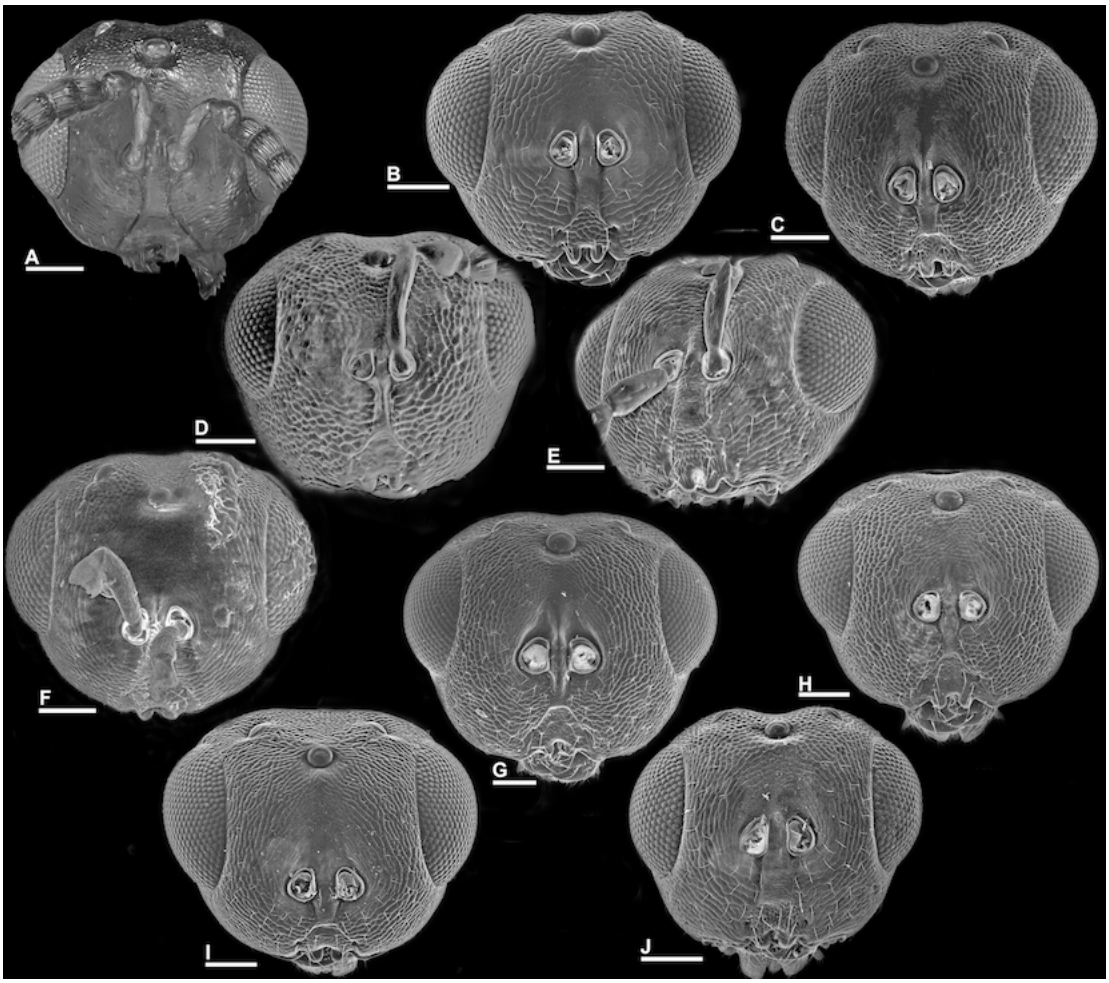


Fig. 5: Head in frontal view, *Idarnes incertus* sp. group, females. A, *I. cremersiae* sp. n.; B, *I. dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček, 1993, Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I. nigriventris* sp. n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 100 μm.

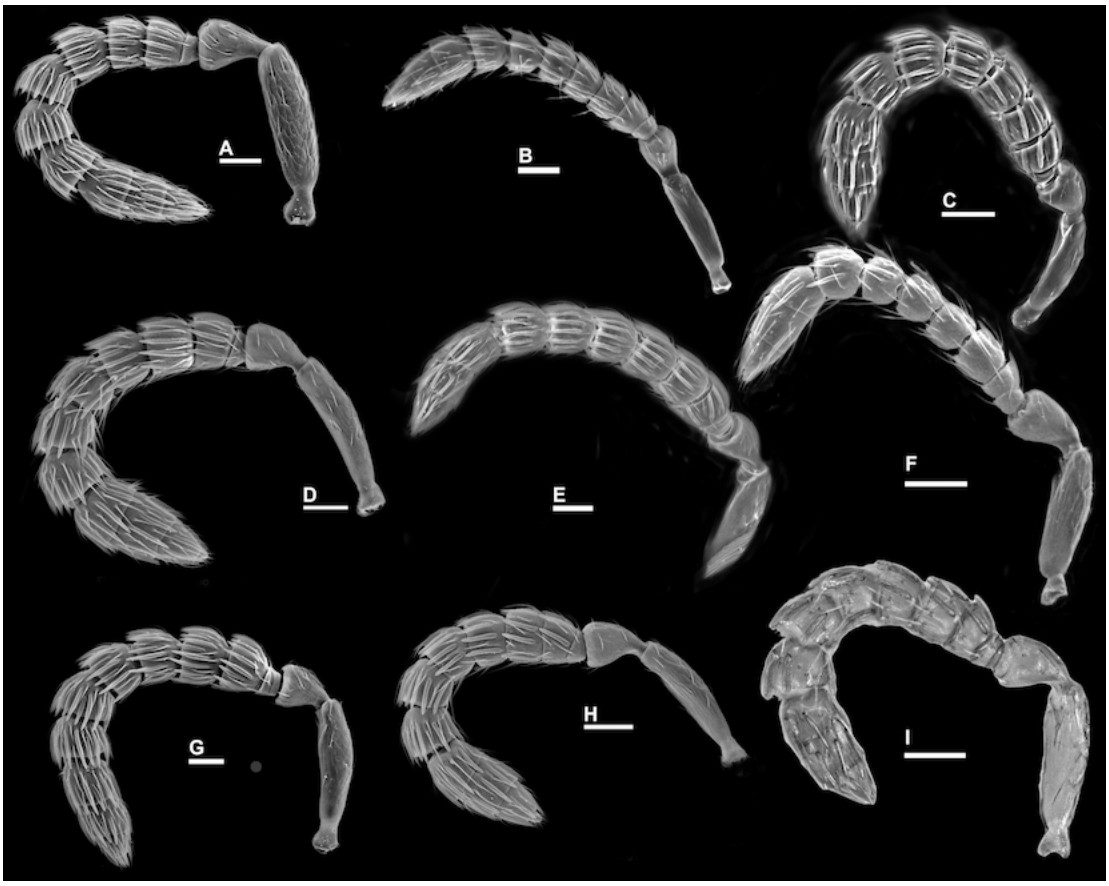


Fig. 6: Antenna, *Idarnes incertus* sp. group, females. A, *I. albiventris* sp. n.; B, *I. amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I. aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni* sp. n. Scale = 50 μm.

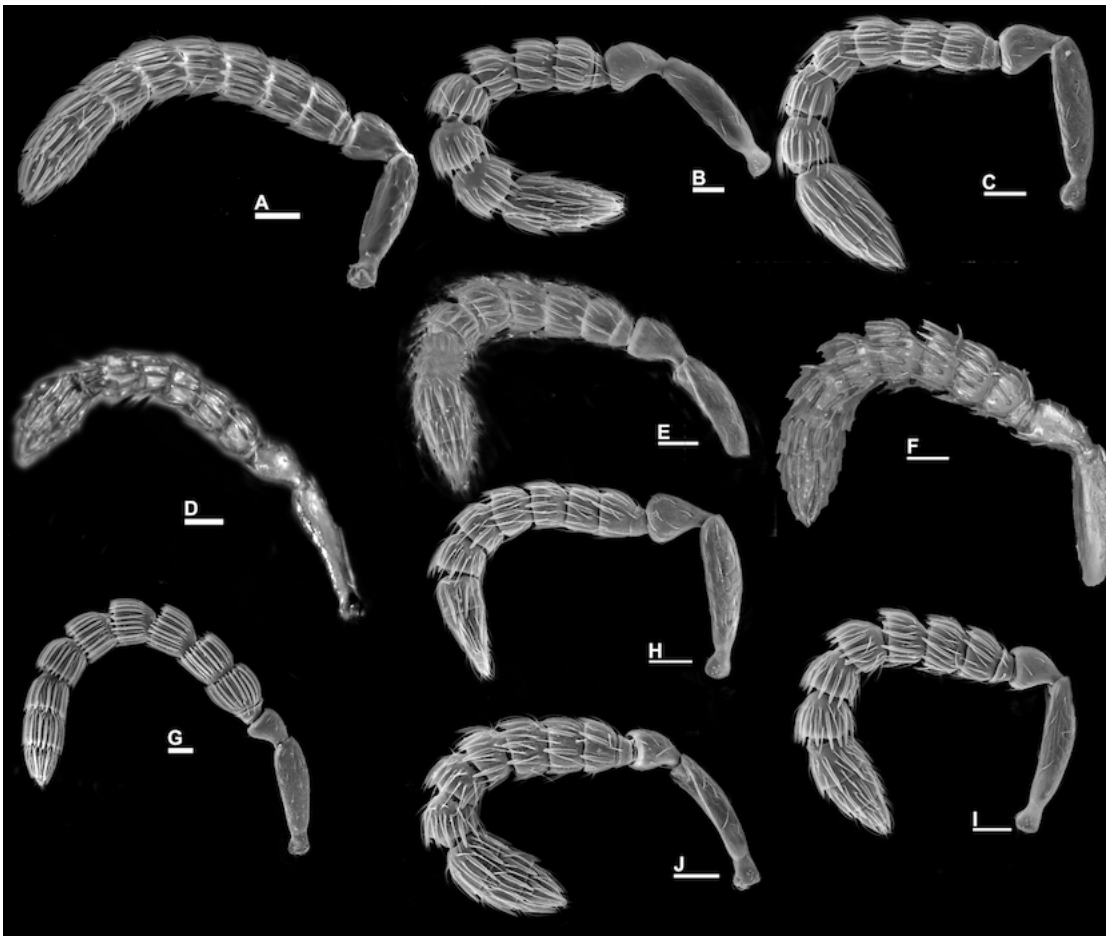


Fig. 7: Antenna, *Idarnes incertus* sp. group, females. A, *I. cremersiae* sp. n.; B, *I. dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček, 1993, Paratype; F, *I. aff. incertus* Ashmead, 1900 (JRAS01219); G, *I. maximus* sp. n.; H, *I. nigriventris* sp. n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 50 μm.

1447

1448 Fig. 8: Pronotum and vertex in dorsal view, *Idarnes incertus* sp. group, females. A, *I. albiventris*

1449 sp. n.; B, *I. amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I.*

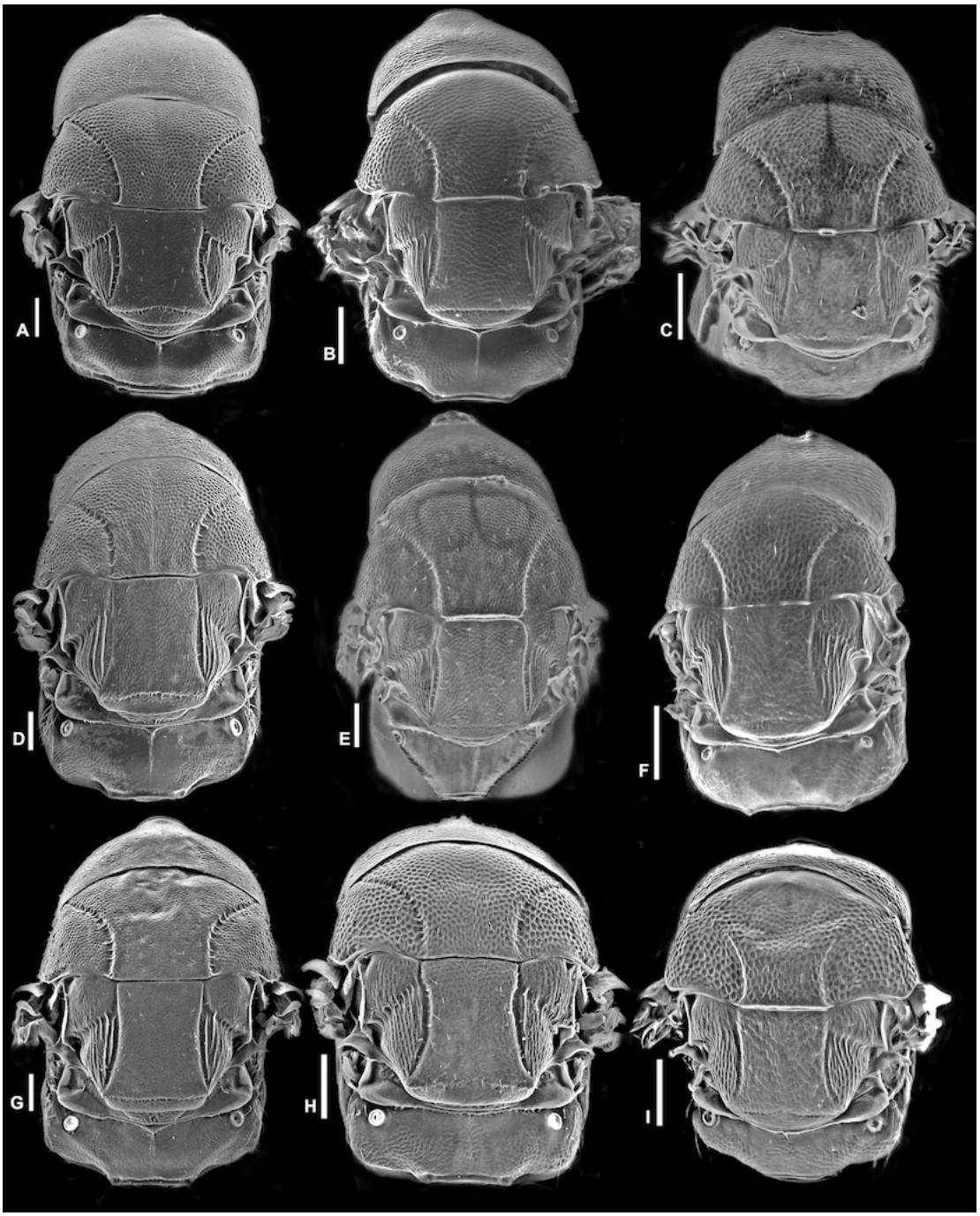
1450 *aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni*
1451 sp. n. Scale = 200 µm.
1452

1453
1454 Fig. 9: Pronotum and vertex in dorsal view, *Idarnes incertus* sp. group, females. A, *I. cremersiae*
1455 sp. n.; B, *I. dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček,
1456 1993, Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I.*
1457 *nigriventris* sp. n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 200 µm.

Fig. 10: Mesosoma in dorsal view, *Idarnes incertus* sp. group, females. A, *I. albiventris* sp. n.; B, *I. amacayacuensis* sp. n.; C, *I. amazonicus* sp. n.; D, *I. americanae* sp. n.; E, *I. aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G, *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni* sp. n. Scale = 200 µm.

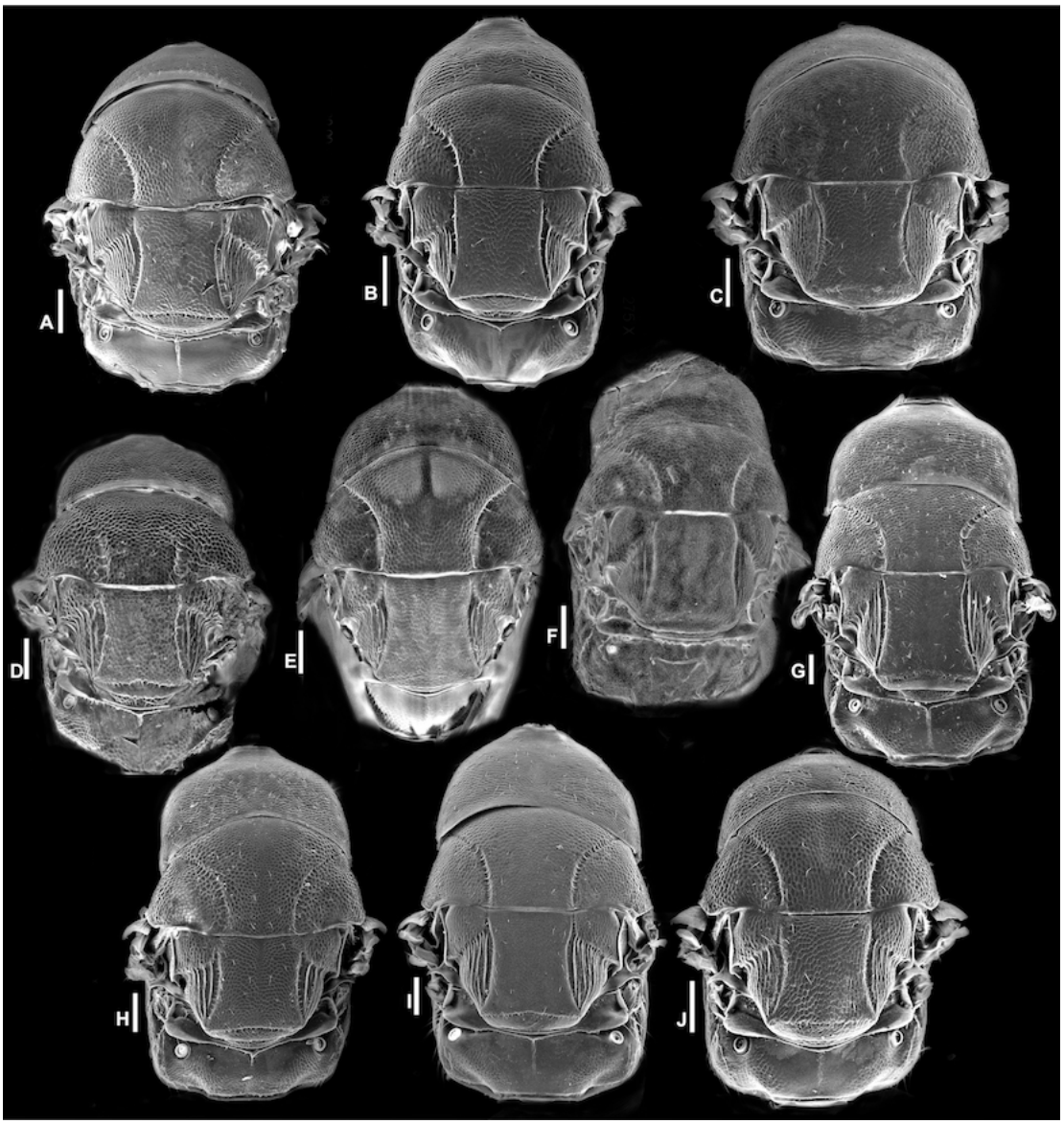
1463

1464 Fig. 11: Mesosoma in dorsal view, *Idarnes incertus* sp. group, females. A, *I. cremersiae* sp. n.; B,
1465 *I. dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček, 1993,
1466 Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I. nigriventris* sp.
1467 n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 200 µm.



1468

1469 Fig. 12: Mesosoma in dorsal view (SEM), *Idarnes incertus* sp. group, females. A, *I. albiventris*
1470 sp. n.; B, *I. amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I.*
1471 *aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni*
1472 sp. n. Scale = 100 μm.



1473

1474 Fig. 13: Mesosoma in dorsal view (SEM), *Idarnes incertus* sp. group, females. A, *I. cremersiae*
1475 sp. n.; B, *I. dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček,
1476 1993, Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I.*
1477 *nigriventris* sp. n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 100 μm.

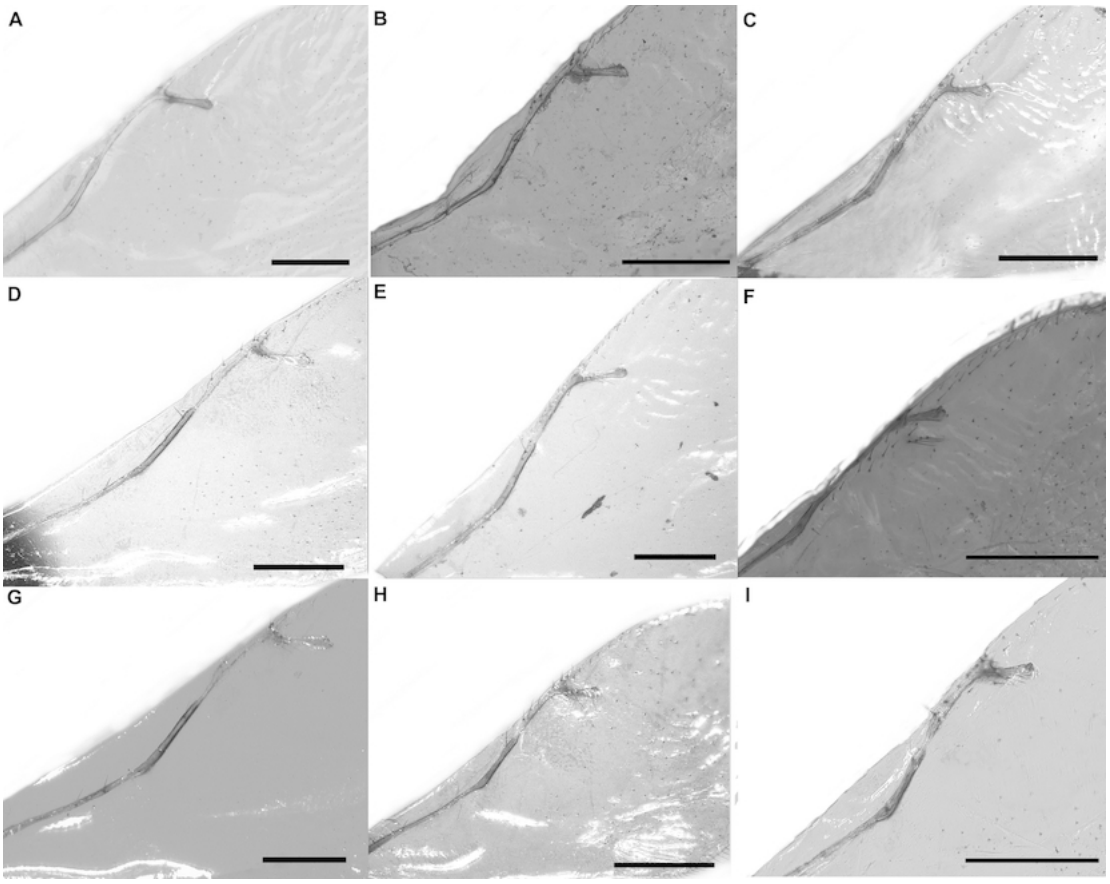
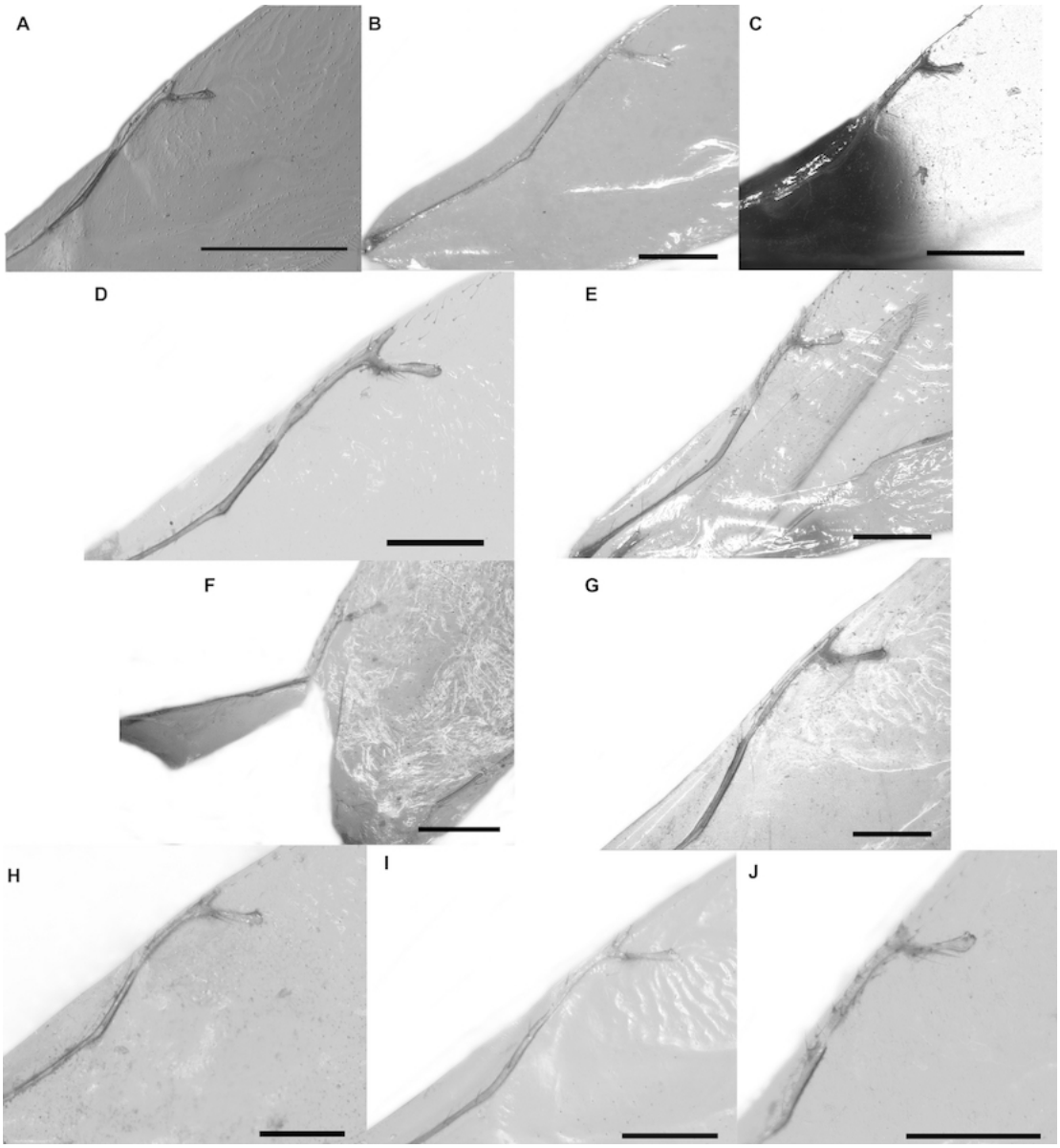


Fig. 14: Wing venation, *Idarnes incertus* sp. group, females. A, *I. albiventris* sp. n.; B, *I. amacayacuensis* sp. n.; C**,** *I. amazonicus* sp. n.; D**,** *I. americanae* sp. n.; E*, I. aureonigrus* sp. n.; F, *I. badiovertex* sp. n.; G**,** *I. brevis* sp. n.; H, *I. brunneus* sp. n.; I, *I. comptoni* sp. n. Scale = 200 μm.



1483

1484 Fig. 15: Wing venation, *Idarnes incertus* sp. group, females. A, *I. cremersiae* sp. n.; B, *I.*
1485 *dimorphicus* sp. n.; C, *I. flavicrus* sp. n.; D, *I. gibberosus* sp. n.; E, *I. hansoni* Bouček, 1993,
1486 Paratype; F, *I. incertus* Ashmead, 1900, Paralectotype; G, *I. maximus* sp. n.; H, *I. nigriventris* sp.
1487 n.; I, *I. pseudoflavus* sp. n.; J, *I. williamsi* sp. n. Scale = 200 µm.

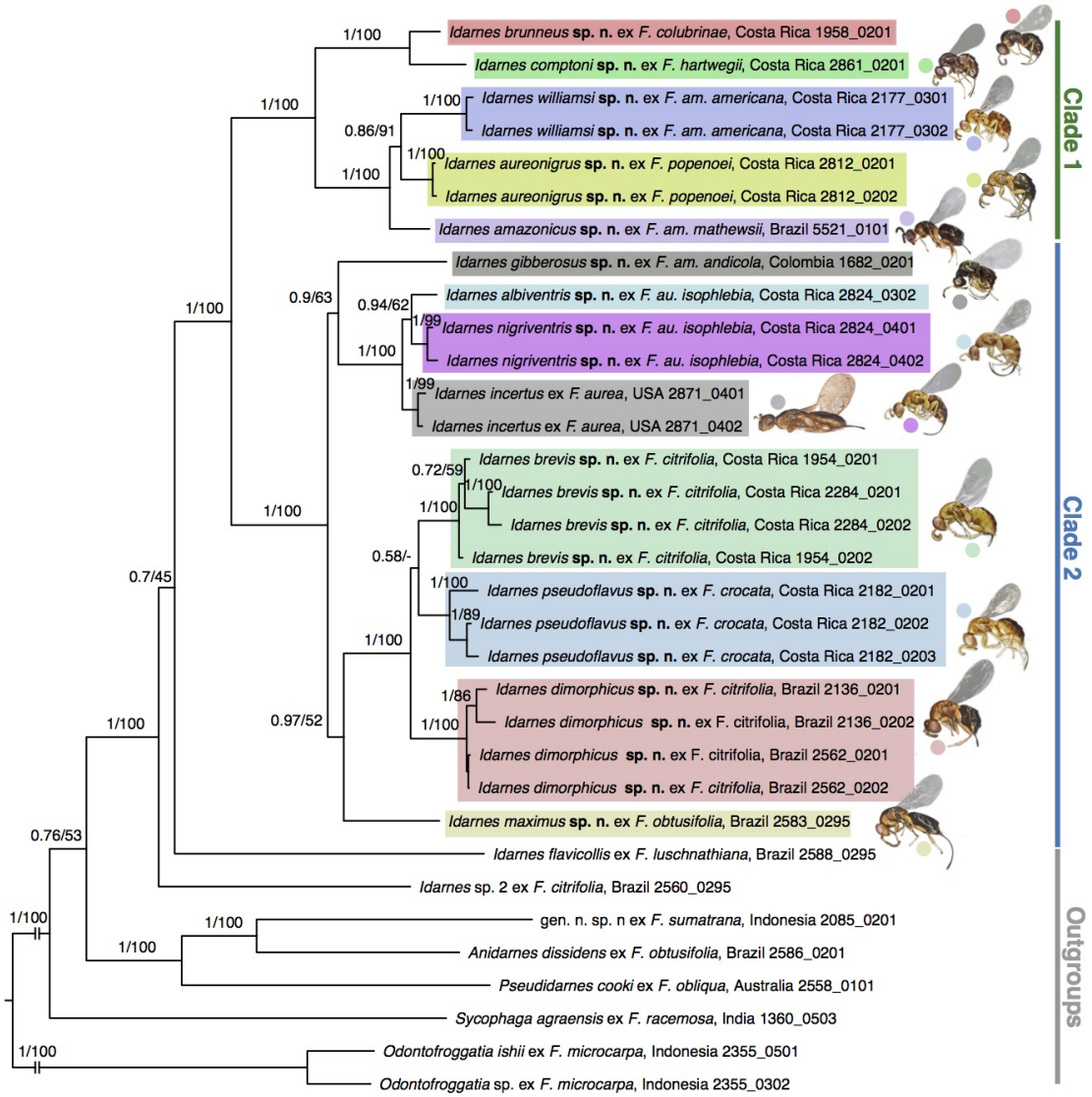


Fig. 16: Phylogram of relationships among the *Idarnes incertus* species-group species and eight outgroups obtained with Bayesian inference. Bayesian posterior probabilities (decimals) and likelihood bootstrap values (percentage) are indicated above nodes (PP/ML_{BP}). Color boxes indicate specimens belonging to a same species. *F. am.* = *F. americana*; *F. au.* = *F. aurea.*