

Description of a new species of Hypaeus (Araneae: Salticidae: Salticinae: Amycini) based on integrative taxonomy

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- Description of a new species of *Hypaeus* (Araneae: Salticidae: Salticinae:
 Amycini) based on integrative taxonomy
- 3
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15

16 Abstract

A new species of *Hypaeus* Simon 1900 is described from French Guiana based on both sexes, *Hypaeus olympeae* **sp. nov.** We employed morphological evidence, field observation, as well the mitochondrial COI rapidly evolving loci to confirm that both males and females belongs to the same species. Finally, nine species are newly recorded for the salticid fauna of French Guiana, *Cyllodania fasciata* (Caporicaco, 1954) **syn. nov.** is considered junior synonym of

Gypogyna forceps Simon, 1900 and 12 COI sequences corresponding to four previously
 unsequenced *Hypaeus* species are added to GenBank.

24

Key words: jumping spiders, barcoding, cytochrome c oxydase 1 subunit 1, taxonomy, French
Guiana.

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- 28

29 Introduction

Neotropical spider faunas are still largely understudied (e.g. Dupérré, 2022), owing to their high 30 diversity (Cardoso et al. 2011; Privet & Pétillon 2018) and the high human and material costs 31 32 to study them. Additionally, large proportions of rare species and juveniles make up tropical spider assemblages (Coddington et al. 2009), being difficult or impossible to identify and 33 describe. Spiders are a model group for ecological studies (Birkhofer & Wolters 2012; Cardoso 34 et al. 2011; Malumbres-Olarte et al. 2018; Moya-Laraño et al. 2013) and the only group to be 35 exclusively predatory among the dominant terrestrial arthropods (Birkhofer & Wolters 2012; 36 37 Pekár & Toft 2015). Improving knowledge on their taxonomy is thus crucial to understand neotropical diversity and ecology. 38

Within the forests of the Amazon, the most abundant and speciose spiders are the jumpingspiders (Salticidae Blackwall,1841; Bodner & Maddison 2012) and the richest subfamily is Amycinae (Araújo & Ruiz 2015; Maddison 2015). Among them, *Hypaeus* Simon 1900 is one of the richest genera with 28 described species distributed from south to central America (World Spider Catalog 2021).

Species of *Hypaeus* are distinguished by: high carapaces, plumose setae over front eyes,
pluridentate chelicerae with 4-5 teeth on promargin and 3-6 on retromargin, mastidia on male

chelicerae and third legs longer than fourth (Galiano, 1968; Ruiz & Madisson 2015). However, *Hypaeus* is still poorly described with inadequate sampling across the genus' range. Thus, the
boundaries of *Hypaeus* are not completely understood (Araújo & Ruiz 2015).

Galiano (1963, 1968) redescribed and revised 18 Hypaeus species described by Crane (1943), 49 Mello-Leitão (1948), Peckham & Peckham (1885), Simon (1900) and Taczanowski (1871, 50 1878). She also transferred two species to this genus, Amycus mystacalis (Taczanowski, 1878) 51 and Triptolemus benignus (Peckham & Peckham, 1885); and synonymized one, Mago 52 53 budoninus (Caporiacco, 1954). Two others were described by Crane, H. duodentatus Crane, 1943, and by Caporiacco, H. barromachadoi Caporiacco, 1947. Recently, the male and the 54 female of the type species of the genus Hypaeus, H. taczanowskyii (Mello-Leitao, 1948), were 55 redescribed by Araújo & Ruiz (2015). The same authors added four new species to the genus, 56 H. tridactylus, H. famoratus, H. poseidon and H. terramediae Araújo & Ruiz 2015, and 57 58 transferred Hasarius pauciaculeis (Caporiacco, 1947) to Hypaeus. The last issue from Martinez & Galvis (2017) added three new species, H. arhuaco, H. proszynskii and H. varzea Martinez 59 & Galvis, 2017. Of the resulting 28 Hypaeus species, 17 have been described only from males 60 61 (Araújo & Ruiz 2015; Martinez & Galvis 2017; World Spider Catalog 2021).

62 Combining multiple lines of evidence such as morphology and DNA barcoding in species 63 delimitation, could help alleviate the limitations on tropical spider diversity knowledge linked 64 to juveniles and rare species. Phylogenetic analyses are also needed to resolve the relationships 65 within *Hypaeus* (Ruiz et al. 2019). However, only sequences for two *Hypaeus* species, *H.* 66 *mystacalis* (Taczanowski, 1878) and *H. miles* (Simon, 1900), are available to date.

One hundred and two species of Salticidae are currently listed for French Guiana (Courtial et
al. 2014; Vedel et al. 2013) and among them three *Hypaeus species*: *H. flavipes* (Simon, 1900), *H. porcatus* (Taczanowski, 1871) and *H. taczanowskii* (Mello-Leitao, 1948). During our last

expeditions to French Guiana (see Privet et al. 2018; Privet & Petillon 2018), in the National Nature Reserves of La Trinité and Les Nouragues, numerous Salticidae were collected, among them several specimens of an undescribed *Hypaeus* species. In this study, we used a combination of morphology and DNA barcoding targeting COI to match and describe the male and female from the new species, *Hypaeus olympeae* **sp. nov.**, produce sequences for four other *Hypaeus* species never sequenced so far, and add nine species to the list of salticids from French Guiana.

77

78

79 Material and Methods

80 Taxon sampling

Taxa sequenced in this study are 12 individuals of salticids belonging to the genus Hypaeus. 81 They were collected in La Trinité (4°35'20"N; 53°18'1"W) and Les Nouragues (4°04'18"N; 82 52°43′57″W) Nature Reserves (French Guiana) during two surveys conducted in 2010 and 2013 83 (see Privet et al. 2018; Privet & Pétillon 2018). In these reserves, seasonally flooded (Aya and 84 Pararé) and summit inselberg (La Roche Bénitier and Nouragues) forests were sampled. 85 86 Inselbergs are rocky outcrops rising abruptly from the surrounding landscape where little research has been devoted to invertebrates, especially spiders (Privet et al. 2018). These 87 specimens were separated based on morphology and sequenced. Six specimens were identified 88 89 as *H. taczanowskii* and four to *H. porcatus*. Two specimens, impossible to assign to any of the currently recognized Hypaeus species, correspond to the new species described here, Hypaeus 90 olympeae sp. nov. Total DNA of the 12 Hypaeus specimens was then extracted using non-91 destructive method (see below). 92

94 Specimens

The type material examined is deposited at the Museum national d'Histoire naturelle (MNHN, 95 Paris). Preserved specimens were studied using an OlympusSZX9 stereomicroscope with a 96 Moticam5 (5.0MP) camera. Live specimens (holotype male and partype female) were 97 photographed with a Canon EOS 450 D digital reflex camera with a 60 mm macro lens. The 98 epigyne was macerated in 10% KOH. The specimens were preserved in 70% ethanol. 99 Measurements were taken according to Edwards (2004) in millimeters (mm), for direct 100 comparison with Hypaeus spp. described by Araújo & Ruiz (2015). The following 101 abbreviations are used: 102

AERW: anterior eye row width; AMEW: anterior median eyes width; CH: carapace height; CL:
carapace length; CLH: clypeus height; co: copulatory opening; CW: carapace wide; dg: digital
gland; eb: embolus base; et: embolus tip; OQL: ocular quadrangle length; MNHN: Muséum
national d'Histoire naturelle, Paris; PERW: posterior eye row width; po: pocket; RNN: Réserve
Naturelle Nationale (National Nature Reserve); sp: spermathecae; ta: tibial apophysis, TL: total
length.

The drawings of male individuals of Galiano (1963, 1968), Crane (1943), Ruiz & Brescovit
(2008), Araujo & Ruiz (2015) and Martinez & Galvis (2017), as well as the reviewing of type
specimens stored at the MNHN (Paris, France), allowed us to identify the new species *Hypaeus olympeae* sp. nov. collected in French Guiana.

113

114 DNA extraction, amplification, sequencing and data assembly

DNA was extracted using DNeasy 96 Blood and Tissue Kit (Qiagen) following manufacturer's 115 recommendations. The entire specimens were directly placed in lysis buffer with proteinase K 116 overnight to extract DNA without compromising morphological requirements for further 117 examination (Paquin & Vink 2009). The standard animal DNA barcode fragment of the 118 mitochondrial cytochrome-c-oxidase subunit 1 (COI) was targeted by PCR using the primers 119 C1-J-1718 "SPID" (Simon et al. 1994) and C1-N-2776 (Hedin & Maddison 2001). PCR 120 121 reactions were performed in 25 µL and contained 0.5X PCR Buffer, 0.2 mM dNTPs, 1 mM MgCl2, 0.15 μ M of each primer, 0.02 U/ μ L of Taq polymerase (GoTaq, Promega) and 2 μ L of 122 DNA. PCR amplification started with an initial 94°C denaturation step for 2 min, followed by 123 124 35 cycles of (i) denaturation at 94°C for 45 s, (ii) annealing at 50°C for 45 s, and (iii) extension 125 at 72°C for 60 s; a final 72°C extension step lasted 10 min. Sequencing of PCR products was performed by Genoscreen (Lille, France) using the same primers than for amplification. 126 Sequence fragments were imported, assembled, and edited in Geneious 6.1.8 (Biomatters Ltd., 127 Auckland, New Zealand). All sequences, with voucher information, are archived in GenBank 128 (Table 1). 129

130

131 *Phylogenetic analysis*

The taxonomic sampling used for the phylogenetic analyses included the 12 sequences newly
generated for the study as well as one GenBank accession of *Sarinda cutleri* (Richman, 1965)
(JX145669), a closely related species (see Maddison et al. 2014) that served as the outgroup.
All sequences were aligned in Geneious using MAFFT v.7.017 (Katoh & Standley 2013).

136 The resulting COI matrix was subjected both to Bayesian inference (BI) and maximum137 likelihood (ML) analyses. We first searched for the best-fitting nucleotide substitution model

using the Akaike information criterion (AIC) estimated by MrModeltest v.2.3 (Nylander 2004);

| 139 | the GTR + G model was selected and assigned to all following phylogenetic analyses. The |
|-----|--|
| 140 | software MrBayes 3.2.6 (Huelsenbeck & Ronquist 2001) and RaxML-HPC v.8.1.24 |
| 141 | (Stamatakis 2014) implemented on the CIPRES Science Gateway (Miller et al. 2010) platform |
| 142 | were used to perform BI and ML analyses, respectively. MrBayes analyses constituted two |
| 143 | independent parallel runs of four Markov chains each, implemented for one million generations |
| 144 | and sampled every 100 generations. Adequate mixing of the Markov chains and convergence |
| 145 | of the two runs were confirmed with Tracer v1.6 (Rambaut et al. 2014). After removing a 10% |
| 146 | burnin, the remaining trees were used to generate a 50% Bayesian majority-rule consensus tree. |
| 147 | For the RaxML analyses, node support was assessed using a rapid bootstrapping algorithm with |
| 148 | 1000 bootstrap iterations. |
| 149 | |
| 150 | |
| 151 | Results |
| 152 | Taxonomy |
| 153 | Class Arachnida Cuvier, 1812 |
| 154 | Order Araneae Clerck, 1757 |
| 155 | Family Salticidae Blackwall, 1841 |
| 156 | Subfamily Salticinae Blackwall, 1841 |
| 157 | Tribe Amycini F.O Pickard-Cambridge, 1900 |
| 158 | Genus Hypaeus Simon, 1900 |
| 159 | Hypaeus Simon, 1900: type species Acragas taczanowskii Mello-Leitão, 1948. |

160 *Hypaeus olympeae* Courtial & Picard sp. nov.

161 Figs 1-18

162 Diagnosis

Males of Hypaeus olympeae sp. nov. are similar to those of H. miles Simon, H. femoratus 163 Araújo & Ruiz and H. terraemediae Araújo & Ruiz for having dilated femora (Fig 4). However, 164 H. olympeae sp. nov. has wider rounded TA, which is small and pointed in aforementioned 165 166 species. Females of *H. olympaeae* sp. nov. are similar to those of *H. femoratus* and *H.* terraemediae (the female of H. miles is unknown). Digitiform glands curve from the center of 167 the epigyne to the antero-lateral portion. Females of *H. olympeae* **sp. nov.** are slightly similar 168 169 in shape to those of H. femoratus and H. terremaediae but the COs openings are less curved and space further apart them is bigger. 170

171 Etymology

The species is named "*olympeae*" to pay tribute to Olympe Delavalle, daughter of MargueriteDelavalle, the Curator of the NNR Nouragues during our survey.

174 Material examined

- 175 *Holotype*
- 176 1∂ from RNN des Nouragues (4°02'N, 52°41'W), Camp Pararé, French Guiana (AR 16169),
- 177 11.XII.2013, Cyril Courtial coll.
- 178 *Paratypes*
- 179 1♀ from RNN des Nouragues (4°02'N, 52°41'W), Camp Pararé, French Guiana (AR 16170),
- 180 11.XII.2013, Cyril Courtial coll.; 1⁽²⁾, 2⁽²⁾ from RNN de la Trinité (04°36'N, 53°24'W), Camp
- 181 Aya, French Guiana, 08.XII.2010, Alain Canard coll.

182 *Additional material examined*

- 183 French Guiana. RNN de la Trinité, Camp Aya (04°36'N, 53°24'W): 1♂, 01.XI.2008, Frédéric
- 184 Ysnel coll.; RNN des Nouragues, Camp Inselberg (4°05'N, 52°41'W): 1♀, 09.XII.2013, Cyril
- 185 Courtial coll.; RNN des Nouragues, Camp Pararé (4°02'N, 52°41'W): 1♀, 26.VI.2010, Vincent
- 186 Vedel coll.; Montagne des Chevaux (4 43'N, 52 24'W): 1^o, 09.XI.2010, Vincent Vedel coll.;
- 187 Roche Bénitier (04°36'N, 53°24'W) : 1°_{+} , 06.IV.2010, Vincent Vedel coll.

188 Description

- 189 Male (Holotype, AR 16169)
- 190 TL:6.00. CL:3.10. CW: 2.30. CH:1.80. OQL: 2.00. AERW:2.20. PERW:2.00. AMEW:0.70.
- 191 CLH: 0.45. Carapace dark brown with light spot behind the fovea bearing white setae (Fig 1).
- 192 Chelicera dark brown (Fig 3) with short mastidions pointed forward; 3 posterior cheliceral teeth,
- 193 2 anterior cheliceral teeth. Palp: femur curved with dorsal bump (Fig 4); tibia with quiet short
- 194 rounded RTA (Figs 5, 7, 11-12); embolus emerging from proximal tegulum with median
- 195 portion slightly narrowed (Figs 6, 13). Abdomen pale with median longitudinal light stripe (Figs
- 196 1, 17) and ventrally with median longitudinal dark brown stripe. Spinnerets light brown. Legs
- 197 1342 (10.00/6.90/7.80/7.50). Length of femur I2.80, II 2.20, III 2.60, IV 2.40. Patella + tibia I
- 4.30, II 2.70, III 2.70, IV 2.40. Metatarsus + tarsus I 2.90, II 2.00, III 2.50, IV 2.70.
- 199 Variation Male (n=3)
- 200 Total length: 6.00-7.10. Carapace length: 3.05-3.20. Length of leg I 9.05-10.00.
- 201 Female (AR 16170)
- 202 TL:9.00. CL:3.90. CW: 2.70. CH:2.00. OQL: 1.90. AERW:2.40. PERW:2.10. AMEW:0.80.
- 203 CLH: 0.30. Carapace light brown with darker cephalic area, base of the cephalothorax bearing

- dark spots (Fig 2). Chelicera dark brown with no mastidion; 3 posterior cheliceral teeth, 4
 anterior cheliceral teeth. Epigyne with a pair of oblique COs (Figs 8-9, 14), long digitiform
 gland ducts and long and thin COs (Figs 10, 15-16). Legs 1-432 (8.60/8.60/8.40/6.90). Length
- of femur I 2.60, II 2.30, III 2.90, IV 2.90. Patella + tibia I 3.70, II 2.80, III 3.00, IV 3.00.
- 208 Metatarsus + tarsus I 2.30, II 1.80, III 2.50, IV 2.80.
- 209 Variation Female (n=6)
- 210 Total length: 6.20-9.00. Carapace length: 2.70-3.90. Length of leg I 7.30-8.60.

211 **Distribution**

212 Only known from French Guiana.

213 Comments

The holotype male and female were caught together during mating behaviour in a building atthe Nouragues field station.

216

217 DNA sequences and phylogenetic analysis

The COI alignment was 442 base pairs (bp) long and included 92 variable sites of which 72 218 were informative in parsimony. The BI and ML topologies are congruent; there was no 219 topological conflict detected between the 50% Bayesian majority-rule consensus tree (Fig. 19) 220 221 and the ML bootstrap 50% majority-rule consensus tree (not shown). The topology we obtained showed (1) that the two individuals of *H. olympeae* sp. nov. included in the study form a 222 strongly supported monophyletic grouping (PP = 1; BS = 100), highly divergent from the two 223 other clades in the tree, (2) that the four accessions sampled for *H. porcatus* are part of a strongly 224 supported clade (PP = 1; BS = 99) resolved as sister to H. olympeae sp. nov. but with poor 225

support (PP = 0.81; BS = 67) and (3) that the 6 accessions identified as *H. taczanowskii* (3 male 226 227 and 3 female individuals) were all included in a monophyletic grouping strongly supported in BI (PP = 0.99; BS = 74). The analysis of COI sequences then confirms the current 228 morphological circumscriptions for the three *Hypaeus* species sampled here. Also, the branch 229 lengths observed between the three clades recognized here are relatively high when compared 230 with the magnitude of the divergence between the ingroup (viz. genus Hypaeus) and the 231 232 outgroup (viz. Sarinda cutleri); this further supports the recognition of H. olympeae sp. nov. as a distinct species. 233

- 234 New records of Salticidae from French Guiana
- According to Vedel et al. (2013), Courtial et al. (2014) and Logunov (2015) we add nine new
 species for French Guiana.
- 237 Eustiromastix moraballi Mello-Leitao, 1940
- 238 RNN Nouragues, camp Pararé (4°02'N, 52°41'W), 1∂, 06.XII.2013, Canard Alain, Courtial
- 239 Cyril, Leroy Boris, Pétillon Julien & Vedel Vincent, at sight in low vegetation.
- 240 Lyssomanes tenuis Peckham & Wheeler, 1889
- 241 RNN Nouragues, camp Inselberg (4°05'N, 52°41'W), 1∂, 08.XII.2013, Courtial Cyril, by
- 242 beating by beating the lower branches of trees.
- 243 Scopocira abaporu Costa & Ruiz, 2014
- Nouragues, Camp Pararé (4°02'N, 52°41'W), 1♂, 13.XII.2013, Courtial Cyril, by beating the
 lower branches of trees.
- 246 Scopocira histrio Simon, 1900

| 247 | Nouragues, camp Inselberg (4°05'N, 52°41'W), 1♀, 10.XII.2013, Courtial Cyril, by beating |
|-----|--|
| 248 | the lower branches of trees. Nouragues, camp Pararé (4°02'N, 52°41'W), 13, 06.XII.2013, |
| 249 | Canard Alain, Courtial Cyril, Leroy Boris, Pétillon Julien & Vedel Vincent, by beating the |
| 250 | lower branches of trees. |

251 Colonus germaini Simon, 1900

Nouragues, camp Pararé (4°02'N, 52°41'W), 1♀, 12.XII.2013, Courtial Cyril, by beating the
lower branches of trees.

254 Corcovetella aemulatrix Galiano, 1975

Kourou, degrad saramak (5°01'N, 52°41'W), 1♀, collection date unknown, Vedel Vincent, by
beating vegetation in garden near primary forest.

257 Pachomius nigrus Caporiacco, 1947

258 RNN Trinité, camp Aya (04°36'N, 53°24'W), 1∂, X.2010, Canard Alain, Courtial Cyril, Leroy

259 Boris & Ysnel Frédéric, by beating the lower branches of trees.

- 260 Gypogyna forceps Simon, 1900
- *Cyllodania fasciata* (Caporicaco, 1954) syn. nov: 150, f.48, French Guiana, Saint-Jean
 du Maroni, 1914, Benoist *leg*, 1^Q examined.

263 After examination of species described by Caporiacco (1954) deposited in the MNHN, the type

species of Cyllodania fasciata (Caporicaco, 1954), considered as a subadult by Caporiaco

265 (1954) and Galiano (1977) is in fact an adult female of *Gypogyna forceps* Simon, 1900.

266 Cyllodania fasciata (Caporicaco, 1954) is here presented as a new synonym of Gypogyna

267 *forceps* Simon, 1900.

| 268 | Kourou, degrad saramak (5°01'N, 52°41'W), 1 \bigcirc , collection date unknown, Vedel Vincent, by |
|-----|---|
| 269 | beating vegetation in garden near primary forest. |
| 270 | Marma nigritarsis (Simon, 1900) |
| 271 | Saül (3°37'N, 53°12'W), 1Å, 08.X.2013, 1Å, 18.X.2013, Bellanger Yannick (Asper Society). |
| 272 | |
| 273 | |
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| 288 | |

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410 Table 1

Summary of GenBank accession numbers, species name and voucher information (site
coordinates are given in the Material and Methods) for the sequences newly generated for the
study.

| GenBank accessions | Name in topology | Voucher | Collection location | Sex |
|-----------------------|------------------------------|----------|---------------------------------------|-----|
| OK501209 | Hypaeus olympeae 1 | ACAV07 3 | La Trinité, French Guyana | 8 |
| OK501210 | Hypaeus olympeae 2 | ACAV07 2 | La Trinité, French Guyana | Ŷ |
| OK501211 | <i>Hypaeus</i> porcatus 1 | NPTN11 | Nourages, French Guvana | Ŷ |
| OK501212 | Hypaeus porcatus 2 | AQJ5 | La Trinité, French Guyana | Ŷ |
| OK501213 | Hypaeus porcatus 3 | AQN1 | La Trinité, French Guyana | ð |
| OK501214 | Hypaeus porcatus 4 | AQJ5 | La Trinité, French Guyana | S |
| OK501215 | Hypaeus taczanowskii 1 | NITJ3 | Les Nouragues, French Guyana | ð |
| OK501216 | Hypaeus taczanowskii 2 | NIQN9 | Les Nouragues, French Guyana | 8 |
| OK501217 | Hypaeus taczanowskii 3 | IQN10 | Les Nouragues, French Guyana | 8 |
| OK501218 | Hypaeus taczanowskii 4 | NPQJ7 | Les Nouragues, French Guyana | Ŷ |
| OK501219 | Hypaeus taczanowskii 5 | PQJ4 | Les Nouragues, French Guyana | Ŷ |
| OK501220 | Hypaeus taczanowskii 6 | NPQJ5 | Les Nouragues, French Guyana | Ŷ |

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- 415 Figures 1-2
- *Hypaeus olympeae* sp. nov. 1 male, dorsal view, scale 0,5mm; 2. Female, dorsal view, scale
 1mm.
- 418 Figures 3 4
- *Hypaeus olypeae* sp. nov. male. 3. Chelicerae detail (ma: mastidion), scale 0.5mm; 4. Left
 male palp with bump on femur (arrow), scale 1mm.
- 421 Figures 5 7
- *Hypaeus olympeae* sp. nov. left male palp; 5. retrolateral view; 6. Same ventral view; 7. Same
 dorsal view showing tibial apophysis, scale 0.5mm.
- 424 Figures 8 10
- 425 *Hypaeus olympeae* **sp. nov.** female; 8. epigyne, ventral view; 9. same, cleared; 9. ventral view,
- 426 cleared, scale 0.5mm.
- 427 Figures 11 13
- 428 Hypaeus olympeae sp. nov. left male palp drawnings; 11. retrolateral view; 12. same, dorsal
- 429 view showing tibial apophysis; 13 same, ventral view, scale 0.5mm.
- 430 Figures 14 16
- 431 Hypaeus olympeae sp. nov. female; 13. Epigyne drawing; 14. same ventral view; 15. path
- 432 within epigyne, scale 0.5mm.
- 433 Figures 17 18
- Hypaeus olympeae sp. nov. pictures of living specimens; 16. male holotype;17. female
 paratype.
- 436 Figure 19
- 50% majority-rule tree from the Bayesian analysis of the COI matrix. Numbers above each
 branch are bootstrap values > 50% followed by posterior probabilities from the Bayesian

- analysis. Branch lengths are proportional to the number of substitutions per nucleotide position
- 440 (scale bar=0.01 substitutions). See Table 1 for complete voucher information.

Figures 1 - 2

Hypaeus olympeae sp. nov. 1 male, dorsal view, scale 0,5mm; 2. Female, dorsale view, scale 1mm.



Figures 3 – 4

Hypaeus olypeae **sp. nov.** male. 3. Chelicerae detail (ma: mastidion), scale 0.5mm; 4. Left male palp with bump on femur (arrow), scale 1mm.



Figures 5-7

Hypaeus olympeae **sp. nov.** left male palp; 5. retrolateral view; 6. Same ventral view; 7. Same dorsal view showing tibial apophysis, scale 0.5mm.



Figures 8 – 10

Hypaeus olympeae **sp. nov.** female; 8. epigyne, ventral view; 9. same, cleared; 9. ventral view, cleared, scale 0.5mm.



Figures 11 – 13

Hypaeus olympeae **sp. nov.** left male palp drawnings; 11. retrolateral view; 12. same, dorsal view showing tibial apophysis; 13 same, ventral view, scale 0.5mm.



Figures 14 - 16

Hypaeus olympeae **sp. nov.** female; 14. Epigyne drawing; 15. same ventral view; 16. path within epigyne, scale 0.5mm.



Figures 17 - 18

Hypaeus olympeae sp. nov. pictures of living specimens; 17. male holotype;18. female paratype.



Figure 19

50% majority-rule tree from the Bayesian analysis of the COI matrix. Numbers above each branch are bootstrap values > 50% followed by posterior probabilities from the Bayesian analysis. Branch lengths are proportional to the number of substitutions per nucleotide position (scale bar=0.01 substitutions). See Table 1 for complete voucher information.

| | 1/100 | |
|---------|---|-------------------|
| | – Hypaeus olympeae 1 - ♂ | |
| 0.81/67 | o zone ⊏ Hypaeus porcatus 4 - 👌 | |
| | 1/200 United Hypaeus porcatus 3 - 3 | |
| | └ Hypaeus porcatus 2 - ♀ | |
| | \square Hypaeus porcatus 1 - \bigcirc | |
| | 0.92/59 _── Hypaeus taczanowskii 6 - ♀ | |
| _ | 0.97/74 Hypaeus taczanowskii 5 - ♀ | |
| | 0.87/73 | |
| 0.98/74 | | |
| | └ Hypaeus taczanowskii 2 - ♂ | |
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| L | | - Sarinda cutleri |
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