

The Siberian centipede species *Lithobius proximus* Sseliwanoff, 1878 (Chilopoda, Lithobiomorpha): a new member of the Polish fauna

Jolanta Wytwer¹, Karel Tajovský²

1 Museum and Institute of Zoology, Polish Academy of Sciences, Wilcza 64, 00-679 Warszawa, Poland **2** Institute of Soil Biology, Biology Centre, Czech Academy of Sciences, České Budějovice, Czech Republic

Corresponding author: Jolanta Wytwer (jolawyt@miiz.waw.pl)

Academic editor: M. Zapparoli | Received 7 December 2018 | Accepted 8 January 2019 | Published 31 January 2019

<http://zoobank.org/3A4DA404-27EF-4270-8FA5-4C932B682C03>

Citation: Wytwer J, Tajovský K (2019) The Siberian centipede species *Lithobius proximus* Sseliwanoff, 1878 (Chilopoda, Lithobiomorpha): a new member of the Polish fauna. ZooKeys 821: 1–10. <https://doi.org/10.3897/zookeys.821.32250>

Abstract

The centipede *Lithobius proximus* Sseliwanoff, 1878 is presented for the first time as a new member of the Polish fauna. This species, originally characterized as a widespread Siberian boreal species, seems to possess high plasticity with regards to environmental requirements. Its actual distribution range covers several geographical zones where local conditions have allowed it to survive. The present research in the Wigry National Park, northeast Poland, shows that its distribution extends to the ends of the East European Plain embracing the East Suwałki Lake District, where it occurs almost exclusively in the oak-hornbeam forests: in summer it is one of the three dominant lithobiomorph centipedes inhabiting litter layers.

Keywords

Lithobiomorph centipede, new records, western limit of the range, East European Plain

Introduction

According to data from the catalogue of the Polish centipede fauna (Kaczmarek 1980), Poland has been unevenly explored. Although almost 40 years have passed, there are still areas where the centipede fauna is unknown. The Suwałki region in northeast Poland represents such an area. The present research in the Wigry National Park focuses on natural habitats and evaluation of soil fauna communities and has

provided us with the first centipede material related to this area. Included in the material collected, *Lithobius proximus* Sseliwanoff, 1878 was recorded as a new centipede species for the Polish fauna.

Previously, the chilopod fauna of Poland contained 56 species (Wytwer 2008, Leśniewska et al. 2015); however, a few species found in Poland are widespread and occur also in the east and north of the Palaearctic region, i.e. *Lithobius curtipes* C. L. Koch, 1847, *Lithobius lucifugus* L. Koch, 1862, *Lithobius forficatus* Linnaeus, 1758, *Geophilus proximus* C. L. Koch, 1847 and *Schendyla nemorensis* (C. L. Koch, 1837), but none of them reaches the western limit of its range in Poland.

Study area, methods, material

The centipede material was collected in forest habitats near the Sobolewo and Krzywe villages in the Wigry National Park, Poland. According to the physicogeographical regionalisation of Kondracki (2002), this area lies within the East Suwałki Lake District mesoregion (Pojezierze Wschodniosuwalskie), the Lituanian Lake District macroregion (Pojezierze Litewskie), the East Baltic Lakeland subprovince (Pojezierze Wschodniobałtyckie), the Eastern Baltic-Belarusian Plain province (Niż Wschodniobałtycko-Białoruski), and the East European Plain megaregion (Niż Wschodnioeuropejski). The deep crystalline basement of the area around the Wigry Lake is created by Precambrian rocks, mainly granites, gneisses, mingmatites, diorites and lamprophyres. The sedimentary cover is represented by sequences of marine or shallow marine Mesozoic and Cenozoic deposits. Sandy soils predominate in most of the area. The Wigry Lake neighborhood is located in the coldest region of Poland (outside the mountains), with a mean annual temperature 6.4 °C and annual precipitation that changes year to year from 330 mm to 830 mm, with a maximum mean in June (87 mm) and minimum in February (25 mm). Snow cover in the last few years has decreased. Winter air circulation is predominated by the western, polar air mass (Rutkowski and Krzysztofiak 2009).

During 2015–2016, surveys were focused on bog-pine forest (*Vaccinio uliginosi-Pinetum*), bog-birch forest (*Thelypteridi-Betuletum pubescens*), bog-spruce forest (*Sphagno girsengohni-Piceetum*) and alder stands (*Ribeso nigri-Alnetum*). Since June 2016, it continued in oak-hornbeam forest stands with the *Tilio-Carpinetum typicum* and *Tilio-Carpinetum calamagrostietosum typicum* plant associations within a running project aimed at assessing the impact of the invasive small balsam *Impatiens parviflora* on forest communities. All stands were located in the Czarna Hańcza River basin.

Centipedes were collected by soil sampling and pitfall trapping. Soil samples (5 samples per plot, sampling area of each 625 cm² and depth 10 cm) were taken twice a year, in bog pine, bog-birch, bog-spruce and alder forests in October 2015 and June 2016, and subsequently in oak-hornbeam forests stands in October 2016 and May and September 2017. Soil samples were transported to the laboratory and invertebrates were subsequently heat extracted using the modified Kempson extraction apparatus (Kempson et al. 1963). Five pitfall traps per plot (cylindrical plastic containers with

a volume of 1 L, diameter 10 cm, filled with a killing-preserved water solution of formaldehyde, with detergent and protected with roofs against small vertebrates and rainwater overflow) were exposed continuously during October 2015, June 2016 and October 2016 in bog-pine, bog-birch, bog-spruce and alder forest stands. More extensive sampling (including during October 2016, May 2017 and September 2017) was performed within oak-hornbeam forest stands.

Within the entire centipede material, *Lithobius proximus* was recorded only in oak-hornbeam forest stands by pitfall trapping. Therefore, the additional data for the following stands relates only to positive records as follows:

- Stand 1 *Tilio-Carpinetum calamagrostietosum typicum*, 54°01'57"N, 22°59'34"E, 167 m a.s.l., forest district 92d, trapping period Oct 2015 – Sept 2017;
- Stand 2 *Tilio-Carpinetum calamagrostietosum typicum*, 54°01'46"N, 23°00'20"E, 158 m a.s.l. forest district 106h, trapping period Oct 2015 – Oct 2016;
- Stand 3 *Tilio-Carpinetum calamagrostietosum typicum*, 54°02'14"N, 23°00'33"E, 169 m a.s.l. forest district 104b, trapping period Oct 2015 – Oct 2016;
- Stand 4a *Tilio-Carpinetum calamagrostietosum typicum*, 54°01'51"N, 23°01'27"E, 154 m a.s.l., forest district 127c, trapping period Oct 2015 – Sept 2017;
- Stand 4b *Tilio-Carpinetum typicum*, 54°01'56"N, 23°00'55"E, 154 m a.s.l. forest district 116f, trapping period Oct 2016 – Oct 2017;
- Stand 4c *Tilio-Carpinetum calamagrostietosum typicum*, 54°01'53"N, 23°01'06"E, 153 m a.s.l., forest district 116g, trapping period Oct 2016 – Oct 2017;
- Stand 5 *Tilio-Carpinetum typicum*, 54°04'23"N, 23°00'55"E, 149 m a.s.l., forest district 52c, trapping period Oct 2016 – Oct 2017;
- Stand 6 *Tilio-Carpinetum typicum*, 54°04'30"N, 23°00'59"E, 161 m a.s.l., forest district 51c, trapping period Oct 2016 – Oct 2017.

The studied material was obtained from the following trapping periods and stands:

- 15 Jun–26 Sep 2016 – 11 ♀♀, 1 ♂, stand 1; 8 ♀♀, 2 ♂♂, stand 2; 16 ♀♀, 3 ♂♂, stand 3; 3 ♀♀, 3 ♂♂, stand 4a;
- 26 Sep–19 Oct 2016 – 1 ♀, 1 ♂, stand 2; 1 ♀, stand 3;
- 19 Oct 2016–23 May 2017 – 1 ♂, stand 3;
- 23 May–12 Sep 2017 – 4 ♂♂, stand 4a; 4 ♀♀, 2 ♂♂, stand 4b; 1 ♀, 2 ♂♂, stand 4c; 6 ♀♀, 6 ♂♂, stand 1; 20 ♀♀, 8 ♂♂, stand 5; 8 ♀♀, 8 ♂♂, stand 6.

Results

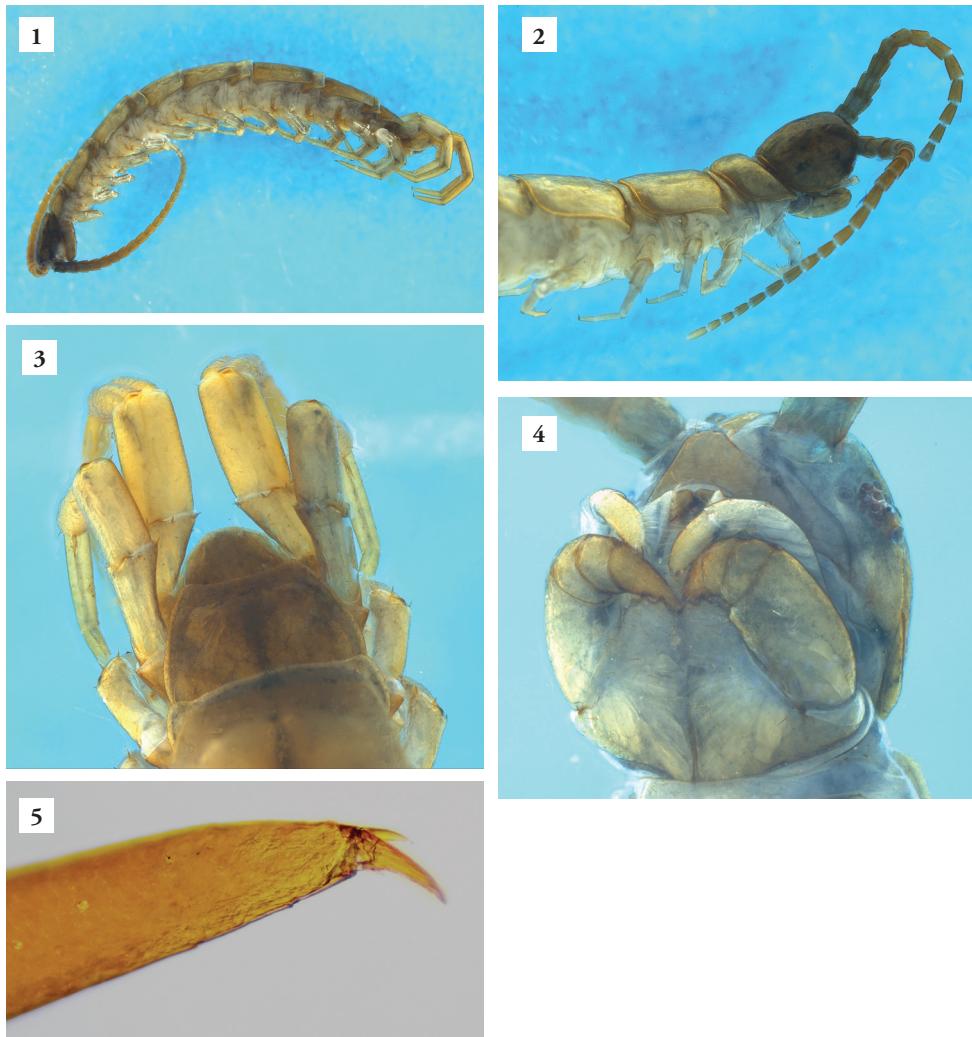
Lithobius (Ezembius) proximus Sselivanoff, 1878

Taxonomical remarks. *Lithobius proximus* is formally treated as belonging to the subgenus *Ezembius* Chamberlin, 1919 (Farzalieva and Esyunin 2008, Nefediev et al. 2017a, b, Nefediev et al. 2018). Species included in the subgenus *Ezembius* are char-

acterized by the number of their antennal articles being limited to about 20, similar to the members of the subgenus *Monotarsobius* Verhoeff, 1905, but they differ from them in that the tarsal articulation of the legs 1–13 is distinct, as in the subgenus *Lithobius* Leach, 1814 (Eason 1974, 1976; Zapparoli and Edgecombe 2011). Therefore, it is easy to distinguish representatives of the genus *Ezembius* from the majority of centipedes inhabiting the litter of Central European forests, most often belonging to either subgenus *Lithobius* or *Monotarsobius*. The morphology of specimens recorded in the Wigry National Park corresponds to the characteristics given by Zalesskaja (1978) as well as Farzalieva and Esyunin (2008). They are distinguished by having elongated antennal articles and a darker brownish to brown colour head compared to the rest of the body (Figures 1, 2). Marginal ridges of tergites 9, 11 and 13 are rather rounded, but tergites 13 and 15 occur with rounded gentle posterior projections. Males have a dorsal groove on the femur and tibia (Figure 3) and often also on the first tarsal segment of the ultimate legs. Females have gonopods with simple claws (Figures 6, 7), with 2 + 2 (most common) and sometimes with 2 + 3 or 3 + 3 spurs (Figure 8). However, in our examined material, the third spur (the most inner) was very small (< one-third of the first one), a feature that distinguishes it from *Lithobius (Ezembius) sibiricus* Gerstfeldt, 1858, whose males, moreover, have no sexual characters on the fifteenth pair of legs (Zalesskaja 1978, Farzalieva and Esyunin 2008). Other key features observed on the sampled specimens were also consistent with the redescription made by Farzalieva and Esyunin (2008), i.e. head with 9–10 ocelli in 3–4 rows, coxosternum with 2 + 2 sharp teeth (Figure 4), presence of the accessory apical claw on ultimate legs in both sexes (Figure 5) and the spinulation pattern on the legs.

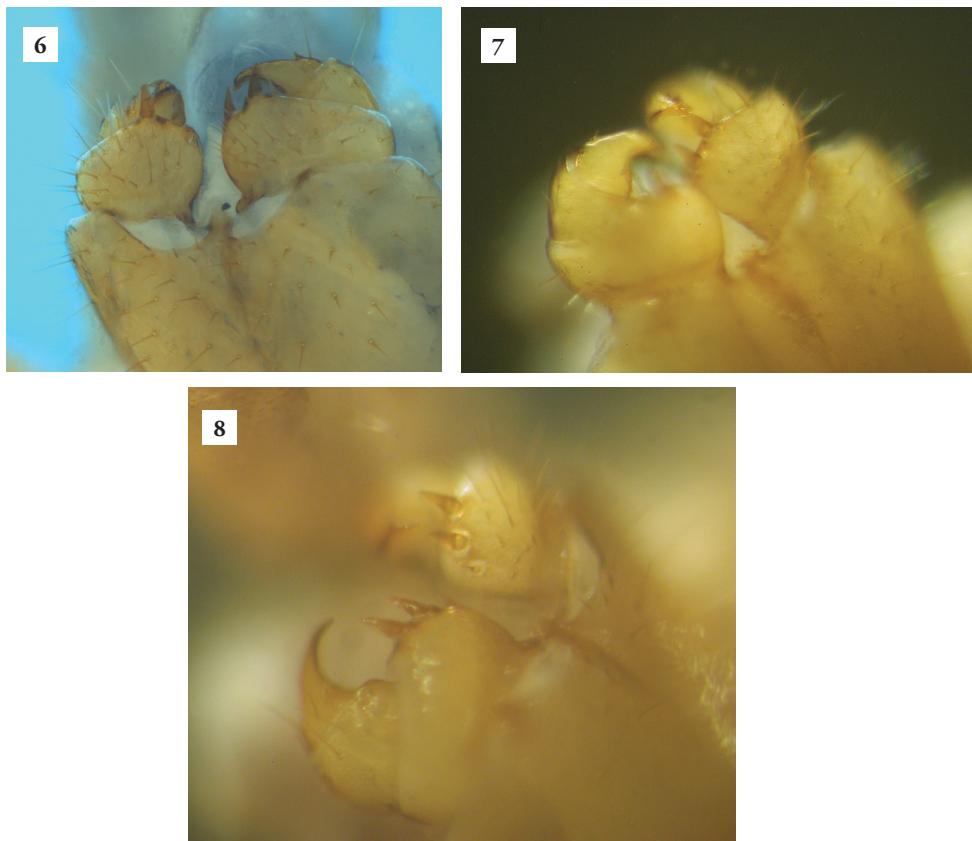
Female specimens with 2 + 3 or 3 + 3 spurs on gonopods were treated as very rare (Farzalieva and Esyunin 2008) or aberrant (Nefediev et al. 2017a). Overall, in our material the ‘aberrant’ specimens accounted for 11% of all females.

Distribution. *Lithobius proximus* is the only representative of the subgenus *Ezembius* in Poland. *Ezembius* was regarded as a subgenus of the genus *Lithobius* by Eason (1974) for the group that occurred in eastern and northern Asia. *Lithobius proximus* was originally described from Irkutsk by Sselivanoff (1878). Zalesskaja (1978) designated it as a Siberian species and later (Zalesskaja and Golovatch 1996) defined it as a centipede that inhabited the belt from the taiga to the steppe and suggested that the Volga River limited its spread to the west. This opinion was later repeated by Dyachkov (2017). Recently, this species was characterised as a widespread Siberian boreal species (Nefediev et al. 2017a), and later it was judged as a Eurasian species widely distributed in Russia, specifically in the Altai area ranging from the taiga on the lake shore up to the mountain tundra at approximately 2200 m a.s.l. (Nefediev et al. 2017b). Subsequently, Nefediev et al. (2018), referred to this species as an eastern European–Transsiberian temperate range species that occurred from the eastern Russian Plain (Republics of Mari El and Tatarstan, Kirov and Samara areas; i.e. respecting the Volga River line) in the west through Siberia to the Russian Far East (Maritime Province, Sakhalin and the Kuril Islands). However, *Lithobius proximus* was also repeatedly re-



Figures 1–5. *Lithobius proximus* Sseliwanoff, 1878, male (23 May–12 Sep 2017, Stand 4a): 1 total habitus, lateral view 2 anterior part of the body with a darker brownish to brown colour of the head and antennal articles, dorsolateral view 3 posterior part of the body, ultimate male legs with dorsal groove on femur and tibia (arrows), dorsal view 4 head in ventrolateral view 5 distal end of ultimate leg with apical claw and accessory apical claw. Photos by P. Ślipiński (1–4) and M. Romański (5).

corded in Ukraine, from the Kanev Nature Reserve on the Dnieper Lowland (Chornyi and Kosyanenko 2003, Kosyanenko and Chornyi 2008) and from the ‘Chernyi Les’ forest near Kirovograd on the Dnieper Upland (Kunakh 2013). Both stands are in the forest-steppe belt, and the nearest stand in the Kanev Nature Reserve is over 750 km in a straight line from the Wigry National Park in Poland. Thus, our records represent the western most points of the entire *Lithobius proximus* distribution area (Figure 9).



Figures 6–8. *Lithobius proximus* Sseliwanoff, 1878: **6, 7** female gonopods with 2 + 2 spurs (23 May–12 Sep 2017, Stands 4b and 5); **8** female gonopods with 3 + 3 spurs marked by arrows (23 May–12 Sep 2017, Stand 5); Photos by P. Ślipiński (**6**) and J. Wytwer (**7, 8**).

Ecology. The present data indicate that *Lithobius proximus* is neither an accessory nor an accidental species in the litter centipede community of the horn-beam forests in the Wigry National Park; rather, it is well anchored as a co-dominant species. Quantitative data on the epigeic fauna based on the extensive pitfall trapping proved that *Lithobius proximus* co-dominates with two other lithobiomorph centipedes. The first is the common, eurytopic species *Lithobius (Lithobius) forficatus* Linnaeus, 1758, with a Holarctic range of distribution, and the second is the common forest species *Lithobius (Monotarsobius) curtipes* (C. Koch, 1847), with a Palearctic range. Our data appear to agree with phenological observations made by Farzalieva and Esyunin (2014) in the southern taiga of the Perm Cis-Ural region, where *Lithobius proximus* was the most numerous species during summer. Similarly, Sergeeva (2013) recorded *Lithobius proximus* as the second most frequent lithobiomorph species in the valley of Irtysh River, West Siberian region. In our observations, 20–30% of all centipedes caught by trapping during the summer, and a negligible amount during the “winter” (i.e. from September to May) sampling period, were found in both sampling seasons.

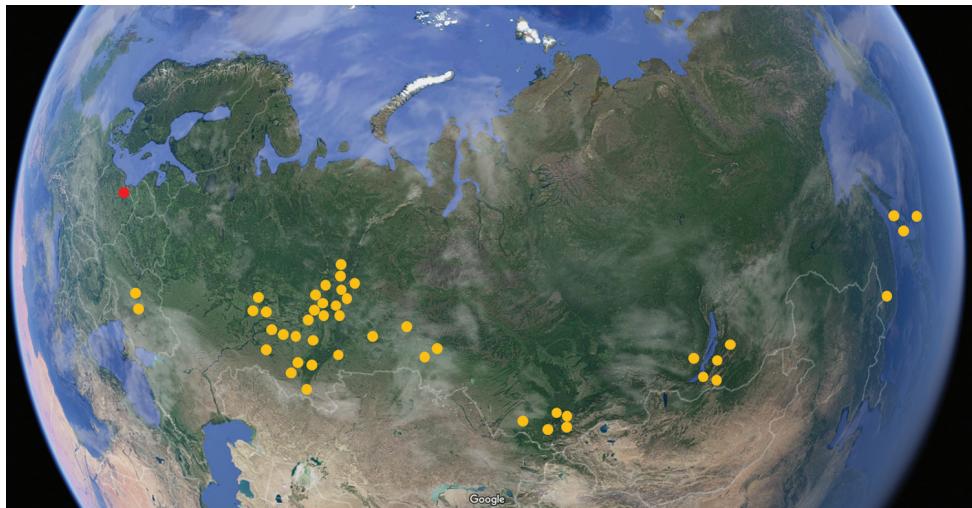


Figure 9. Distribution map of *Lithobius proximus* Sselivanoff, 1878 based on a summarisation of the published data (yellow dots; Zalesskaja 1978, Zalesskaja and Golovatch 1996, Chornyi and Kosyanenko 2003, Farzalieva and Esyunin 2008, Kosyanenko and Chornyi 2008, Kunakh 2013, Sergeeva 2013, Nefediev et al. 2017a, b, Nefediev et al. 2018) and our records (red dot; this paper).

Discussion

Geographically, the northeastern most edge of Poland is the most western part of the East European Plain (Russian Plain), the megaregion that is characterised by a classic latitudinal nature zonation combined with an increasing longitudinal continental character. Climate shifts result in the East European Plain to be covered by belts of biomes arranged from the tundra to the taiga, mixed coniferous-deciduous forests, broadleaved forests, steppe and semideserts to deserts in the south. Previous research has demonstrated that climate is the main factor that influences distribution of some soil fauna in the East European Plain (Chernov 1975, Penev 1992, Esyunin et al. 1995, Wytwer et al. 2009). On the other hand, some groups of soil animals seem to be subordinate to local conditions, as confirmed for earthworms (Penev et al. 1994a, b). Hence, there are many soil invertebrates where their actual distribution range would cover several geographical zones if only the local conditions allowed them to survive. *Lithobius proximus* seems to be such an example. Zalesskaja and Golovatch (1996) reported that this centipede species occurs from the taiga to the steppe, although they supposed its spread to the west was limited by the Volga River. The Ukrainian data from the Dnieper Lowland (Chornyi and Kosyanenko 2003, Kosyanenko and Chornyi 2008) and Dnieper Upland (Kunakh 2013), and the present data from Poland, have changed our view about the actual range for this species.

Based on the known published data, *Lithobius proximus* seems to be a species with high plasticity with regards to environmental requirements. Farzalieva and Esyunin (2008), in their review of centipedes of the Ural and Cis-Ural Area, noted a range

of environments where it can survive, mainly different types of forests (spruce, pine, birch, oak and lime), and mostly wetlands, as well as other environments including gypsum quarry. The same authors (Farzalieva and Esyunin 2014) later examined the structure and seasonal dynamics of myriapods in the Perm Cis-Ural region, and classified this centipede as a forest species, i.e., a eurybiont and forest-preferring species that was most abundant in all forest and derivative habitats. Nefediev et al. (2017a) discussed data from Siberia and noted that this species tended to dwell in small-leaved forest stands. Our current research in the Wigry National Park suggests that *Lithobius proximus* occurs almost exclusively in the oak-hornbeam forests, where in the summer it is one of the three dominant lithobiomorph centipedes inhabiting litter layers. Based on our observations, this species may be associated with deciduous forests much more than was previously thought.

Acknowledgement

This research was co-financed by the forest fund under an agreement concluded between the State Forests National Forest Holding and the Wigry National Park (EZ.0290.1.6.2016 and EZ.0290.1.39.2017). The authors thank Anna and Lech Krzysztofiak for logistic support and help with the field research. We wish to thank our colleagues, Piotr Ślipiński (Museum and Institute of Zoology, PAS) and Maciej Romański (Wigry National Park), for taking photographs.

References

- Chernov YI (1975) Prirodnaia zonalnost' i zhivotnyj mir sushi [Nature zonation and terrestrial animal life]. Mysl, Moscow, 222 pp. [In Russian]
- Chornyi MG, Kosyanenko OW (2003) Dvuparnonogi ta gubonogi bagatonizhki Seredn'ogo Pridnipro'ya [Millipedes and centipedes of middle Dnepr] Zapovidna sprawka w Ukraini [Nature Reserves in Ukraine] 9(2): 64–66. [in Ukrainian]
- Dyachkov YuV (2017) The first data on centipede (Chilopoda: Geophilomorpha; Lithobiomorpha) fauna on the Katunskiy Biosphere State Nature Reserve, Altai Mts. Ukrainian Journal of Ecology 7(4): 453–456. https://doi.org/10.15421/2017_141 [in Russian, with English abstract]
- Eason EH (1974) The type specimens and identity of the species described in the genus *Lithobius* by F. Meinert and now preserved in the Zoological Museum, Copenhagen University (Chilopoda: Lithobionorpha). Zoological Journal of the Linnaean Society 55(1): 1–52. <https://doi.org/10.1111/j.1096-3642.1974.tb01584.x>
- Eason EH (1976) The type specimens and identity of the Siberian species described in the genus *Lithobius* by Anton Stuxberg in n1876 (Chilopoda: Lithobionorpha). Zoological Journal of the Linnean Society 58(2): 91–127. <https://doi.org/10.1111/j.1096-3642.1976.tb00822.x>

- Esjunin SI, Penev LD, Golovatch SI (1995) Distribution and assemblage classification of spiders of the east European oak forests (Arachnida: Aranei). *Arthropoda Selecta* 3(3–4) [1994]: 67–98.
- Farzalieva GSh, Esyunin SL (2008) A review of the centipede (Lithobiomorpha, Henicopidae, Lithobiidae) fauna of the Urals and cis-Ural area. *Entomological Review* 88(5): 598–623. <https://doi.org/10.1134/S0013873808050102> [original Russian text in: *Zoologichesky Zhurnal* 87(8): 923–947]
- Farzalieva GSh, Esyunin SL (2014) The structure and seasonal dynamics of myriapods (Chilopoda and Diplopoda) in the southern taiga of the Perm cis-Ural region. *Entomological Review* 94(4): 498–513. <https://doi.org/10.1134/S0013873814040058> [original Russian text in: *Zoologichesky Zhurnal* 93(1): 65–80]
- Kaczmarek J (1980) *Katalog fauny Polski. XIV, 4. Pareczniki (Chilopoda)*. PWN, Warszawa, 44 pp.
- Kempson D, Lloyd M, Ghelardi R (1963) A new extractor for woodland litter. *Pedobiologia* 3: 1–21.
- Kondracki J (2002) *Geografia regionalna Polski*. PWN, Warszawa, 442 pp. [Maps available at: https://upload.wikimedia.org/wikipedia/commons/7/7c/Physico-Geographical_Regionalization_of_Poland.png]
- Kosyanenko OW, Chornyi MG (2008) *Istoriya ta stan vivchenniya miriapodofauni Kanivs'kogo Prirodного Zapovidnika* [History and state of research of Kanev nature reserve]. *Zapovidna sprawka w Ukraini* [Nature Reserves in Ukraine] 14(2): 25–29. [In Ukrainian]
- Kunakh ON (2013) Fauna gubonogikh mnogonozhek (Chilopoda) stepnogo Pridneprov'ya [Centipede fauna in steppe on the Dnepr]. *Ukrainian Journal of Ecology* 3(1): 65–81. [https://doi.org/10.7905/bbmfspu.v0i1\(7\).560](https://doi.org/10.7905/bbmbspu.v0i1(7).560) [in Russian]
- Leśniewska M, Jastrzębski P, Stańska M, Hajdamowicz I (2015) Centipedes (Chilopoda) richness and diversity in the Bug River valley. *ZooKeys* 510: 125–139. <https://doi.org/10.3897/zookeys.510.8763>
- Nefediev PS, Knyazev SYu, Farzalieva GSh, Tuf IH (2017a) A contribution to the myriapod fauna of the Omsk Area, Siberia, Russia (Myriapoda: Diplopoda, Chilopoda). *Arthropoda Selecta* 26(2): 113–118.
- Nefediev PS, Farzalieva GSh, Tuf IH (2017b) A preliminary review of the centipede fauna of the Altai State Nature Biosphere Reserve, southeastern Siberia, Russia (Chilopoda: Lithobiomorpha, Geophilomorpha). *Arthropoda Selecta* 26(3): 217–224.
- Nefediev PS, Farzalieva GSh, Tuf IH, Nedoev KhKh, Niyazov ST (2018) Millipede and centipede assemblages on the northern and southern slopes of the lowland Altais, southeastern Siberia, Russia (Diplopoda, Chilopoda). *ZooKeys* 741: 219–254. <https://doi.org/10.3897/zookeys.741.21936>
- Penev LD (1992) Qualitative and quantitative spatial variation in soil wire-worm assemblages in relation to climatic and habitat factors. *Oikos* 63: 180–192. <https://doi.org/10.2307/3545377>
- Penev LD, Vasilev AI, Golovatch SI, Kvavadze ES (1994a) Species composition and classification of earthworm assemblages (Oligochaeta, Lumbricidae) in oak forests of the Russian Plain. *Zoologichesky Zhurnal* 73(2): 23–37. [in Russian, with English summary]

- Penev LD, Vasilev AI, Golovatch SI, Kvavadze ES (1994b) Variation in indices of diversity of earthworms (Oligochaeta, Lumbricidae) in oak forests of the Russian Plain to environmental factors. *Zoologicheski Zhurnal* 73(7/8): 14–21. [in Russian, with English summary]
- Rutkowski J, Krzysztofiak L (2009) Wigry lake. History of the lake in the light of geological and paleoecological studies. Publ. “Man and Nature“ Association, Suwalki, 288 pp. [In Polish, with English abstracts]
- Sergeeva EV (2013) Biotopic distribution and number of centipedes (Chilopoda) in Irtysh valley of West Siberia, Russia. *Euroasian Entomological Journal* 12(6): 529–533. [in Russian, with English summary]
- Sseliwanoff A (1878) Materialy k izucheniyu russkikh tysyachenogikh (Myriapoda) [Material for getting to know centipedes]. *Trudy Russkogo Entomologicheskogo Obshchestva* (S. Petersburg) 11(1878–1880): 1–26.
- Wytwer J (2008) Pareczniki (Chilopoda). In: Bogdanowicz, Chudzicka E, Pilipiuk I, Skibińska E (Eds) *Fauna of Poland – Characteristic and Check List of Species* (Vol. 3). Museum and Institute of Zoology PAS, Warszawa, 329–334.
- Wytwer J, Golovatch SI, Penev L (2009) Variation in millipede assemblages in oak woodlands of the Eastern European Plain (Diplopoda). In: Xylander W, Voightländer K (Eds) *Myriapoda and Onychophora of the World – Diversity, Biology and Importance*. Görlitz. Soil Organisms 81(3): 791–813.
- Zalesskaja NT (1978) *Opredelitel' mnogonožek kostyanok SSSR* [Key for identification of centipedes of Soviet Union]. Nauka, Moscow, 212 pp.
- Zalesskaja NT, Golovatch SI (1996) Some patterns in the distribution and origin of the lithobiomorph centipede fauna of the Russian Plain (Chilopoda: Lithobiomorpha). In: Geofroy J-J, Mauriès J-P, Nguyen Duy-Jacquemin M (Eds) *Acta Myriapodologica. Mémoires du Muséum national d'Histoire naturelle* 169: 265–268.
- Zapparoli M, Edgecombe GD (2011) Order Lithobiomorpha. In: Minnelli A (Ed.) *Treatise on Zoology – Anatomy, Taxonomy, Biology. The Myriapoda*, Vol. 1, Chpt: Chilopoda – taxonomic overview. Brill, Leiden, 371–389.

Seven new species of the genus *Trilacuna* Tong & Li, 2007 from Yunnan, China (Araneae, Oonopidae)

Yanfeng Tong¹, Haifeng Chen², Shuchong Bai¹, Zhisheng Zhang³, Shuqiang Li⁴

1 College of Life Science, Shenyang Normal University, Shenyang 110034, China **2** College of Life Science, Langfang Normal University, Langfang 065000, Hebei Province, China **3** Key Laboratory of Eco-environments in Three Gorges Reservoir Region (Ministry of Education), School of Life Sciences, Southwest University, Chongqing 400715, China **4** Institute of Zoology, Chinese Academy of Sciences, Beijing 100101, China

Corresponding authors: Zhisheng Zhang (zhangzs327@gmail.com); Shuqiang Li (lisq@ioz.ac.cn)

Academic editor: Y. Marusik | Received 7 September 2018 | Accepted 15 January 2019 | Published 31 January 2019

<http://zoobank.org/3EA94D1E-6BC6-46B2-8EF1-9DFB41C74BBF>

Citation: Tong Y, Chen H, Bai S, Zhang Z, Li S (2019) Seven new species of the genus *Trilacuna* Tong & Li, 2007 from Yunnan, China (Araneae, Oonopidae). ZooKeys 821: 11–44. <https://doi.org/10.3897/zookeys.821.29599>

Abstract

Seven new species of the genus *Trilacuna* Tong & Li, 2007: *Trilacuna bawan* Tong, Zhang & Li, sp. n. (male, female), *T. datang* Tong, Zhang & Li, sp. n. (male, female), *T. fugong* Tong, Zhang & Li, sp. n. (male, female), *T. gongshan* Tong, Zhang & Li, sp. n. (male, female), *T. longling* Tong, Zhang & Li, sp. n. (male, female), *T. wuhe* Tong, Zhang & Li, sp. n. (male, female), and *T. xinping* Tong, Zhang & Li, sp. n. (male, female) are described from Yunnan Province, China.

Keywords

Asia, Oonopinae, southwestern China, spider, taxonomy

Introduction

Oonopidae is a diverse spider family with 1807 extant described species in 115 genera (WSC 2019; Li and Quan 2017). They have a nearly worldwide distribution, occurring mainly in the leaf litter, under bark, and in the tree canopy (Jocqué and Dippenaar-Schoeman 2006; Ubick and Dupérré 2017).

Trilacuna Tong & Li, 2007 currently comprises 22 species. Members of this genus are known from Iran, China, and south to Sumatra (WSC 2019). Only four species of *Trilacuna* are known in China: *T. angularis* Tong & Li, 2007, *T. simianshan* Tong & Li, 2018 and *T. songyuae* Tong & Li, 2018 from Chongqing, and *T. rastrum* Tong & Li,

2007 from Yunnan Province. In this paper seven new *Trilacuna* species collected from Yunnan Province, are described and illustrated.

Materials and methods

The specimens were examined using a Leica M205C stereomicroscope. Details were studied under an Olympus BX51 compound microscope. Photos were made with a Canon EOS 550D zoom digital camera (18 megapixels) mounted on an Olympus BX51 compound microscope. Vulvae were cleared in lactic acid. Scanning electron microscope images (SEM) were taken under high vacuum with a Hitachi S-4800 after critical point drying and gold-palladium coating. All measurements were taken using an Olympus BX51 compound microscope and are in millimeters.

The following abbreviations are used in the text and figures:

ap	apodeme;	gro	grooves;
as	anterior sclerite (T-shaped sclerite);	hsc	horseshoe-shaped sclerite;
bep	basal ear-shaped projection;	lbh	long, brush of “hairs”;
bll	blade-like lobes;	lcb	lateral curved branch;
blp	basal leaf-shaped projection;	ldi	labium deep incision;
bmb	broad medial branch;	ldp	large distal plate;
boc	booklung covers;	lh	lateral “hairs”;
bth	basal thin “hairs”;	lha	long hairs;
clh	cluster of long hairs;	lmb	long medial branch;
csl	comb-shaped lobes;	lth	long thick “hairs”;
css	cluster of short setae;	lts	long, very thick setae;
dbe	distal bending;	mel	median elevation;
dbh	dorsal brush of “hairs”;	psp	posterior spiracle;
dbl	distal broad lobe;	rls	rows of long setae;
ddo	dark dot;	sar	sclerotized, recurved arches;
dha	distal “hairs”;	sdb	slightly curved distal branch;
dmp	distal medial plate;	sis	short, italic thick setae;
dpr	distal projection;	slh	small hole;
dsh	distal short “hairs”;	sri	small ridges;
dth	distal thick “hairs”;	ssc	stick-like sclerite;
ehb	elevated hair base;	tba	transverse bars;
fl	finger-like lobes;	tll	tooth-like lobes;
glo	globular structure;	tsc	transverse sclerite;
grl	rows of lobes in basal ventral groove;	vbl	ventral broad lobes;
		wri	wrinkles.

Type material is deposited in Shenyang Normal University (**SYNU**) in Shenyang, China.

Taxonomy

Family Oonopidae Simon, 1890

Genus *Trilacuna* Tong & Li, 2007

Trilacuna Tong & Li, 2007: 333; Grismado et al. 2014: 26.

Type species. *Trilacuna rastrum* Tong & Li, 2007.

Comments. This genus was originally diagnosed by the enlarged male palpal femora, the very complicated embolus-conductor complex, the branched endites in males, and the notched labium (Tong and Li 2007). These characters were later recognized as shared by a more inclusive group, the “*Dysderoides* complex”, including *Bannana* Tong & Li, 2015, *Dysderoides* Fage, 1946, *Himalayana* Grismado, 2014, and *Trilacuna* (Grismado et al. 2014; Tong and Li 2015). The genus *Bannana* is distributed only in Xishuangbanna, Yunnan Province, China; *Dysderoides* species were known from caves from northern India and Thailand; species of *Himalayana* were known only in Nepal and northern India; while those of *Trilacuna* have a wider distribution from Iran to the Korean Peninsula.

The genus *Trilacuna* can be distinguished from the other genera of the *Dysderoides* complex by the females having a long postepigastric scutum, covering almost the whole ventral abdomen (Fig. 3G), and males usually lacking the furrow connecting the posterior tracheal spiracles (Fig. 1H). The females of the other genera of the *Dysderoides* complex, *Bannana*, *Dysderoides*, and *Himalayana* have a very short postepigastric scutum, only around the epigastric furrow (Grismado et al. 2014: fig. 12E, 69H; Tong and Li 2015: fig. 5G), and males have the furrow connecting the posterior tracheal spiracles (Grismado et al. 2014: fig. 59D; Tong and Li 2015: fig. 1G).

Composition. 29 species, 7 of them are described here.

Distribution. Iran to Korean Peninsula.

Trilacuna bawan Tong, Zhang & Li, sp. n.

<http://zoobank.org/C097B8B5-259B-4E96-AE13-94B2CB9A0E9E>

Figs 1–3, 22A, B, 24A, B, 26A

Type material. Holotype ♂ (SYNU-254), China, Yunnan Province, Baoshan City, Bawan Town, Dasheyao, 13.II.2011, Zongxu Li & Luyu Wang. **Paratypes:** 3♀ (SYNU-252), same data as holotype; 1♂ (SYNU-253), same locality as holotype, 14.II.2011.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males of the new species is similar to *T. hansanensis* Seo, 2017, but can be distinguished by the following characters: sternum with grooves (gro) on posterior area (Fig. 1E); epigastric region strongly elevated, then followed by a narrow, slightly median elevation (mel) (Fig. 1I); embolus system with a leaf-shaped projection on

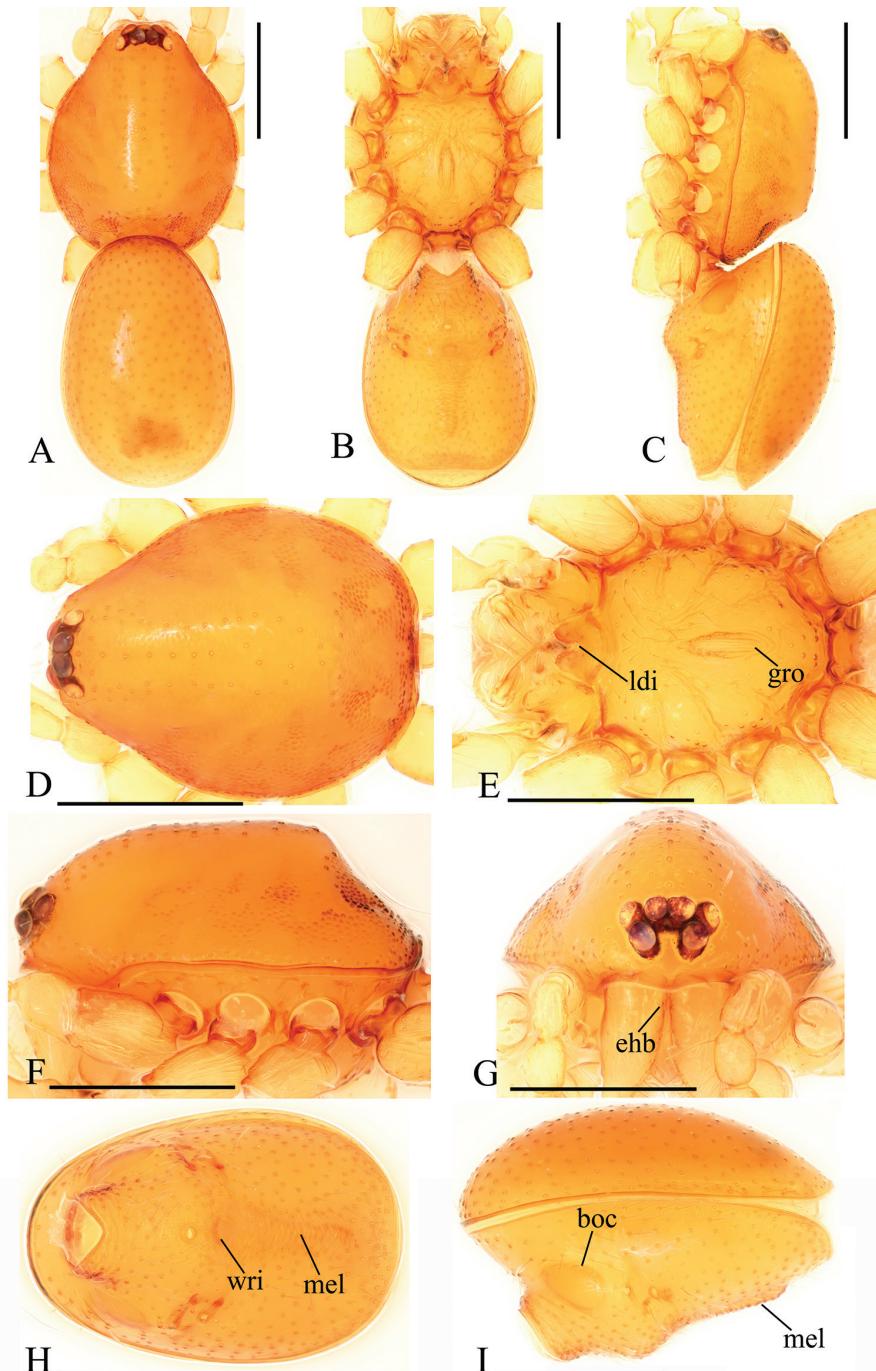


Figure 1. *Trilacuna bawan* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; ehb = elevated hair base; gro = grooves; ldi = labium deep incision; mel = median elevation; wri = wrinkles. Scale bars: 0.4 mm.

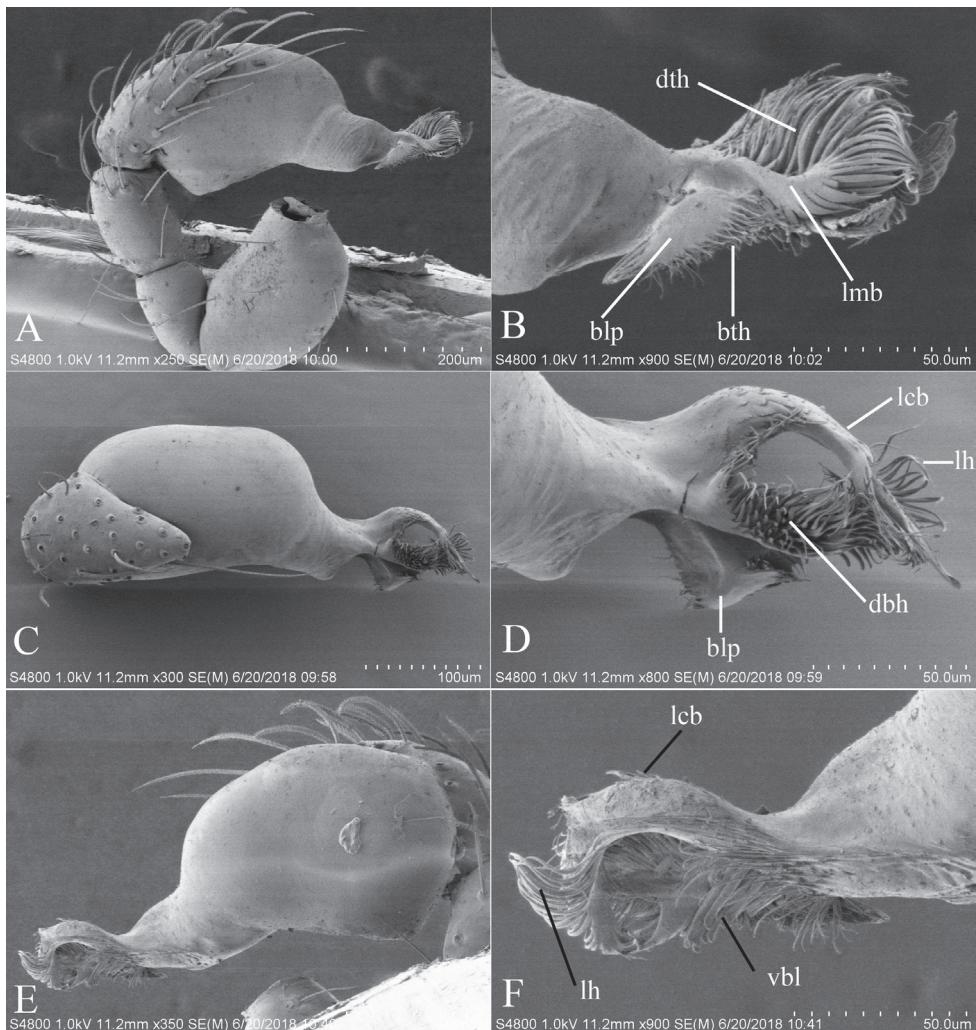


Figure 2. *Trilacuna bawan* sp. n., left male palp. **A** prolateral view **B, D, F** distal part of palpal bulb, pro-lateral, dorsal and retrolateral views **C, E** palpal bulb, dorsal and retrolateral views. Abbreviations: blp = basal leaf-shaped projection; bth = basal thin “hairs”; dbh = dorsal brush of “hairs”; dth = distal thick “hairs”; lcb = lateral curved branch; lh = lateral “hairs”; lmb = long medial branch; vbl = ventral broad lobes.

basal part (blp) (Fig. 2B, D). *T. hansanensis* has a pair of chitinized ridges on posterior area of sternum (Seo 2017: fig. 1B), epigastric region and ventral surface of abdomen not elevated (Seo 2017: fig. 1B), and has a strongly bent terminal hook on basal part of bulb (Seo 2017: fig. 1K). Females of the new species are similar to those of *T. songyuae* Tong & Li, 2018, but can be distinguished by the absence of the large dark knob marking in ventral surface of genital area (Tong et al. 2018: fig. 10H).

Description. Male. Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 1A–C. Body length 1.76; carapace 0.88 long, 0.74 wide; abdomen

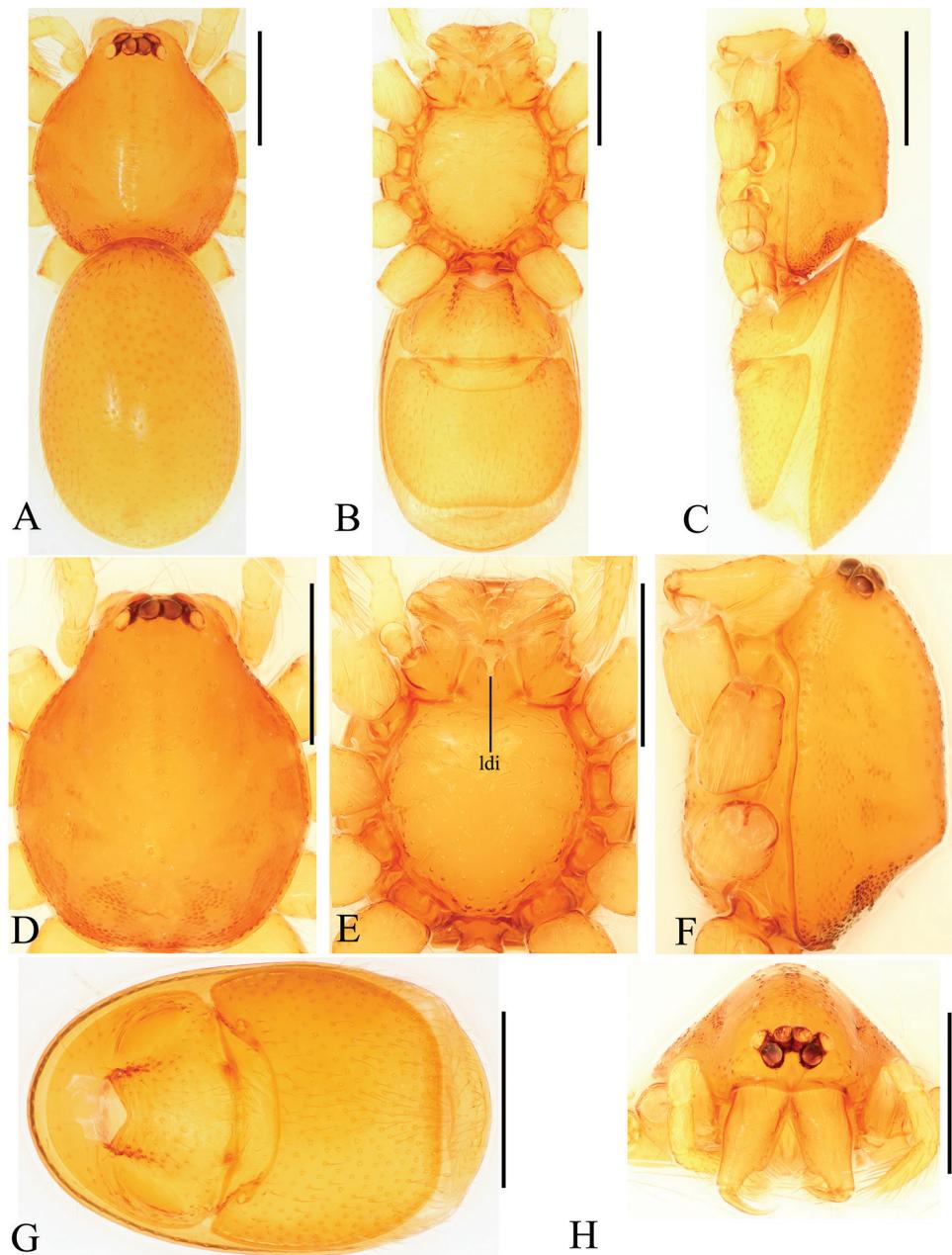


Figure 3. *Trilacuna bawan* sp. n., female. **A–C** habitus, doral, ventral and lateral views **D–F, H** prosoma, dorsal, ventral, lateral and anterior views **G** abdomen, ventral view. Abbreviation: ldi = labium deep incision. Scale bars: 0.4 mm.

0.97 long, 0.64 wide. Carapace sides granulate; lateral margin rebordered (Fig. 1D). Six eyes, well developed, nearly equal sized, arranged in a compact group; ALE–PLE separated by less than ALE radius, PME touching each other; posterior row recurved from

above, procurved from front (Fig. 1D, G). ALE separated from edge of carapace by 1.1 diameters. Mouthparts (Figs 1E, G, 26A): chelicerae straight, proximal region with one hair with elevated hair base; labium rectangular, anterior margin deeply incised (ldi); endites slender, distally only slightly branched (sdb). Sternum surface smooth, with several grooves (gro) on posterior area (Fig. 1E). Abdomen as in Fig. 1I. Leg spination (all spines longer than segment width): legs I-II: tibia: v2-2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Sperm pore situated at level of anterior spiracles; with several wrinkles (wri) between the posterior spiracles (Fig. 1H); epigastric region strongly elevated in lateral view, then followed by a narrow, slightly median elevation (mel) (Fig. 1I). Palp (Figs 2, 22A, B): orange. 0.46 long (0.19, 0.11, 0.12, 0.17). Femur 0.19 long, 0.13 wide (width/length = 0.68) (Fig. 22A, B). Tip of cymbium with long setae, almost as long as cymbium. Bulb oval, stout, tapering apically. Embolus system (Fig. 2B, D, F) with a leaf-shaped projection on base (blp) prolaterally; with a long medial branch (lmb) and a lateral curved branch (lcb) dorsally; all these structures surrounded by numerous hair-like structures.

Female. As in male except as noted. Habitus as in Fig. 3A–C. Slightly larger than male. Body length 1.89; carapace 0.85 long, 0.75 wide; abdomen 1.12 long, 0.73 wide. Endites unmodified; sternum without grooves on middle area; ventral side of abdomen unmodified. **Genitalia.** Ventral view (Figs 3G, 24A): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal view (Fig. 24B): with narrow, transverse sclerite (tsc); with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse bars (tba) nearly straight, with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

Trilacuna datang Tong, Zhang & Li, sp. n.

<http://zoobank.org/E680C826-455B-4E90-912C-5D43CD8D4A26>

Figs 4–6, 22C, F, 24C, D, 26B

Type material. Holotype ♂ (SYNU-240), China, Yunnan Province, Baoshan City, Tengchong County, Jietou Town, Datang Village, Dahelingganjiao, 23.II.2011, Zongxu Li & Luyu Wang. **Paratypes:** 6♀, 1♂ (SYNU-241), same data as holotype; 1♂, 3♀ (SYNU-242), same locality as holotype, 21.II.2011; 1♂ (SYNU-243), same locality as holotype, 24.II.2011.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. The new species is similar to *T. rastrum* Tong & Li, 2007, but males can be distinguished by the strongly elevated epigastric region (Fig. 4I), the long, very thick setae (lts) between the anterior spiracles (Fig. 4H) and 2 basal broad blade-like lobes (bll) and one long distal broad lobe (dbl) of embolus system (Fig. 5B), and the females by the smooth carapace and rugose surface of the sternum. *Trilacuna rastrum* males have flat epigastric region, without thick setae between the anterior spiracles, and have rake-like lobes of embolus system, and females have granulated sides of carapace and pitted surface of the sternum.

Description. Male. Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 4A–C. Body length 1.87; carapace 0.89 long, 0.76 wide; ab-

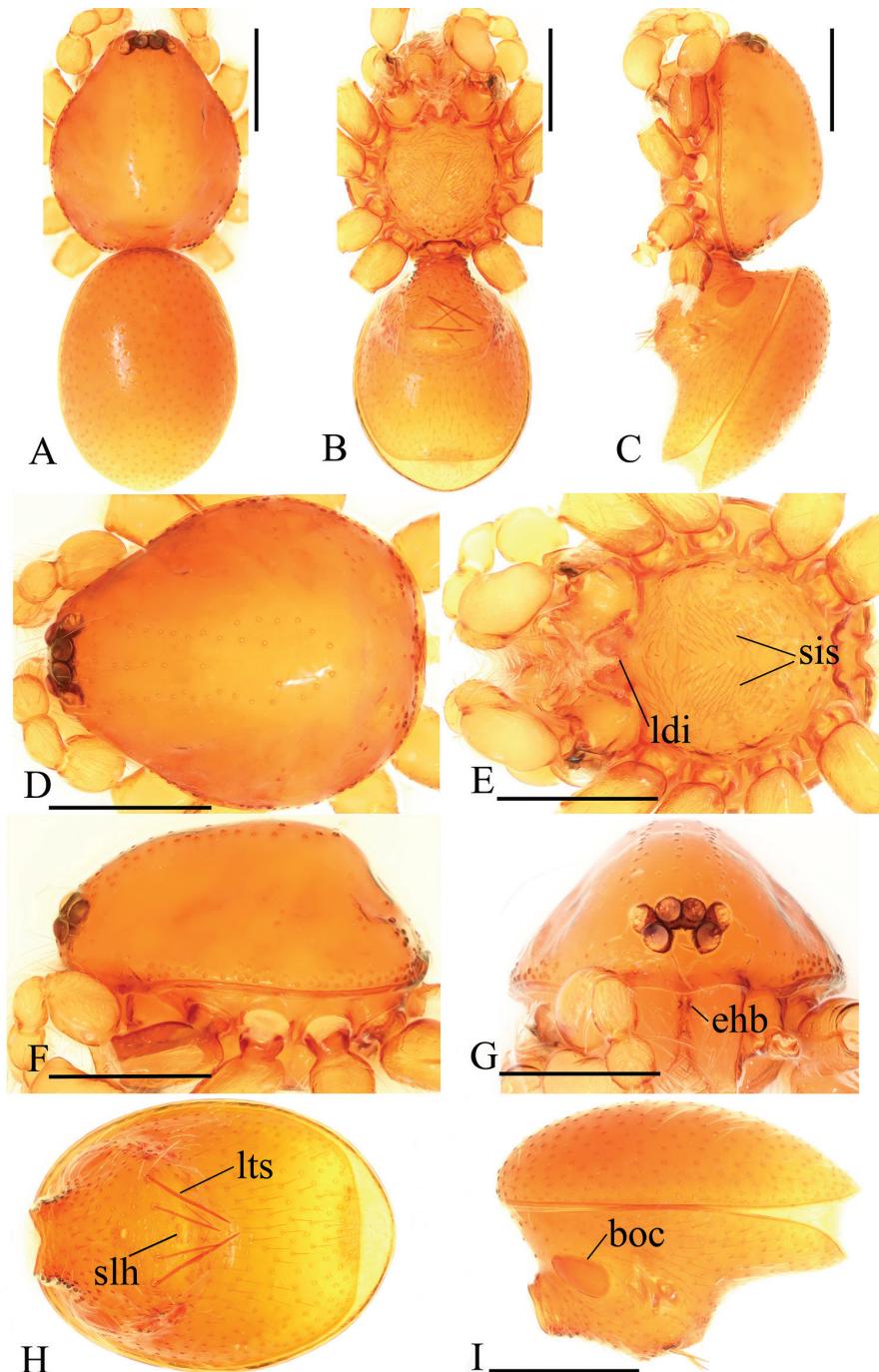


Figure 4. *Trilacuna datang* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; ehb = elevated hair base; ldi = labium deep incision; lts = long, very thick setae; sis = short, italic thick setae; slh = small hole. Scale bars: 0.4 mm.

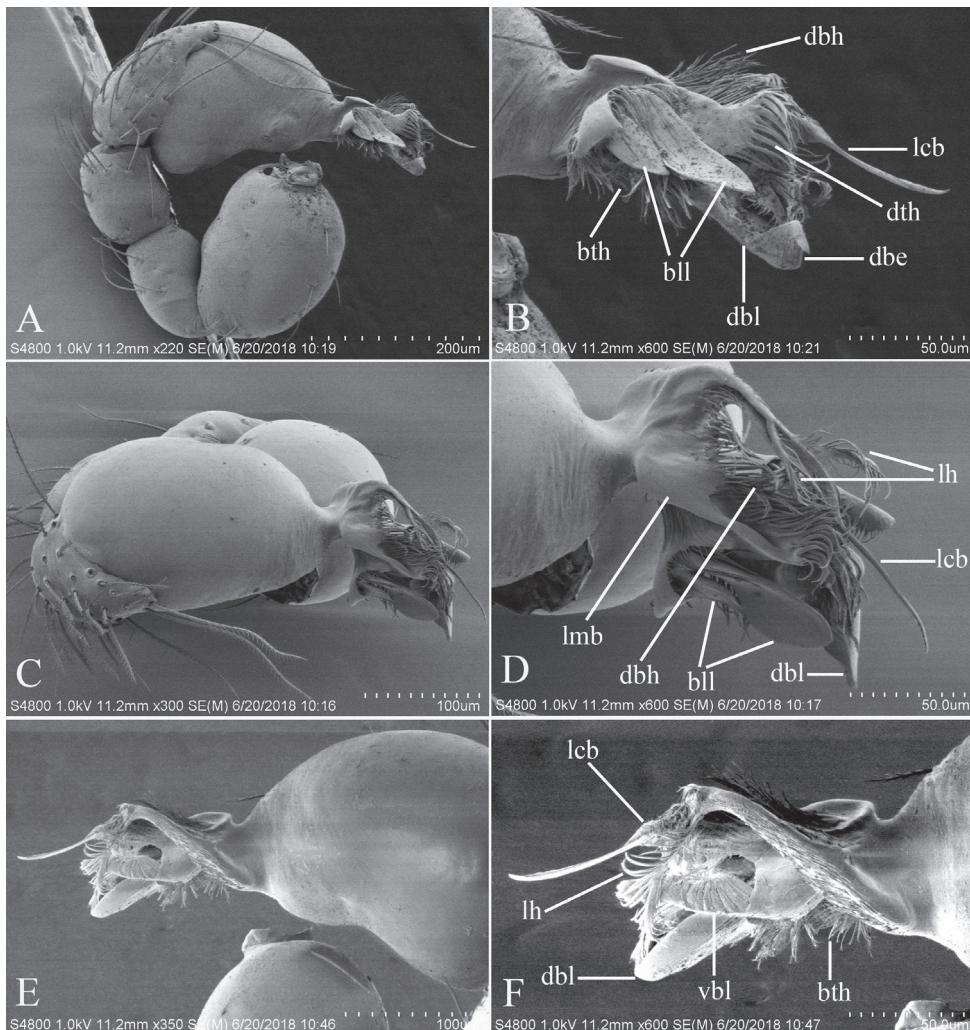


Figure 5. *Trilacuna datang* sp. n., left male palp. **A** prolateral view **B, D, F** distal part of palpal bulb, prolateral, dorsal and retrolateral views **C, E** palpal bulb, dorsal and retrolateral views. Abbreviations: bll = blade-like lobes; bth = basal thin “hairs”;dbe = distal bending; dbh = dorsal brush of “hairs”; dbl = distal broad lobe; dth = distal thick “hairs”; lcb = lateral curved branch; lh = lateral “hairs”; lmb = long medial branch; vbl = ventral broad lobes.

domen 0.99 long, 0.72 wide. Carapace sides smooth, lateral margin rebordered (Fig. 4D). Eyes similar to those of *T. bawan* sp. n. (Fig. 4D, G). ALE separated from edge of carapace by 1.3 diameters. Mouthparts (Figs 4E, G, 26B) similar to those of *T. bawan* sp. n. Sternum surface smooth, with many short, italic thick setae (sis) on middle area (Fig. 4E). Abdomen as in Fig. 4I. Leg spination (all spines longer than segment width): legs I-II: tibia: v2-2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Sperm pore situated in front of anterior spiracles; with four long, very thick setae (lts) between the anterior spir-

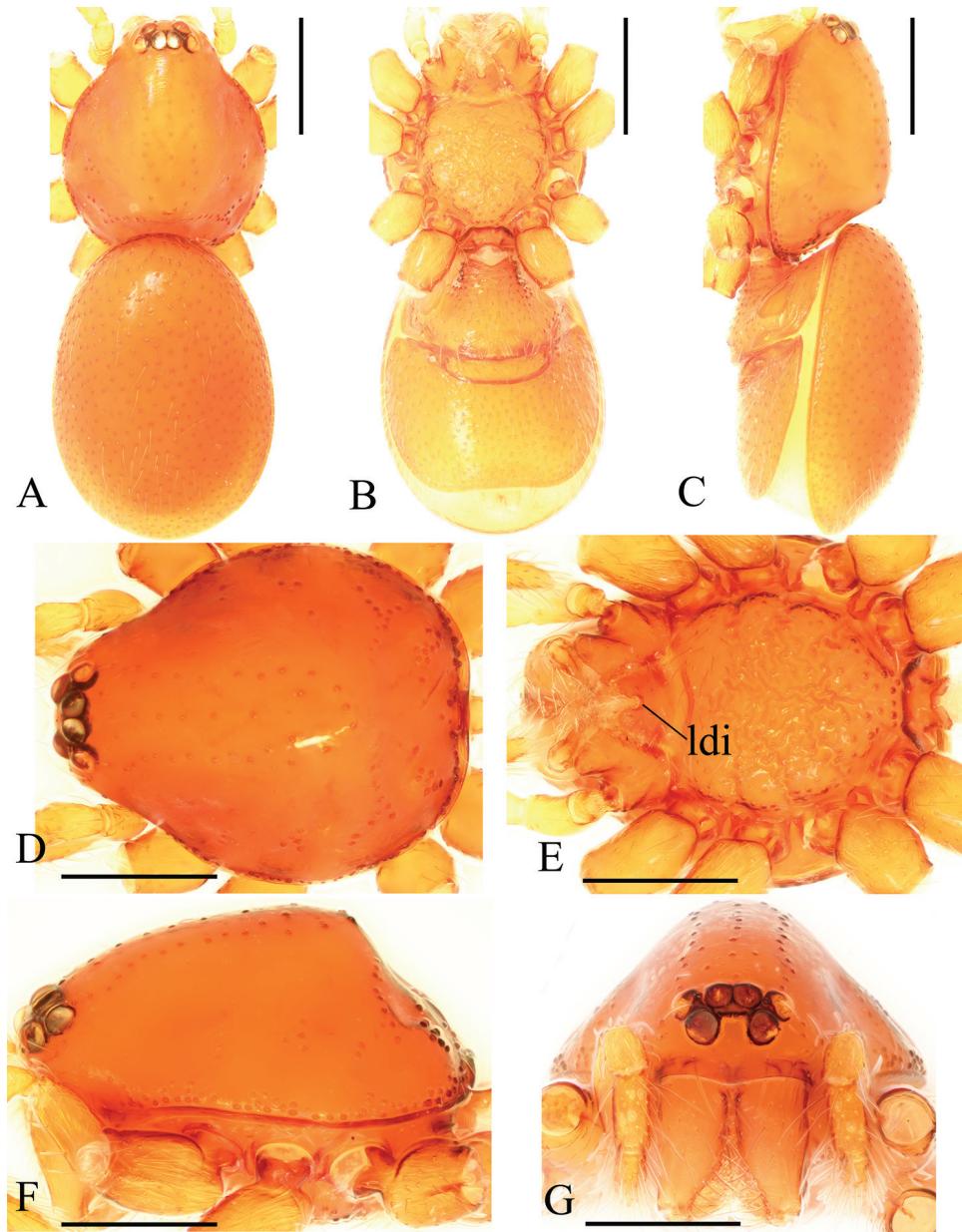


Figure 6. *Trilacuna datang* sp. n., female. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviation: ldi = labium deep incision. Scale bars: 0.4 mm.

cles; with a small hole (slh) between the posterior spiracles (Fig. 4H); epigastric region strongly elevated (Fig. 4I) in lateral view. Palp (Figs 5, 22C, F): orange. 0.46 long (0.15, 0.08, 0.11, 0.12). Femur 0.15 long, 0.09 wide (width/length = 0.6) (Fig. 22C, F). Tip of cymbium with long setae, longer than cymbium. Bulb oval, stout, tapering

apically. Embolus system (Fig. 5B, D, F) with 2 basal broad blade-like lobes (bll) and one long distal broad lobe (dbl) prolaterally, the tip of the distal lobe sharply bending (dbe); with a lateral curved branch (lcb) and a long medial branch (lmb) dorsally; with numerous brush of “hairs” (dbh) on dorsal branch and lateral “hairs” (lh) on small branches derived from the lateral curved branch (lcb).

Female. As in male except as noted. Habitus as in Fig. 6A–C. Body length 1.87; carapace 0.85 long, 0.74 wide; abdomen 1.09 long, 0.81 wide. Endites unmodified; sternum surface strongly rugose; ventral side of abdomen unmodified. **Genitalia.** Ventral view (Fig. 24C): with recurved, strongly sclerotized arches (sar) anterior to the spiracles; grooves connected posterior spiracles heavily sclerotized. Dorsal view (Fig. 24D): with narrow, transversally elongated sclerite (tsc); with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse bars (tba) slightly arched, with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

Trilacuna fugong Tong, Zhang & Li, sp. n.

<http://zoobank.org/918ACACD-6775-43C9-BF67-9139BFFDF847>

Figs 7–9, 22D, E, 24E, F, 26C

Type material. Holotype ♂ (SYNU-250), China, Yunnan Province, Nujiang Lisu Autonomous Prefecture, Fugong County, Pihe Town, 11.III.2011, Zongxu Li & Luyu Wang. **Paratypes:** 1♀, 2♂ (SYNU-251), same data as holotype.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. Males of the new species is similar to *T. werni* Eichenberger, 2011, but can be distinguished by the several rows of lobes on ventral groove (grl) of the bulb (Fig. 8C), the large distal plate (ldp) of embolus system (Fig. 8C), and the smooth carapace and sternum (Fig. 7D, E) vs. only one row of lobes in a venrtal groove without large distal plate on embolus system in *T. werni* (Eichenberger and Kranz-Baltensperger 2011: fig. 12E–F, I), and granulated carapace and reticulated sternum in *T. werni* (Eichenberger and Kranz-Baltensperger 2011: fig. 10D–G). Females of the new species can be distinguished from all other *Trilacuna* species by the horseshoe-shaped sclerite (hsc) of the endogyne (Fig. 24F), the females of all the known species have transversally elongated sclerite of the endogyne (e.g., Figs 24B, D, H, J, 25B, D).

Description. Male. Body yellow, chelicerae, sternum and legs lighter. Habitus as in Fig. 7A–C. Body length 1.59; carapace 0.78 long, 0.64 wide; abdomen 0.86 long, 0.55 wide. Carapace sides smooth, lateral margin rebordered (Fig. 7D). Eyes: ALE largest, PME smallest (Fig. 7D, G). ALE separated from edge of carapace by approximately one diameter. Mouthparts as in Figs 7E, G, 26C, endites with a small distal projection (dpr). Sternum surface smooth (Fig. 7E). Abdomen as in Fig. 7I. Leg spination (all spines longer than segment width): legs I–II: tibia: v2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Epigastric region sharply elevated from lateral view (Fig. 7I), sperm pore situated at level of anterior spiracles. Palp (Figs 8, 22D, E): orange. 0.46 long (0.15,

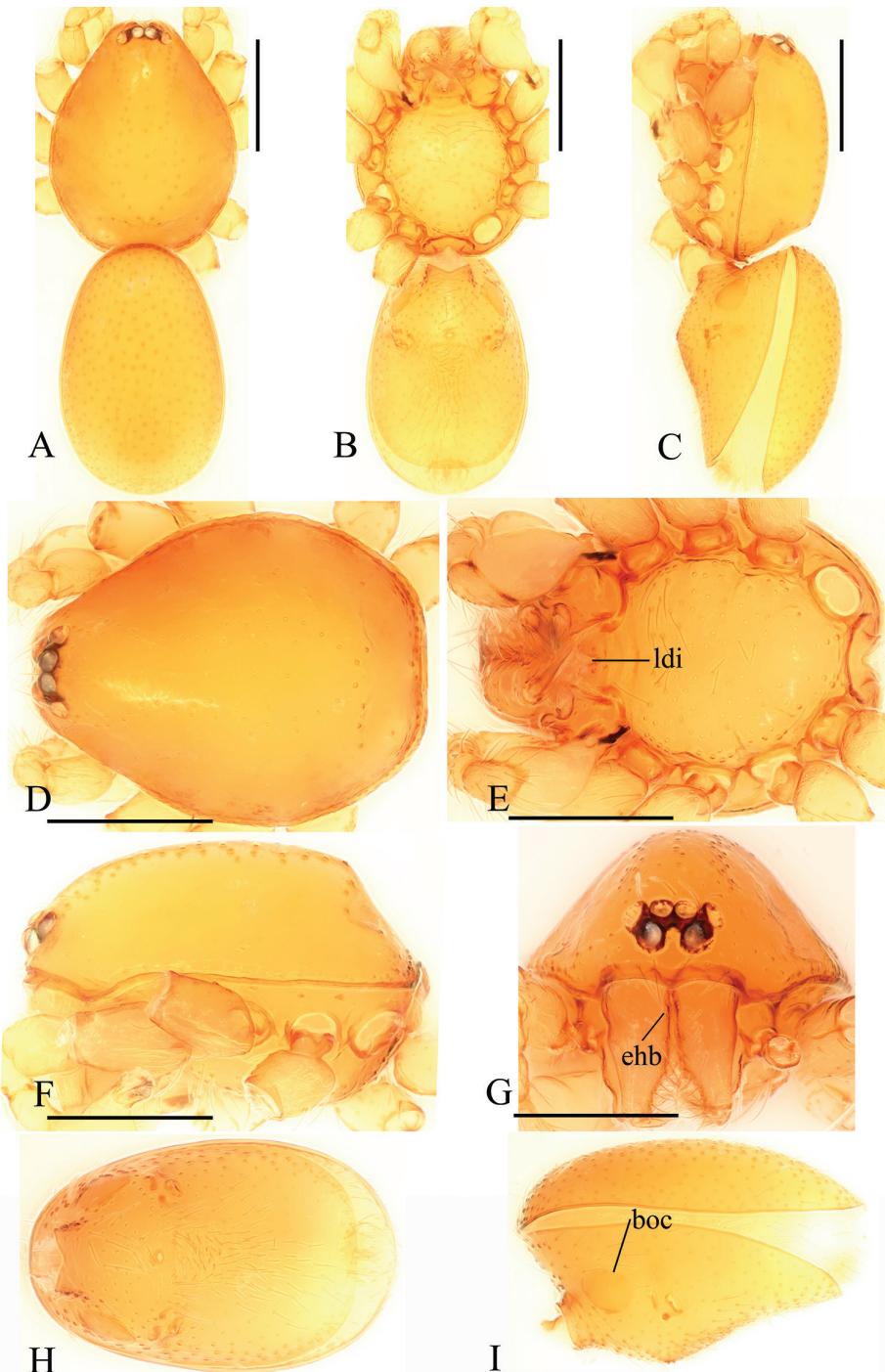


Figure 7. *Trilacuna fugong* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; ehb = elevated hair base; ldi = labium deep incision. Scale bars: 0.4 mm.

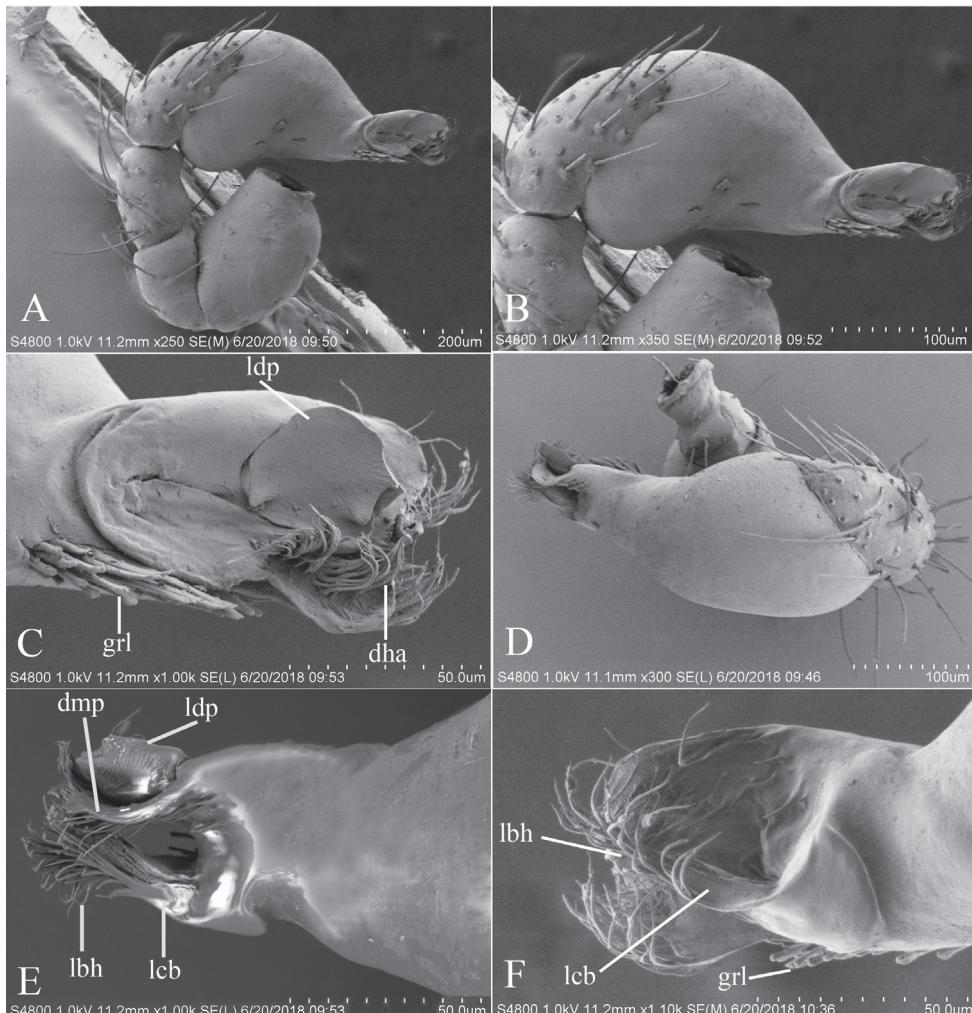


Figure 8. *Trilacuna fugong* sp. n., left male palp. **A** prolateral view **B, D** palpal bulb, prolateral and dorsal views **C, E, F** distal part of palpal bulb, prolateral, dorsal and retrolateral views. Abbreviations: dha = distal “hairs”; dmp = distal medial plate; grl = rows of lobes in basal ventral groove; lbh = long, brush of “hairs”; lcb = lateral curved branch; ldp = large distal plate.

0.08, 0.11, 0.12). Femur 0.15 long, 0.09 wide (width/length = 0.6) (Fig. 22D, E). Cymbium without long setae. Bulb oval, stout, tapering apically. Embolus system (Fig. 8C, E, F) with rows of lobes in basal ventral groove (grl) and a large distal plate (ldp); with a distal medial plate (dmp) and a short lateral curved branch (lcb), surrounded by long, brush of “hairs” (lbh).

Female. As in male except as noted. Habitus as in Fig. 9A. Slightly larger than male. Body length 1.68; carapace 0.71 long, 0.63 wide; abdomen 1.01 long, 0.63 wide. Endites unmodified; epigastric region not sharply elevated from lateral view.

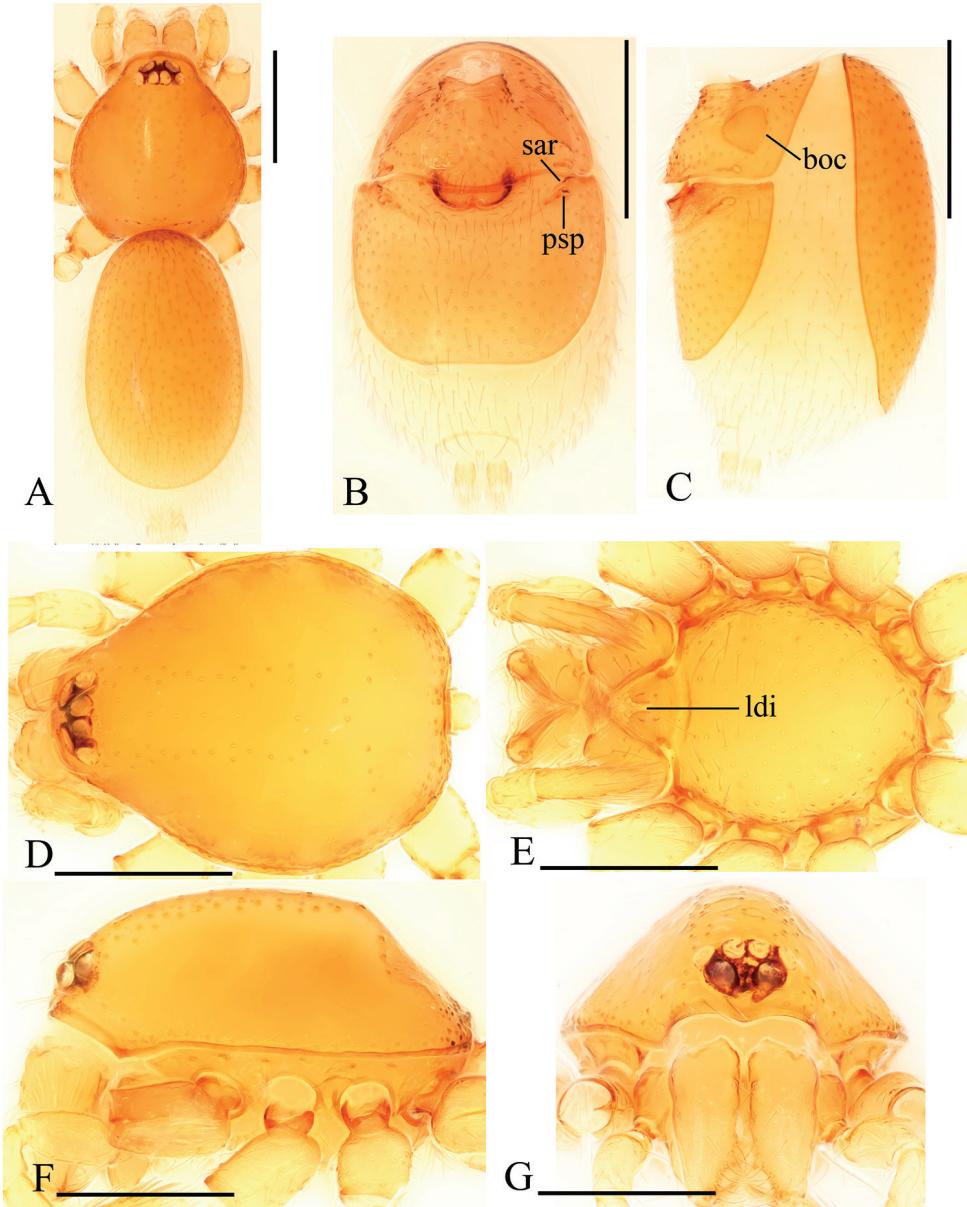


Figure 9. *Trilacuna fugong* sp. n., female. **A** habitus, dorsal view **B, C** abdomen, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviations: boc = booklung covers; ldi = labium deep incision; psp = posterior spiracle; sar = sclerotized, recurved arches. Scale bars: 0.4 mm.

Genitalia. Ventral view (Figs 9B, 24E): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal view (Fig. 24F): with an anterior stick-like sclerite (ssc) and a posterior horseshoe-shaped sclerite (hsc).

Distribution. Known only from the type locality.

***Trilacuna gongshan* Tong, Zhang & Li, sp. n.**

<http://zoobank.org/DD6BC9A6-B90B-4789-84AD-BCE229277B42>

Figs 10–12, 23A, B, 24G, H, 26D

Type material. Holotype ♂ (SYNU-257), China, Yunnan Province, Nujiang Lisu Autonomous Prefecture, Gongshan County, Bingzhongluo Town, 28°00'866"N, 98°35'953"E, 1840 m, 11.III.2011, Zongxu Li & Guchun Zhou. **Paratypes:** 6♀, 4♂ (SYNU-258), same data as holotype; 2♀, 1♂ (SYNU-259), same locality as holotype, 8.III.2011, Zongxu Li & Luyu Wang.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. The new specie is similar to *T. rastrum* Tong & Li, 2007, but can be distinguished by the presence of three pairs of spines on male tibiae I and II, the leaf-shaped projection (blp) and three long, tooth-like lobes (tll) on the embolus system (Fig. 11B, D), and the several longitudinal wrinkles on sternum surface of female. *Trilacuna rastrum* has four pairs of ventral spines on male tibiae I and II, lacking the leaf-shaped projection, has a rake-shaped lobes on the embolus system, and has a pitted surface on sternum of female (Tong and Li 2007: fig. 7–10).

Description. Male. Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 10A–C. Body length 1.89; carapace 0.88 long, 0.74 wide; abdomen 1.08 long, 0.68 wide. Carapace sides granulate, lateral margin rebordered (Fig. 10D). Eyes: ALE separated from edge of carapace by 1.4 diameters (Fig. 10D, G). Mouthparts (Figs 10E, G, 26D) similar to those of *T. bawan* sp. n. Sternum surface smooth, with finely setae (Fig. 10E). Abdomen as in Fig. 10I. Leg spination (all spines longer than segment width): legs I-II: tibia: v2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Sperm pore situated at level of anterior spiracles; with a small hole (slh) between the posterior spiracles (Fig. 10H). Palp (Figs 11, 23A, B): orange. 0.46 long (0.15, 0.08, 0.11, 0.12). Femur 0.15 long, 0.09 wide (width/length = 0.6) (Fig. 23A, B). Cymbium without long seta. Bulb oval, stout, tapering apically. Embolus system (Fig. 11B, D, F) with a leaf-shaped projection (blp) and three long, tooth-like lobes (tll) prolaterally; with a lateral curved branch (lcb) and a long medial branch (lmb) dorsally; with numerous brush of “hairs”(dbh) surrounded medial branch and lateral “hairs” (lh) on lateral curved branch (lcb).

Female. As in male except as noted. Habitus as in Fig. 12A–C. Slightly larger than male. Body length 1.92; carapace 0.81 long, 0.72 wide; abdomen 1.18 long, 0.72 wide. Endites unmodified; sternum surface smooth, but medially with several

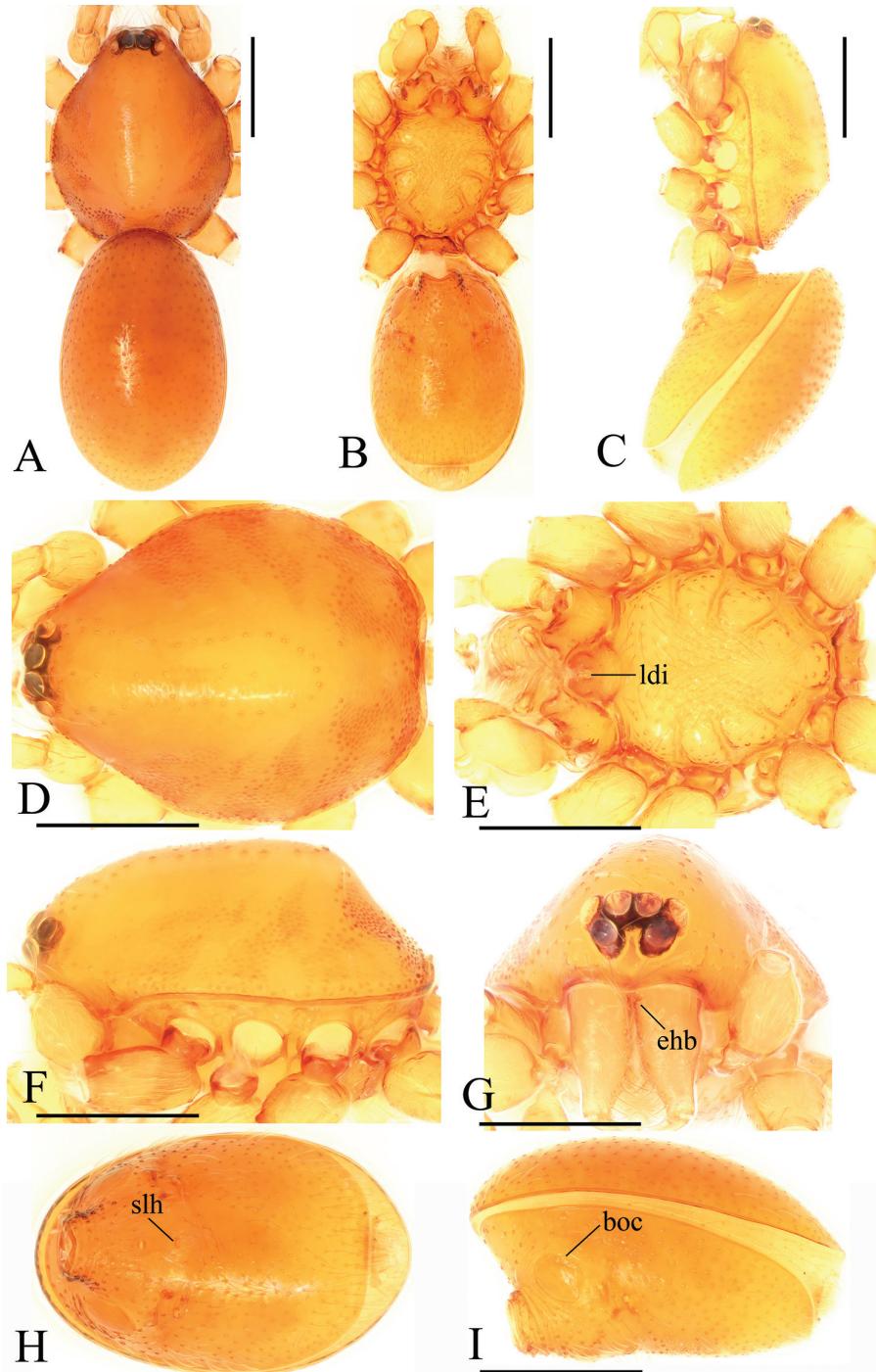


Figure 10. *Trilacuna gongshan* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; ehb = elevated hair base; ldi = labium deep incision; slh = small hole. Scale bars: 0.4 mm.

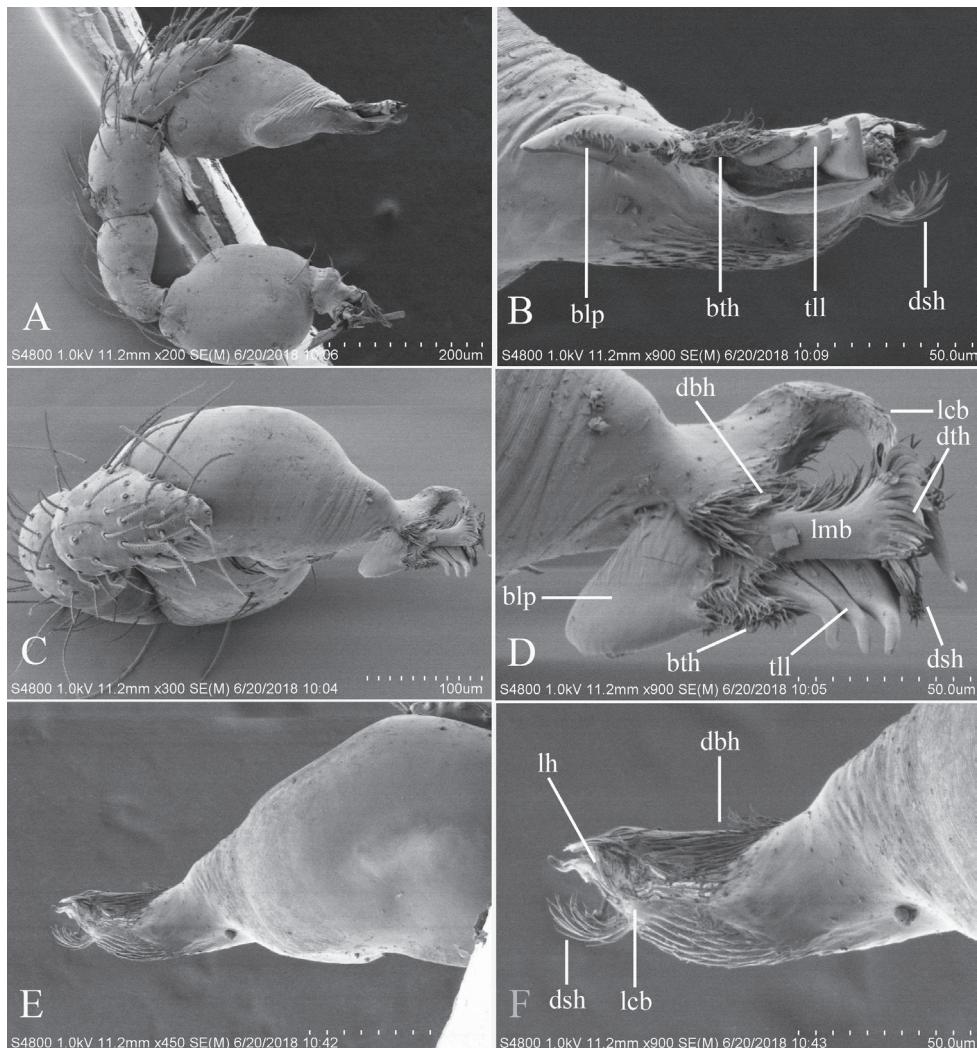


Figure 11. *Trilacuna gongshan* sp. n., left male palp. **A**, prolateral view; **B, D, F**, distal part of palp bulb, prolateral, dorsal and retrolateral views; **C, E**, palpal bulb, dorsal and retrolateral views. Abbreviations: blp = basal leaf-shaped projection; bth = basal thin "hairs"; dbh = dorsal brush of "hairs"; dsh = distal short "hairs"; dth = distal thick "hairs"; lcb = lateral curved branch; lh = lateral "hairs"; lmb = long medial branch; tll = tooth-like lobes.

longitudinal wrinkles. **Genitalia.** Ventral view (Fig. 24G): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal view (Fig. 24H): with narrow, transversally elongated sclerite (tsc); with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse bars (tba) straight, with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

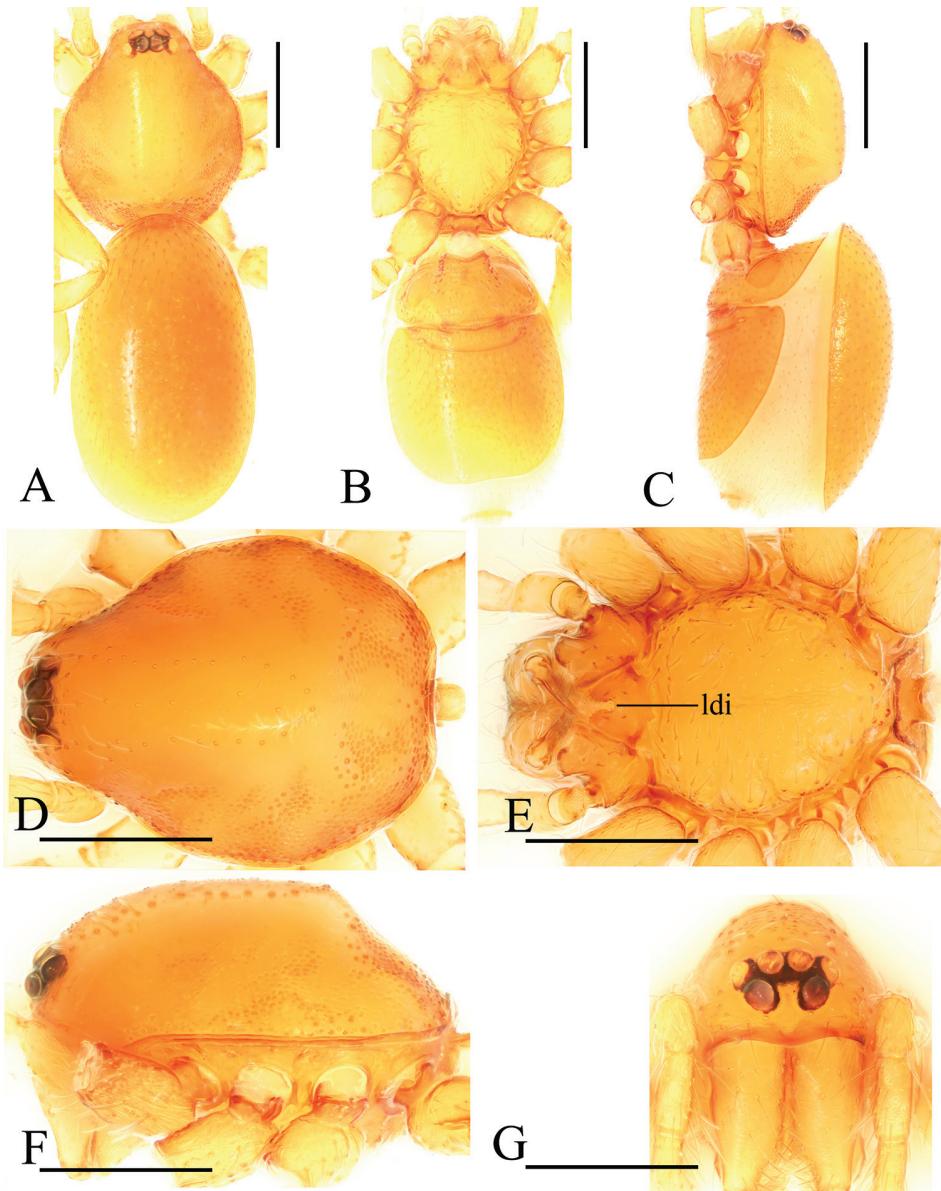


Figure 12. *Trilacuna gongshan* sp. n., female. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviation: ldi = labium deep incision. Scale bars: 0.4 mm.

***Trilacuna longling* Tong, Zhang & Li, sp. n.**

<http://zoobank.org/68D4FDB8-9F3E-42B8-A087-977742F6ED29>

Figs 13–15, 23C, D, 24I, J, 26E

Type material. Holotype ♂ (SYNU-244), China, Yunnan Province, Baoshan City, Longling County, Xiaoheishan Natural Reserve, 17.II.2011, Zongxu Li & Luyu Wang.

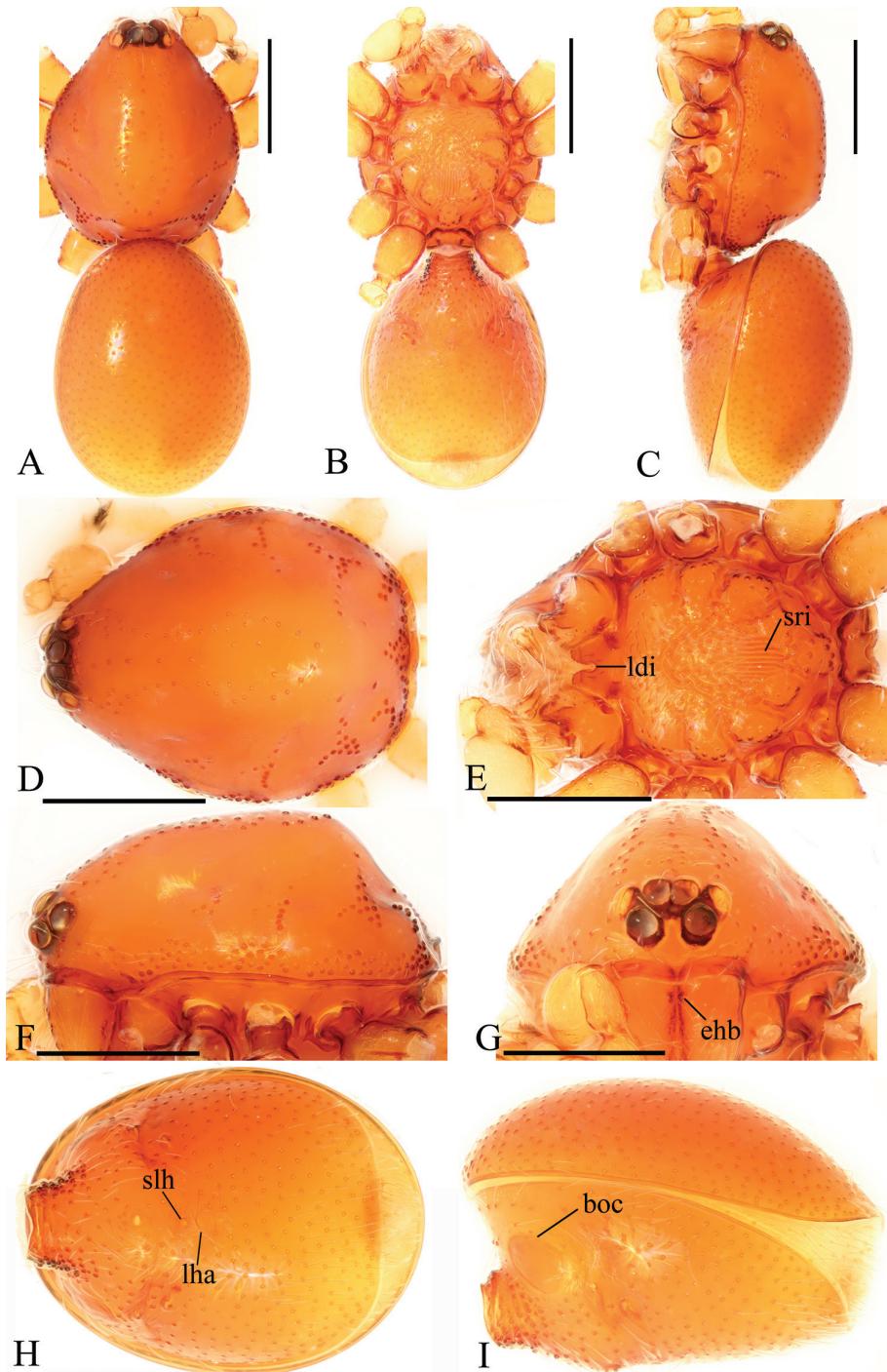


Figure 13. *Trilacuna longling* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; ehb = elevated hair base; ldi = labium deep incision; lha = long hairs; slh = small hole; sri = small ridges. Scale bars: 0.4 mm.

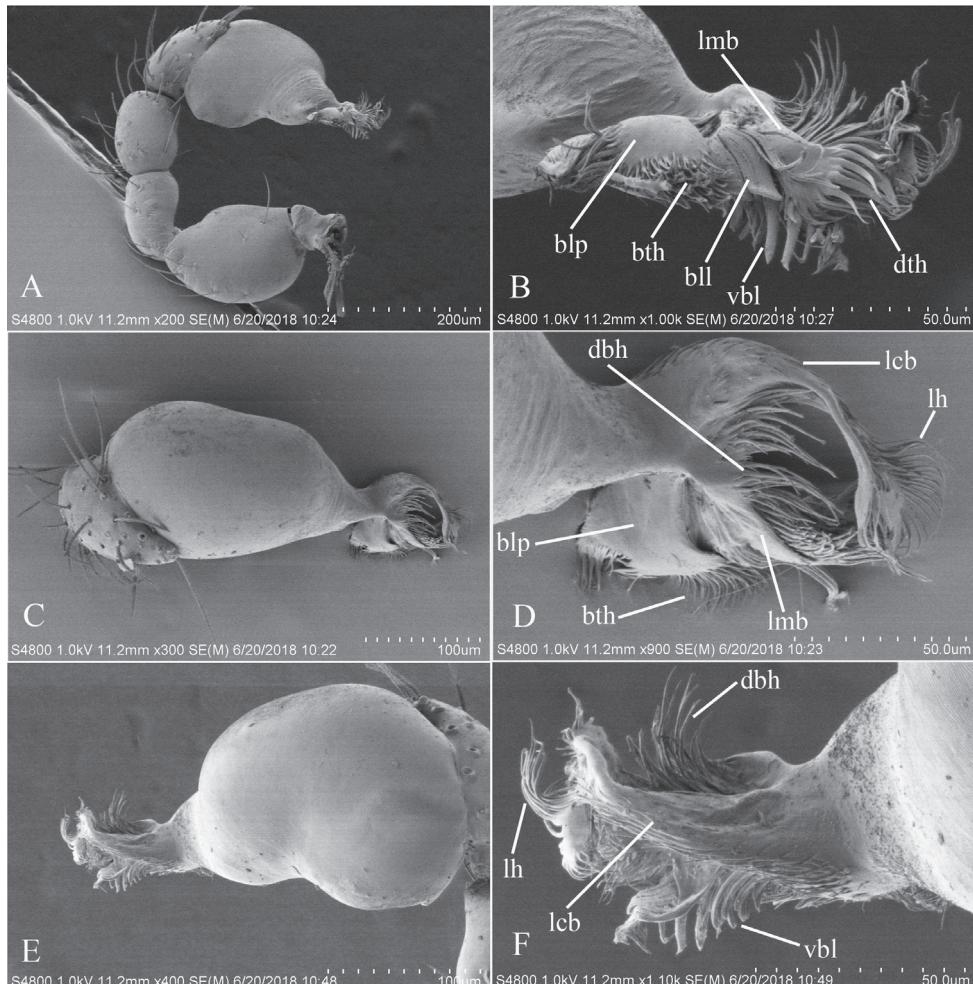


Figure 14. *Trilacuna longling* sp. n., left male palp. **A**, prolateral view; **B, D, F**, distal part of palpal bulb, prolateral, dorsal and retrolateral views; **C, E**, palpal bulb, dorsal and retrolateral views. Abbreviations: bll = blade-like lobes; blp = basal leaf-shaped projection; bth = basal thin “hairs”; dbh = dorsal brush of “hairs”; dth = distal thick “hairs”; lcb = lateral curved branch; lh = lateral “hairs”; lmb = long medial branch; vbl = ventral broad lobes.

Paratypes: 2♀, 2♂ (SYNU-247), same data as holotype; 2♀ (SYNU-246), same data as holotype; 1♂ (SYNU-261), same data as holotype.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. The new species is similar to *T. wuhe* sp. n., but can be distinguished by the narrow, blade-like lobes (bll) on embolus system (Fig. 14B, D, F), and the straight transversal sclerite (tsc) of the endogyne (Fig. 24J). *T. wuhe* sp. n. has 4 long, finger-like lobes (fl) and a cluster of long, thick “hairs” (lth) on embolus system (Fig. 17B) and has an “angled” transversal sclerite (tsc) of the endogyne (Fig. 25A).

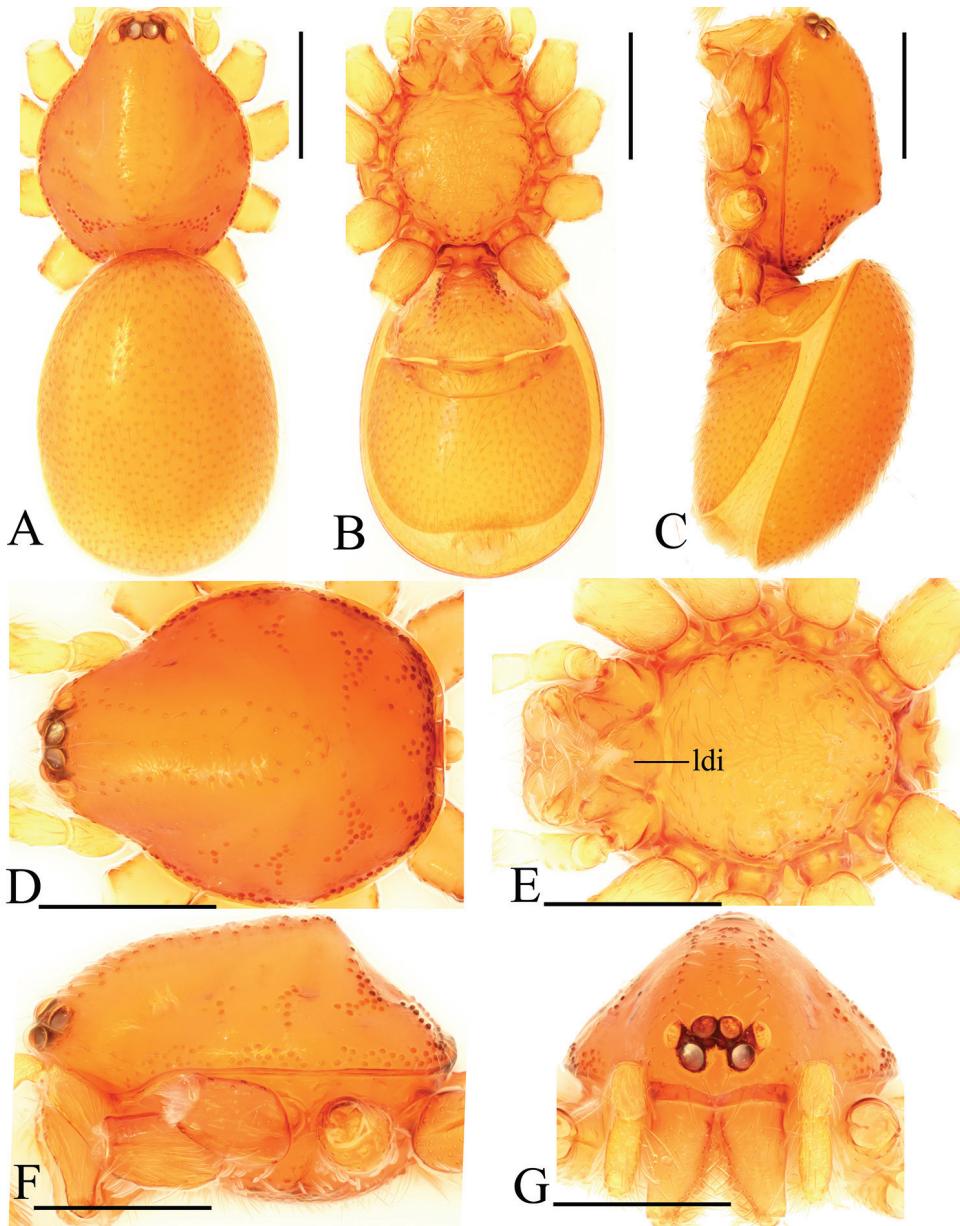


Figure 15. *Trilacuna longling* sp. n., female. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviations: ldi = labium deep incision. Scale bars: 0.4 mm.

Description. Male. Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 13A–C. Body length 1.69; carapace 0.81 long, 0.71 wide; abdomen 0.92 long, 0.71 wide. Carapace sides smooth, with only a few granulates, lateral margin rebordered (Fig. 13D). Eyes: ALE largest, PME smallest (Fig. 13D, G).

ALE separated from edge of carapace by 1.2 diameters. Mouthparts as in Figs 13E, G, 26E. Sternum surface smooth, medial area strongly rugose, with many rows of small ridges (sri) on posterior area (Fig. 13E). Abdomen as in Fig. 13I. Leg spination (all spines longer than segment width): legs I-II: tibia: v2-2-2-2-0, metatarsus: v2-2-0.

Genitalia. Sperm pore situated at level of anterior spiracles; with a small hole (slh) between the posterior spiracles, surrounded by some long hairs (lha) (Fig. 13H). Palp (Figs 14, 23C, D): orange. 0.46 long (0.15, 0.08, 0.11, 0.12). Femur 0.15 long, 0.09 wide (width/length = 0.6) (Fig. 23C, D). Bulb oval, stout, tapering apically. Embolus system (Fig. 14B, D, F) with a leaf-shaped prolateral projection at base (blp), projection with numerous thin, short “hairs” at the margin (bth); with two narrow, blade-like lobes (bll); with a retrolaterally curved branch (lcb) and a long medial branch (lmb), the former (lcb) with a cluster of lateral “hairs” (lh), the latter (lmb) covered by numerous dorsal “hairs” (dbh); with rows of ventral broad lobes (vbl) retrolaterally.

Female. As in male except as noted. Habitus as in Fig. 15A–C. Slightly larger than male. Body length 1.76; carapace 0.78 long, 0.67 wide; abdomen 1.01 long, 0.75 wide. Endites unmodified; sternum without rows of small ridges (sri) on posterior area.

Genitalia. Ventral view (Fig. 24I): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal view (Fig. 24J): with narrow, transversally elongated sclerite (tsc); with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse bars (tba) with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

Trilacuna wuhe Tong, Zhang & Li, sp. n.

<http://zoobank.org/71684C74-2B6B-4A17-B4ED-77B51B05C535>

Figs 16–18, 22G–I, 25A, B, 26F

Type material. Holotype ♂ (SYNU-255), China, Yunnan Province, Baoshan City, Tengchong County, Wuhe Town, Xiaodifang Village, 27.II.2011, Zongxu Li & Luyu Wang. **Paratypes:** 3♀, 1♂ (SYNU-256), same data as holotype.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. The new species is similar to *T. xinping* sp. n., but males can be distinguished by the numerous rows of small ridges (sri) in posterior part of sternum (Fig. 16E), four long, finger-like lobes (fl) and a cluster of long, thick “hairs” (lth) on embolus system (Fig. 17B), and the females by the “angled” transversal sclerite (tsc) of the endogyne (Fig. 25A). *Trilacuna xinping* sp. n. males have a cluster of short setae (css) in posterior part of sternum (Fig. 19E), comb-shaped lobes (csl) on embolus system (Fig. 20B), and females there is no the transversal sclerite (tsc) (Fig. 25C).

Description. Male. Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 16A–C. Body length 1.62; carapace 0.82 long, 0.69 wide; abdomen 0.84 long, 0.64 wide. Carapace sides granulate, lateral margin rebordered (Fig. 16D). Eyes: ALE separated from edge of carapace by 1.2 diameters (Fig. 16D, G). Mouthparts as in Figs 16E, G, 26F. Sternum smooth, with many rows of small ridges

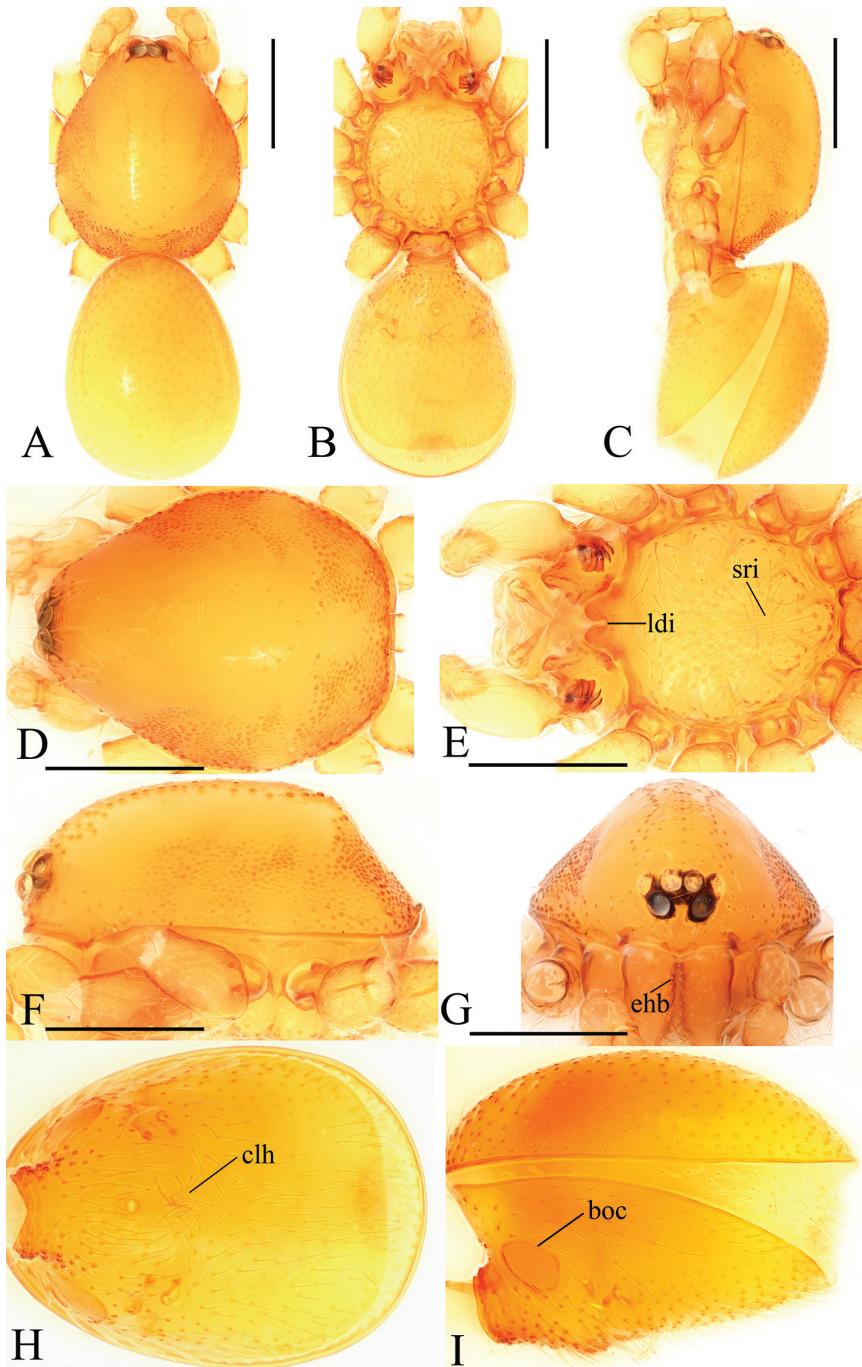


Figure 16. *Trilacuna wuhe* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; clh = cluster of long hairs; ehb = elevated hair base; ldi = labium deep incision; sri = small ridges. Scale bars: 0.4 mm.

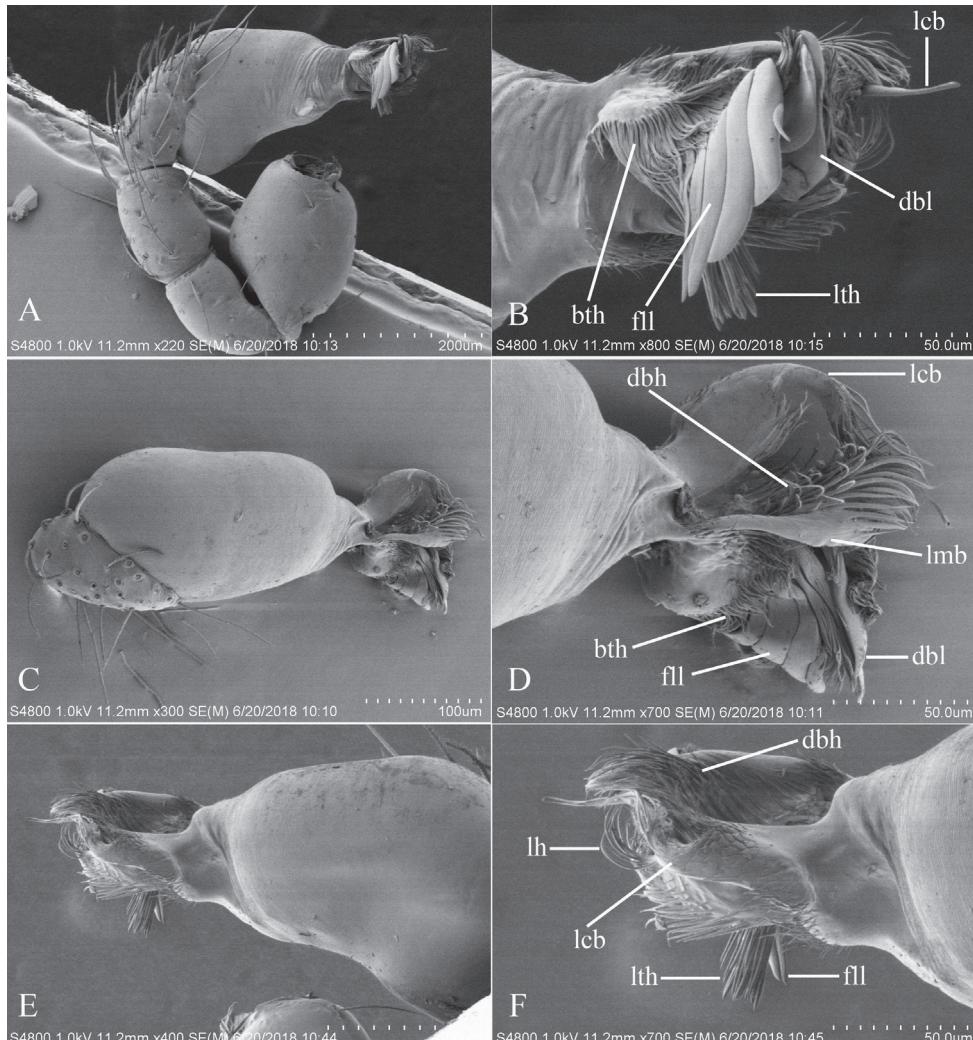


Figure 17. *Trilacuna wuhe* sp. n., left male palp. **A** prolateral view **B, D, F** distal part of palpal bulb, prolateal, dorsal and retrolateral views **C, E** palpal bulb, dorsal and retrolateral views. Abbreviations: bth = basal thin “hairs”; dbh = dorsal brush of “hairs”; dbl = distal broad lobe; fll = finger-like lobes; lcb = lateral curved branch; lh = lateral “hairs”; lmb = long medial branch; lth = long thick “hairs”.

(sri) on posterior area (Fig. 16E). Abdomen as in Fig. 16I. Leg spination (all spines longer than segment width): legs I-II: tibia: v2-2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Sperm pore situated at level of anterior spiracles; with cluster of long hairs (clh) between the posterior spiracles (Fig. 16H). Palp (Figs 17, 22G–I): orange. 0.46 long (0.15, 0.08, 0.11, 0.12). Femur 0.15 long, 0.09 wide (width/length = 0.6) (Fig. 22G, I). Bulb oval, stout, tapering apically. Embolus system (Fig. 17B, D, F) with four long, finger-like lobes (fll), two distal broad lobes (dbl), and a cluster of long, thick “hairs”

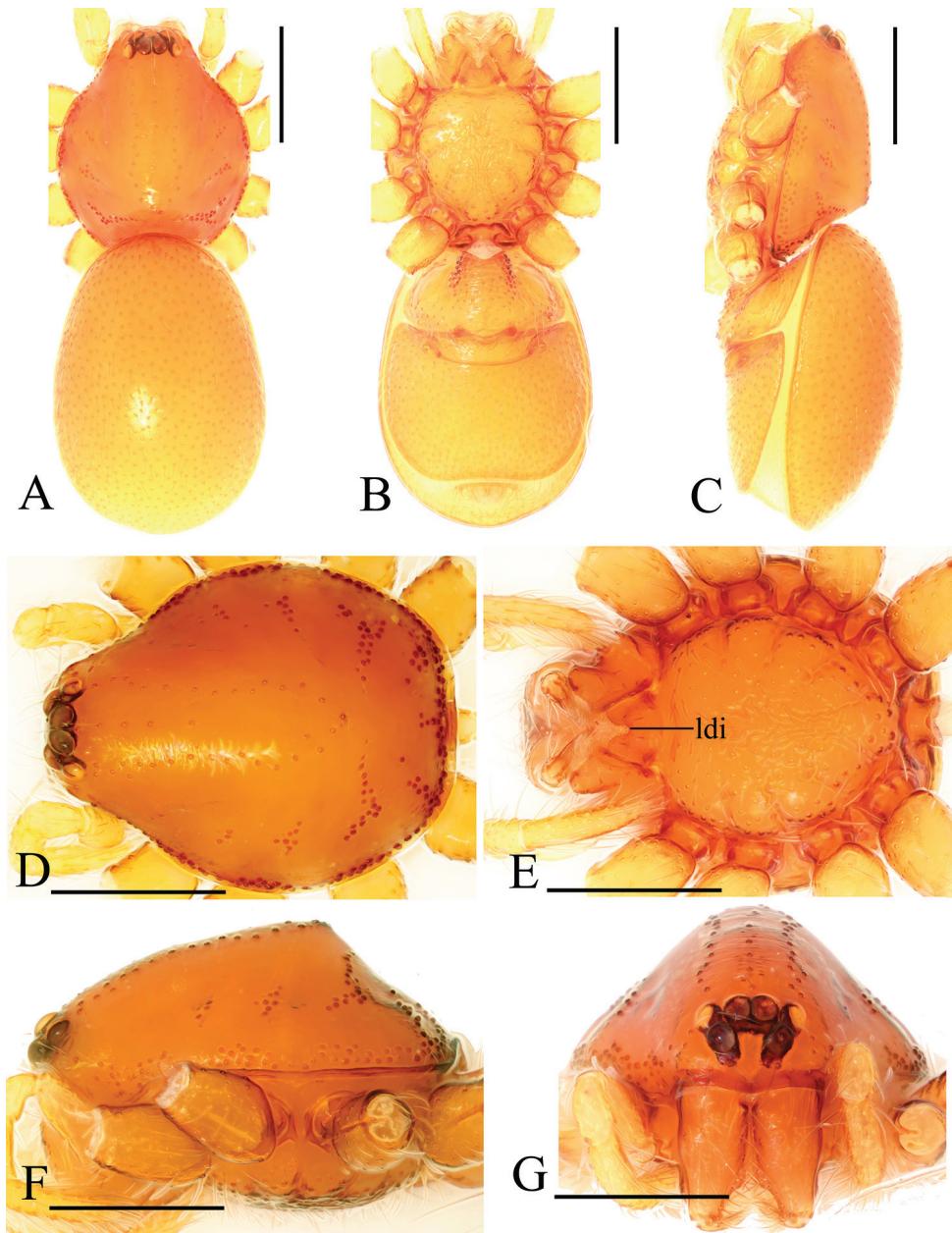


Figure 18. *Trilacuna wuhe* sp. n., female. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviation: ldi = labium deep incision. Scale bars: 0.4 mm.

(lth) prolaterally; with a retrolateral curved branch (lcb) and a long medial branch (lmb) dorsally, all these structures surrounded by numerous hair-like structures.

Female. As in male except as noted. Habitus as in Fig. 18A–C. Slightly larger than male. Body length 1.81; carapace 0.79 long, 0.69 wide; abdomen 1.05 long, 0.75

wide. Endites unmodified; sternum surface slightly rugose on middle area, without rows of small ridges (sri) on posterior area. **Genitalia.** Ventral view (Fig. 25A): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal view (Fig. 25B): with narrow, nearly “angled” transversally elongated sclerite (tsc); with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse bars (tba) with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

Trilacuna xinping Tong, Zhang & Li, sp. n.

<http://zoobank.org/C5A45139-711B-4978-9026-BE121DF236B2>

Figs 19–21, 23E–G, 25C, D, 26G

Type material. Holotype ♂ (SYNU-248), China, Yunnan Province, Yuxi City, Xinpíng County, Ailaoshan Natural Reserve, on the roadside from Jinshan bealock to the Ancient Tea Horse Road, 23°56'967"N, 101°30'270"E, 2283 m, 19.V.2011, Zongxu Li & Guchun Zhou. **Paratypes:** 5♀ (SYNU-249), same data as holotype.

Etymology. The specific name is a noun in apposition taken from the type locality.

Diagnosis. The new species is similar to *T. rastrum* Tong & Li, 2007, but males can be distinguished by the cluster of short setae (css) on posterior part of sternum (Fig. 19E), and the kidney-shaped palpal bulb (Fig. 23E, G), and the females by the absence of the transverse sclerite (tsc) of endogyne (Fig. 25D). *T. rastrum* males are lacking cluster of short setae on posterior part of sternum, and have pear shaped palpal bulb, and the females have the transverse sclerite (Tong and Li 2007: figs 6–10).

Description. Male (Holotype). Body yellow-brown, chelicerae and sternum lighter, legs yellow. Habitus as in Fig. 19A–C. Body length 1.74; carapace 0.81 long, 0.69 wide; abdomen 0.93 long, 0.64 wide. Carapace sides granulate. Eyes: ALE largest, PME smallest (Fig. 19D, G). ALE separated from edge of carapace by 1.1 diameters. Mouthparts as in Figs 19E, G, 26G. Sternum reticulated, with a cluster of short setae (css) posteriorly (Fig. 19E). Abdomen as in Fig. 19I. Leg spination (all spines longer than segment width): legs I–II: tibia: v2-2-2-2-0, metatarsus: v2-2-0. **Genitalia.** Sperm pore situated in front of anterior spiracles; with a small dark dot (ddo) between anterior and posterior spiracles, surrounded by rows of long setae (rls) (Fig. 19H, I). Palp (Figs 20, 23E–G): orange. Tip of cymbium with long setae, almost as long as cymbium. Bulb kidney-shaped. Embolus system (Fig. 20B, D, F), with ear-shaped projection at base (bep) and comb-shaped prolateral lobes (csl); with a lateral curved branch (lcb) and broad medial branch (bmb), the former (lcb) with a cluster of lateral “hairs” (lh), the latter (bmb) covered by numerous dorsal “hairs” (dbh).

Female. As in male except as noted. Habitus as in Fig. 21A–C. Slightly larger than male. Body length 1.91; carapace 0.81 long, 0.74 wide; abdomen 1.16 long, 0.76 wide. Endites unmodified; sternum without cluster of short setae on posterior area; ventral side of abdomen not elevated from lateral view. **Genitalia.** Ventral view (Fig. 25C): with recurved, strongly sclerotized arches (sar) anterior to the spiracles. Dorsal

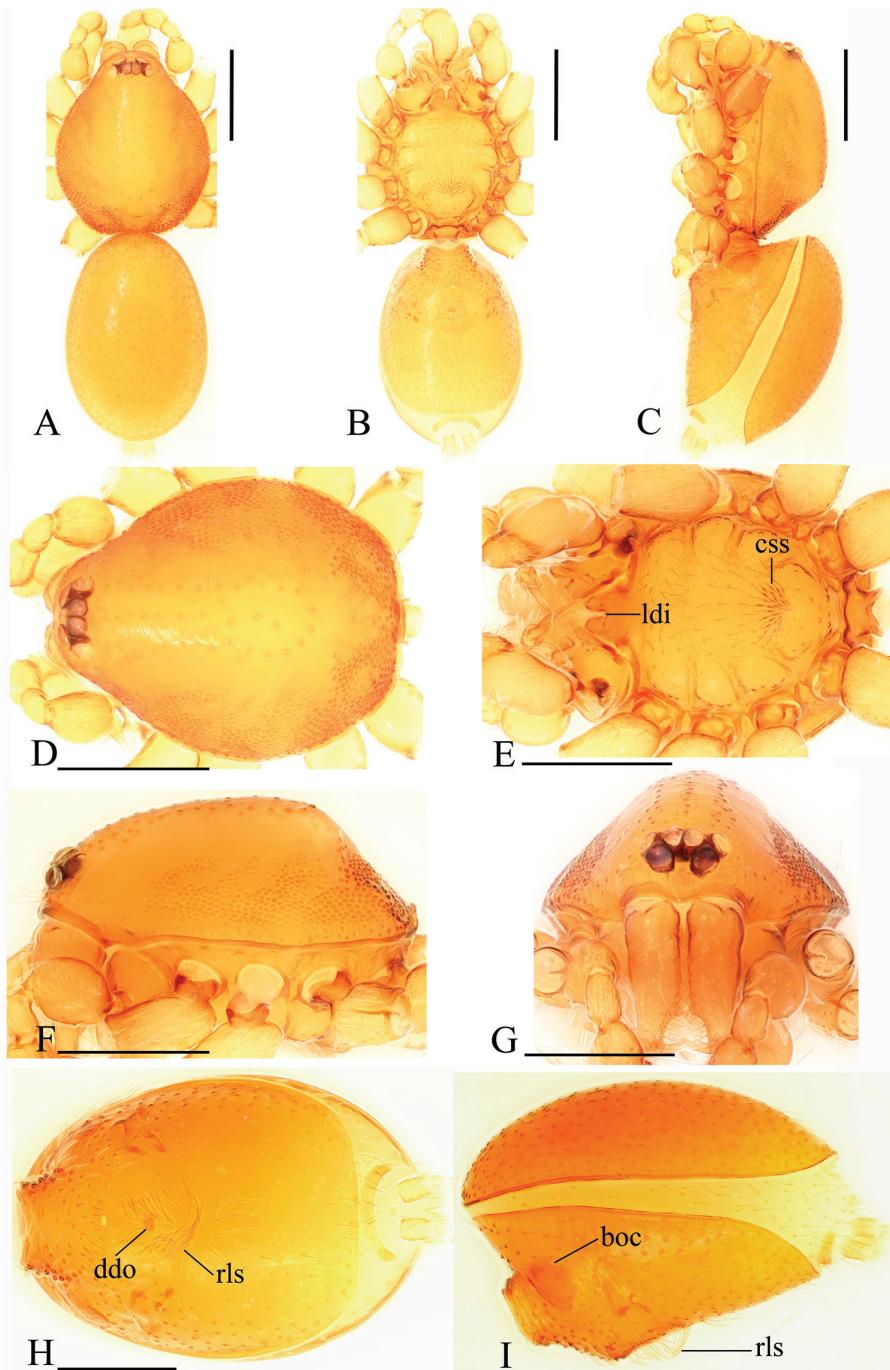


Figure 19. *Trilacuna xiping* sp. n., male. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views **H, I** abdomen, ventral and lateral views. Abbreviations: boc = booklung covers; css = cluster of short setae; ddo = dark dot; ldi = labium deep incision; rls = rows of long setae. Scale bars: 0.4 mm.

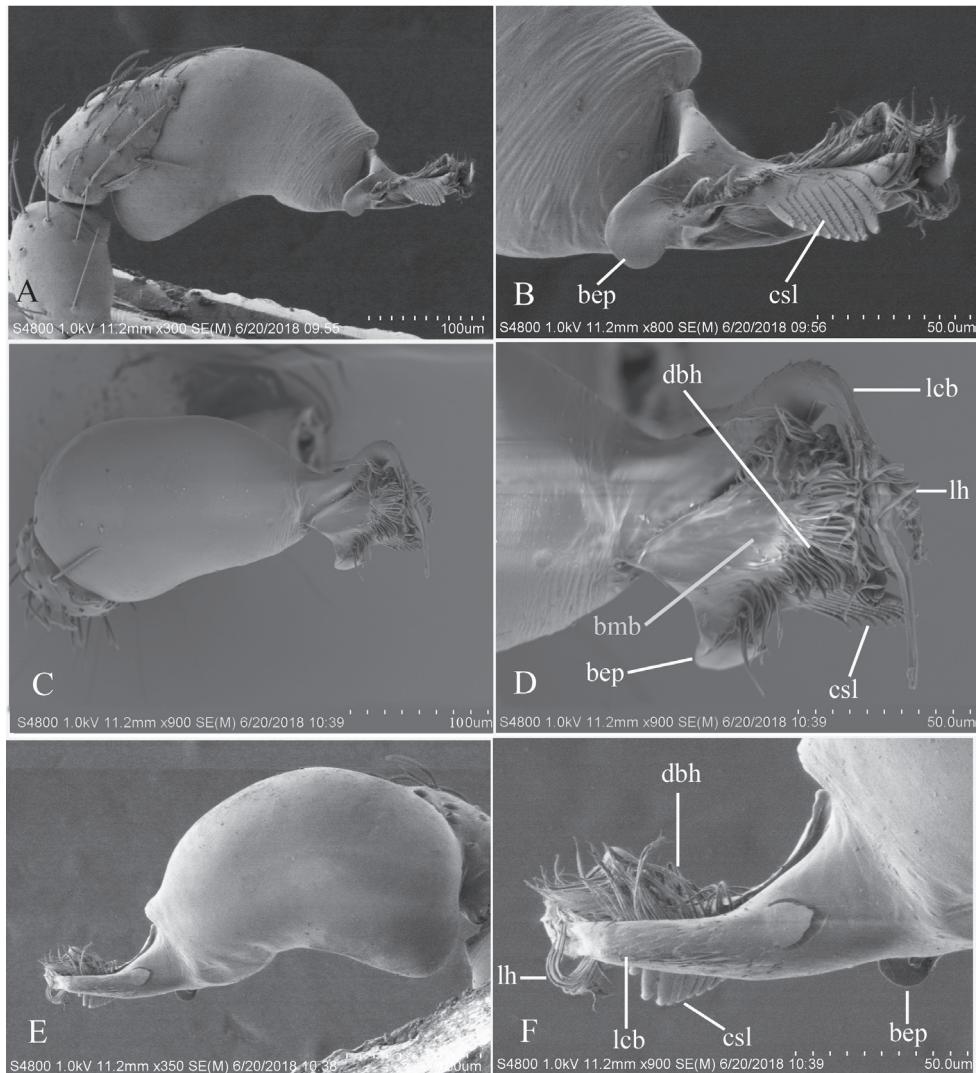


Figure 20. *Trilacuna xinping* sp. n., left male palp. **A** prolateral views **B, D, F** distal part of palpal bulb, prolateral, dorsal and retrolateral views **C, E** palpal bulb, dorsal and retrolateral views. Abbreviations: *bep* = basal ear-shaped projection; *bmb* = broad medial branch; *csl* = comb-shaped lobes; *dbh* = dorsal brush of “hairs”; *lcb* = lateral curved branch; *lh* = lateral “hairs”.

view (Fig. 25D): with an anterior T-shaped sclerite (as) and a posterior small globular structure (glo). Transverse sclerite (tsc) absent, transverse bars (tba) strongly arched, with two short, lateral apodemes (ap).

Distribution. Known only from the type locality.

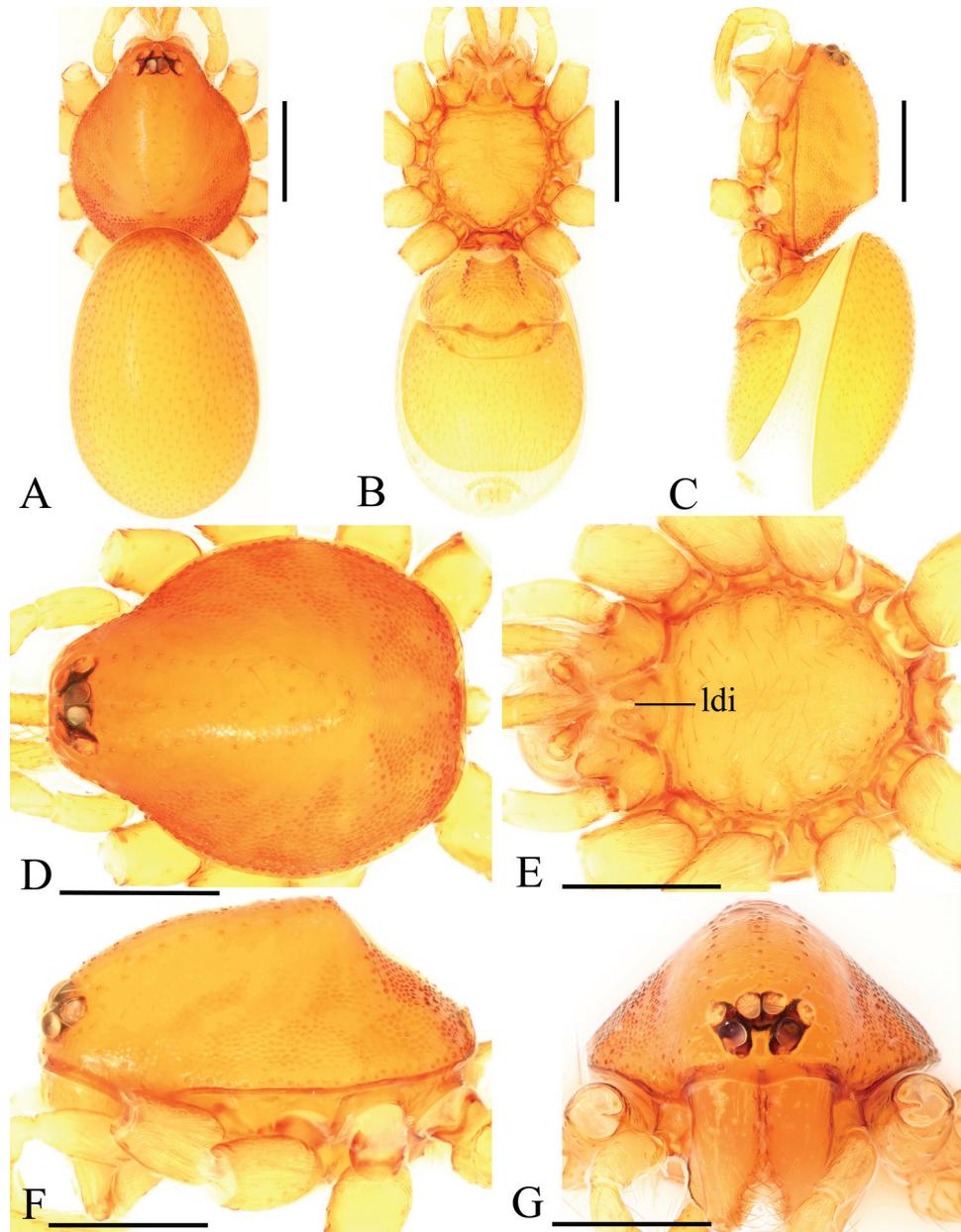


Figure 21. *Trilacuna xinping* sp. n., female. **A–C** habitus, dorsal, ventral and lateral views **D–G** prosoma, dorsal, ventral, lateral and anterior views. Abbreviation: ldi = labium deep incision. Scale bars: 0.4 mm.

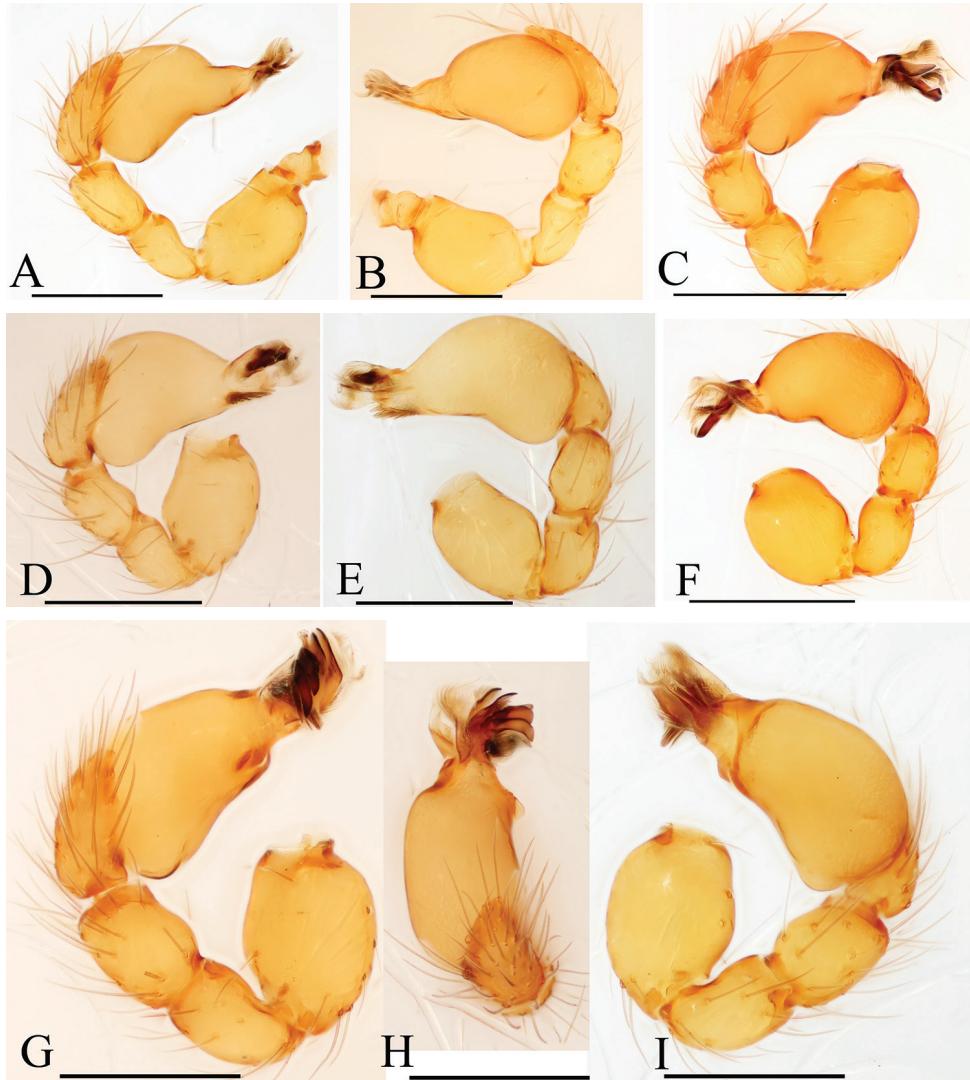


Figure 22. *Trilacuna* spp., male left palp. **A, B** *Trilacuna bawan* sp. n. **C, F** *Trilacuna datang* sp. n. **D, E** *Trilacuna fugong* sp. n. **G–I** *Trilacuna wuhe* sp. n. **A, C, D, G** prolateral views **B, E, F, I** retrolateral view **H** dorsal view. Scale bars: 0.2 mm.

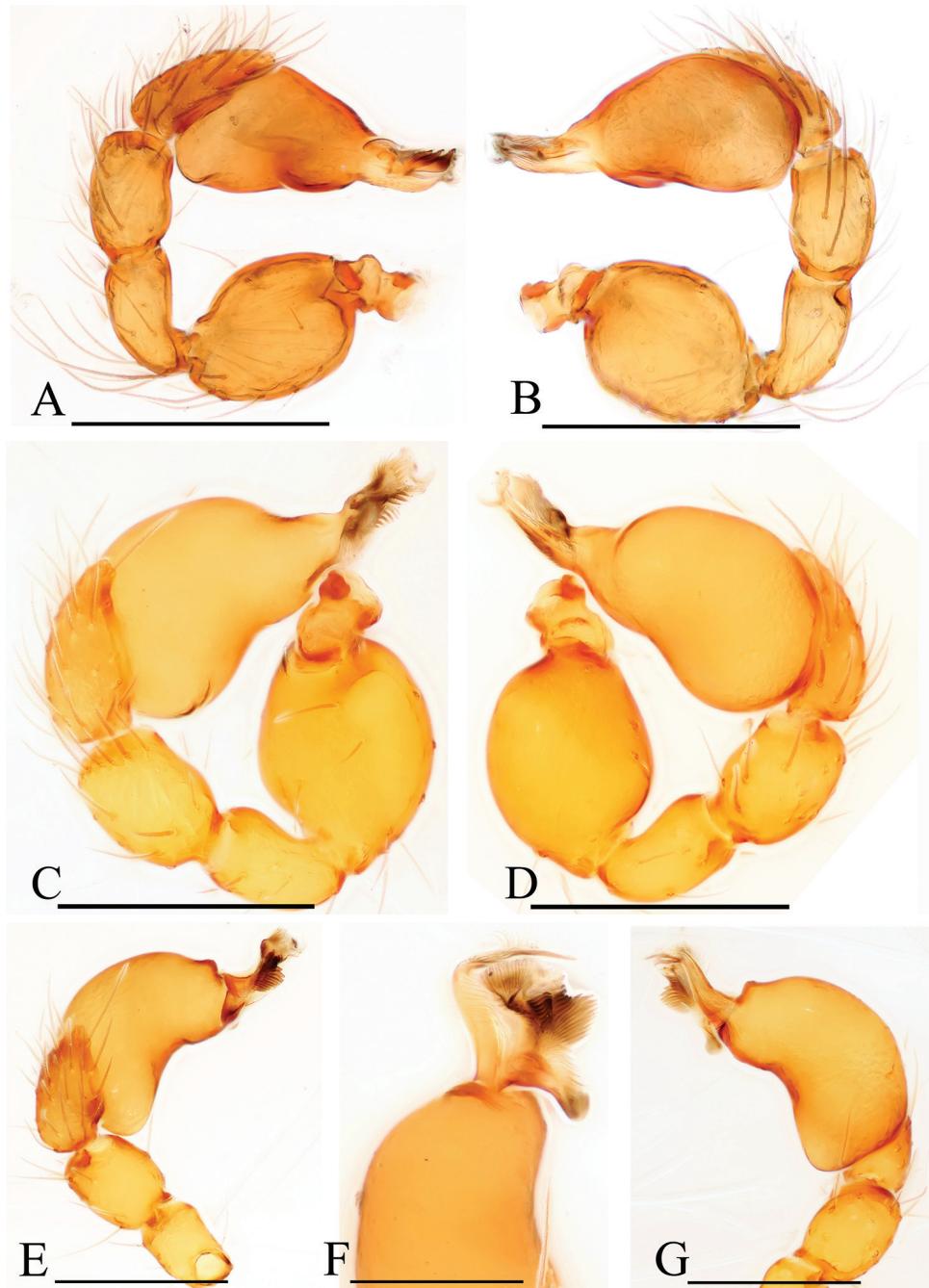


Figure 23. *Trilacuna* spp., male left palp. **A, B** *Trilacuna gongshan* sp. n. **C, D** *Trilacuna longling* sp. n. **E-G** *Trilacuna xiping* sp. n. **A, C, E** prolateral views **B, D, G** retrolateral view **F** dorsal view. Scale bars: 0.2 mm.

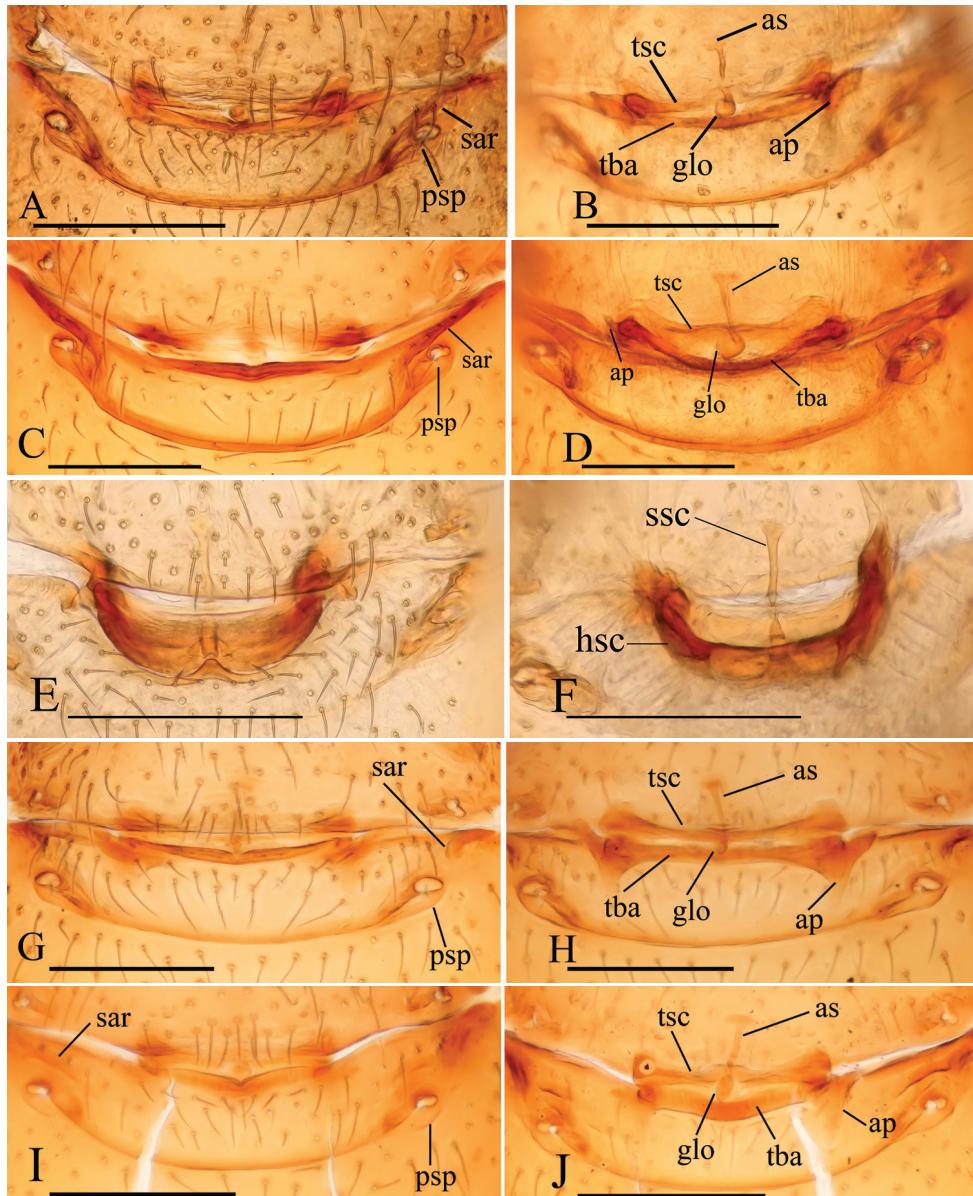


Figure 24. *Trilacuna* spp., female genitalia, ventral views. **A, B** *Trilacuna bawan* sp. n. **C, D** *Trilacuna datang* sp. n. **E, F** *Trilacuna fugong* sp. n. **G, H** *Trilacuna gongshan* sp. n. **I, J** *Trilacuna longling* sp. n. Abbreviations: ap = apodeme; as = anterior sclerite; glo = globular structure; hsc = horseshoe-shaped sclerite; psp = posterior spiracle; sar = sclerotized, recurved arches; ssc = stick-like sclerite; tba = transverse bars; tsc = transverse sclerite. Scale bars: 0.1 mm.

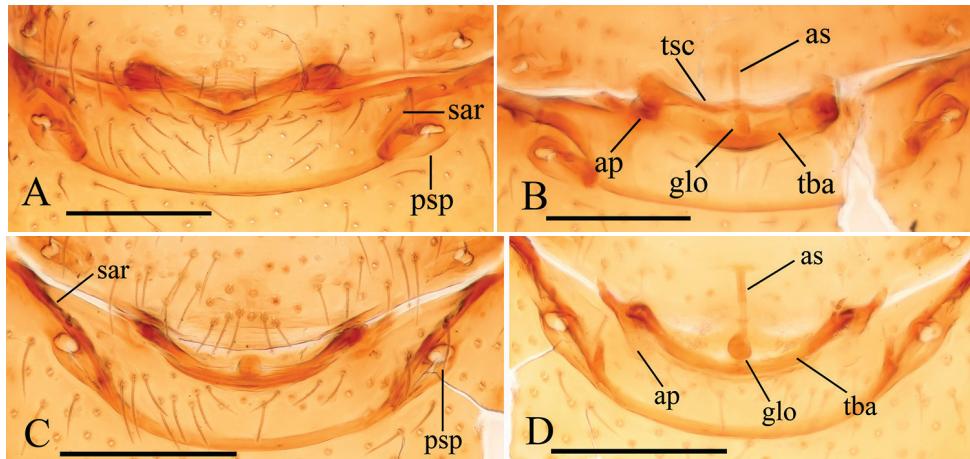


Figure 25. *Trilacuna* spp., female genitalia, ventral views. **A, B** *Trilacuna wuhe* sp. n. **C, D** *Trilacuna xinping* sp. n. Abbreviations: ap = apodeme; as = anterior sclerite; glo = globular structure; psp = posterior spiracle; sar = sclerotized, recurved arches; tba = transverse bars; tsc = transverse sclerite. Scale bars: 0.1 mm.



Figure 26. *Trilacuna* spp., male endites, ventral views. **A** *Trilacuna bawan* sp. n. **B** *Trilacuna datang* sp. n. **C** *Trilacuna fugong* sp. n. **D** *Trilacuna gongshan* sp. n. **E** *Trilacuna longling* sp. n. **F** *Trilacuna wuhe* sp. n. **G** *Trilacuna xinping* sp. n. Abbreviations: dpr = distal projection; sdb = slightly curved distal branch. Scale bars: 0.1 mm.

Acknowledgements

We thank Yuri Marusik, Nadine Dupérré, and Akio Tanikawa for providing constructive comments on an earlier version of the manuscript. This study was supported by the National Natural Science Foundation of China (NSFC-31572237, 31750002) to Yanfeng Tong, by the National Natural Science Foundation of China (NSFC-31672278) to Zhisheng Zhang, and by the National Natural Science Foundation of China (NSFC-31530067) to Shuqiang Li.

References

- Eichenberger B, Kranz-Baltensperger Y (2011) New *Trilacuna* species from Thailand, Malaysia and Sumatra (Araneae, Oonopidae). Zootaxa 2823: 1–31.
- Grismado CJ, Deeleman-Reinhold CL, Piacentini LN, Izquierdo MA, Ramírez MJ (2014) Taxonomic review of the goblin spiders of the genus *Dysderoides* Fage and their Himalayan relatives of the genera *Trilacuna* Tong and Li and *Himalayana*, new genus (Araneae, Oonopidae). Bulletin of the American Museum of Natural History 387: 1–108. <https://doi.org/10.5531/sd.sp.1>
- Jocqué R, Dippenaar-Schoeman AS (2006) Spider Families of the World. Musée Royal de l'Afrique Central, Tervuren, 336 pp.
- Li S, Quan R (2017) Taxonomy is the cornerstone of biodiversity conservation – SEABRI reports on biological surveys in Southeast Asia. Zoological Research 38(5): 213–214. <https://doi.org/10.24272/j.issn.2095-8137.2017.061>
- Seo BK (2017) Four new species of the genera *Trilacuna*, *Orchestina* and *Hahnia* of the families Oonopidae and Hahniidae (Araneae) from Korea. Korean Journal of Environmental Biology: 35, 184–190. <https://doi.org/10.11626/KJEB.2017.35.2.184>
- Tong Y, Li S (2007) One new genus and four new species of oonopid spiders from Southwest China (Araneae: Oonopidae). Annales Zoologici, Warszawa 57: 331–340.
- Tong Y, Li S (2015) One new genus and two new species of oonopid spiders from Xishuangbanna Rainforest, southwestern China (Araneae, Oonopidae). ZooKeys 494: 1–12. <https://doi.org/10.3897/zookeys.494.9183>
- Tong Y, Guan X, Li S (2018) Two new species of the genus *Trilacuna* from Chongqing, China (Araneae, Oonopidae). ZooKeys 771: 41–56. <https://doi.org/10.3897/zookeys.771.23158>
- Ubick D, Dupérré N (2017) Oonopidae. In: Ubick D, Paquin P, Cushing P, Roth V (Eds) Spiders of North America: an Identification Manual, 2nd Ed. American Arachnological Society, 181–182.
- World Spider Catalog (2019) World Spider Catalog. Version 19.5. Natural History Museum Bern. <http://wsc.nmbe.ch> [accessed on 15 January 2019]

Redescription of the forgotten New Caledonian weevil genus *Callistomorphus* Perroud, 1865 (Coleoptera, Curculionidae, Eugnomini) with descriptions of eight new species

Miłosz Adam Mazur¹

¹ Institute of Biology, University of Opole, Oleska 22, 45–052 Opole, Poland

Corresponding author: Miłosz Adam Mazur (milosz@uni.opole.pl)

Academic editor: M. Alonso-Zarazaga | Received 10 August 2018 | Accepted 7 January 2019 | Published 31 January 2019

<http://zoobank.org/2EF1F944-B9FF-4CFD-9DD7-5F47808CB7B8>

Citation: Mazur MA (2019) Redescription of the forgotten New Caledonian weevil genus *Callistomorphus* Perroud, 1865 (Coleoptera, Curculionidae, Eugnomini) with descriptions of eight new species. ZooKeys 821: 45–83. <https://doi.org/10.3897/zookeys.821.29019>

Abstract

Callistomorphus is one of the “forgotten” genera of the tribe Eugnomini inhabiting rain forest in New Caledonia. In this paper, the genus *Callistomorphus* and the type species *C. farinosus* are redescribed. Eight new species, *Callistomorphus fundatus* sp. n., *C. gibbus* sp. n., *C. malleus* sp. n., *C. minimus* sp. n., *C. rutai* sp. n., *C. szoltysi* sp. n., *C. torosus* sp. n. and *C. turbidus* sp. n., are described, originating from the main island of New Caledonia. Illustrations and SEM photographs of the external morphology and the male and female terminalia are provided, as well as dorsal habitus colour photographs of the adults, a key to the species, a distribution map, and a discussion of the systematic position of *Callistomorphus* within the tribe.

Keywords

Beetles, biodiversity, endemic species, New Caledonia, new taxa, taxonomy, weevils

Introduction

For many years, only three genera of Eugnomini from New Caledonia were known: *Pactola* Pascoe, 1876, with two species (a third was synonymised by Mazur (2014)), originally placed in the genus *Macropoda* Montrouzier, 1861 (see Mazur 2014);

Acanthopterus Faust, 1889, with seven species (recently transferred to the tribe Aterpini by Kuschel (2014)); and a monotypic genus *Callistomorphus* Perroud, 1865.

Lacordaire (1863) established two groups for genera currently placed in Eugnomini (Alonso-Zarazaga and Lyal 1999): Eugnomides (as species group No. V within the Erirrhinidae) for the genera *Eugnomus* Schoenherr, 1847, *Hypselus* Schoenherr, 1843 (now in the tribe Erirhinini), *Rhopalomerus* Blanchard, 1849, *Stephanorhynchus* White, 1846, *Meriphus* Erichson, 1842, *Ophthalmoborus* Schoenherr, 1843 (now a synonym of *Anthobius* Schoenherr, 1833 (Derelomini)), *Phyllotrox* Schoenherr, 1843 (now in the tribe Derelomini) and *Brachonyx* Schoenherr, 1825 (now in the tribe Anthonomini); and Scoloptérides (as a tribe) for one genus – *Scolopterus* White, 1846.

Callistomorphus was described three years after the fundamental work of Lacordaire was published (Perroud and Montrouzier 1865). Although both Perroud and Montrouzier are stated as being authors, the descriptions of all Curculionidae, including the new genus and species *C. farinosus*, were written only by Perroud. This is evidenced by Perroud's comment in this paper, and the fact that the text was written in the first person singular (see comment on page 248 in Alonso-Zarazaga and Lyal 1999). The new genus and species were classified as Eugnomides (sensu Lacordaire), closely related to *Stephanorhynchus*.

Since that time, the systematic position of the genus *Callistomorphus* has not been discussed in detail. In Junk's "Coleopterorum Catalogus" (Pars, 140) (Klima 1934), the genus was clearly placed in Eugnomini (at that time, a subdivision of the Erirhininae); subsequently, the genus was practically forgotten and ignored by further researchers.

It is probable that Voss, who studied the Eugnomini in the 1930s and gave them subfamily status, did not examine any *Callistomorphus* specimens. He mentioned the genus only once (1937), vaguely indicating its similarity to the genus *Macropoda* (now a synonym of *Pactola*, see above). Subsequently, he pointed out the necessity for a closer examination of the genus and its affiliation to Stephanorhynchina, which was the species group established by him one year earlier (Voss 1936) for two genera: *Stephanorhynchus* and *Hoplocneme* White, 1846 (including neither *Callistomorphus* nor *Macropoda*). It is likely that Voss examined only species from New Zealand, and that his comparisons were based on the original description of *Callistomorphus* with no specimens at hand.

A more detailed study of the Eugnominae was carried out by Marshall (1937). He introduced a more comprehensive diagnosis to the subfamily established by Voss, and he drew up a key for the New Zealand genera. He also considered the Australian genus *Meriphus* Erichson, 1842 and some of its relatives, and established the new subfamily Meriphinae for them. Additionally, he added comments on the other genera of Eugnomini, e.g. Chilean *Rhopalomerus* (currently also known from New Zealand); but again, *Callistomorphus*, as well as *Macropoda*, were not mentioned in this work.

Another comprehensive taxonomic paper on the Eugnominae was that of Cawthra (1966). He examined most of the known genera, redefined the subfamily, and summarised the available information about the biology and distribution of the studied species. This author also drew up a key for genera not considered by Marshall (those known from outside New Zealand). Once again, *Callistomorphus* was not included in the study and was mentioned only as: "a genus occurring in New Caledonia, not included

in Marshall's key and, according to the original description of Perroud, very similar to Stephanorrhynchus White, from which it differs by the fact that its rostrum is three times, not twice, as long as the head".

May (1993) analysed in detail the morphology of the larvae from six genera of Eugnominae and revised the status of the subfamily to a tribe with two subtribes – Eugnomina Lacordaire, 1863 and Meriphina Marshall, 1937. This state of affairs was confirmed by Alonso-Zarazaga and Lyal (1999).

In this paper, a redescription of the genus *Callistomorphus* is presented, as well as descriptions of eight new species from New Caledonia, along with a key to all the species within the genus and comments about the taxonomic position of the genus within the tribe.

Materials and methods

This study is based on 26 specimens. Holotypes are deposited in the Muséum National d'Histoire Naturelle, Paris (MNHN). Paratypes are deposited in the Museum of Natural History, University of Wrocław, Poland (MNHW) and in the Natural History Department of Upper Silesian Museum, Bytom, Poland (USMB).

Measurements were made using a calibrated stereomicroscopic grid eyepiece (C-W10xB/22) in a Nikon SMZ-800 stereomicroscope. Genitalia preparations were made according to the standard method of macerating the separated abdomen for 5–10 min in a warm KOH solution. After dissection, if necessary, terminal structures were stained with a solution of Chlorazol Black E in glycerine for 5–10 min under visual control. Habitus photographs were taken using a Canon Power Shot A640 camera connected with the stereomicroscope and processed using the Helicon Focus v. 4.50 and Photo-Filtre v. 6.1 software programmes. All drawings were made by using the Corel Draw package. Scanning electron micrographs were taken using a Hitachi S-3400N.

The nomenclature of the male terminalia and abbreviations of particular measurements (partly modified) follows Wanat (2001):

- al** abdomen length (measured through the middle of ventrites);
- apw** pronotum width at anterior margin;
- arw** width of rostrum apex;
- aw** abdomen maximum width;
- bew** width of elytral base (measured through the middle of humeral calli);
- bpw** pronotum width at the base;
- el** elytra length (measured in top view in a position when the base and apex of elytra are at the same level);
- eyl** eye length (measured in top view, when the head is positioned horizontally);
- frw** minimum frons width;
- hl** head length (measured in top view, from anterior edge of pronotum to fore margin of eyes);

- hw** head width (measured across the middle of the eyes);
lb length of body exclusive of rostrum;
lvl last ventrite length (measured through the middle);
lww last ventrite maximum width;
mpw minimum pronotal width;
pl pronotum length (measured through the middle);
rl rostrum length, measured in dorsal view, when base and apex of rostrum are at the same level;
scl antennal scape length.

All dimensions are given in millimetres.

The distribution maps (Fig. 145) use a base map obtained from the Demis World Maps Service, open source (<http://www2.demis.nl/worldmap/mapper.asp>).

Taxonomy

Genus *Callistomorphus* Perroud, 1865

Callistomorphus Perroud, 1865: Perroud and Montrouzier 1865 [1864-misprint]: 169 (description); Gemminger and Harold 1871: 2449 (catalogue); Marschall 1873: 178 (catalogue); Scudder 1882: 49 (catalogue of generic names in zoology); Klima 1934: 80 (catalogue); Alonso-Zarazaga and Lyal 1999: 79 (catalogue).

Type species: *Callistomorphus farinosus* Perroud, 1865 (by monotypy).

Diagnosis. Distinguished from other genera of Eugnominini by the following combination of characters: rostrum elongate, longer than pronotum alone, but shorter than head and pronotum taken together; in dorsal view with distinct, polished longitudinal carina. Mandibles elongate, distinctly protruding beyond apical margin of rostrum, not exodont, overlapping. Head behind eyes distinctly constricted. Pronotum strongly narrowed before apical part with pair of various developed tubercles near middle of length. Elytra strongly scabrous with numerous, small tubercles and pair of large, elongate tubercles near middle of length (next as “middle tubercles”). Legs elongate, all femora strongly broadened, with distinct, enlarged tooth that is usually larger than half of maximum femoral width; all tibiae distinctly sinuate, without mucro in male; tarsal claws free at base, glabrous, only regularly extended basally.

Redescription. Body length (lb) – 7.20–14.70 mm.

Body colour and vestiture (Figs 13–21). Entire body covered with strictly adjoining, small, elongate scales. Colour variable but general patterns appear stable in some species (e.g. *C. farinosus* Perroud). Middle of elytra usually with paler spot between the 7th and 11th elytral intervals and usually extending from one-third to two-thirds of elytral length, though sometimes shorter.

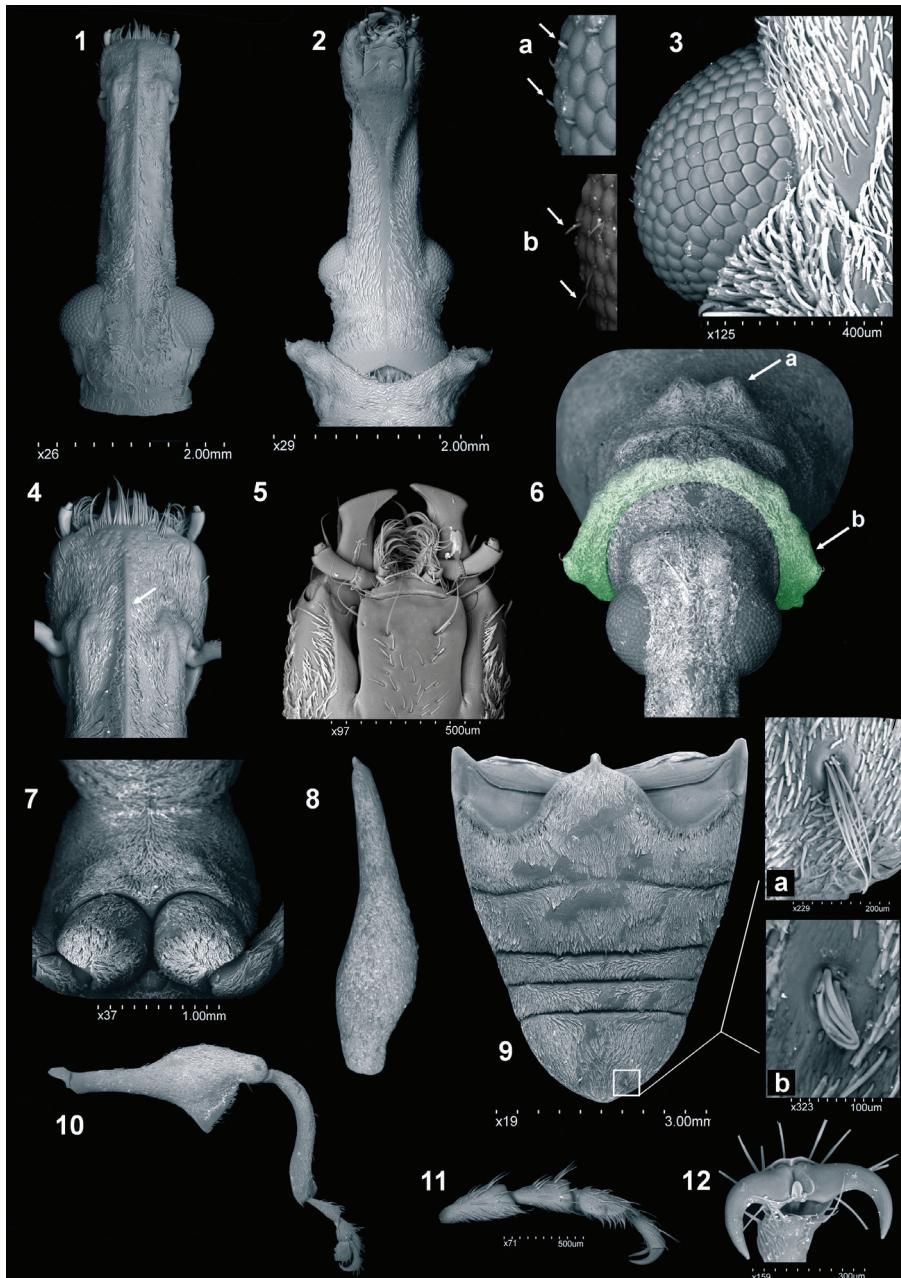
Rostrum (Figs 1, 2, 4, 5, 58–75). Elongate, almost as long as head and pronotum taken together; medially in most species with distinct longitudinal carina (Fig. 4) reaching almost to hind margin of eyes, slightly to distinctly curved in lateral view (Figs 58–66), maximum width at apical portion between antennal insertion and apex, slightly narrowing from antennal insertion to base. *Scrobes* partially visible in dorsal view (Fig. 4); in lateral view visible to about two-thirds of length; in ventral view dilated, not connected, evanescent before fore margin of eyes (Fig. 2). *Antennae* elongate; scape reaches beyond front margin of eye, funicle 7-segmented, club elongate (Figs 67–75). *Mouthparts* (Fig. 5) with elongate, flexible maxillae, reaching distinctly beyond front margin of rostrum; maxillary palpi 3-segmented, second maxillary palpomere distinctly elongate, third segment very short. Labial palps three-segmented, third palpomere very small, slightly protruding from second palpomere. Mentum short and wide, 3–4 × wider than long. Submentum slightly longer than wide. Mandibles strongly elongate, distinctly protruding beyond edge of rostrum; overlapping, with one apical incisor; outer edge gently rounded inwardly; inner edge smooth, without teeth.

Head (Figs 1, 2, 3a, b, 6, 58–66, 76–84). Subquadrate to transverse, distinctly narrowed behind eyes. Vertex usually with a pair of small tubercles, each furnished with bundle of scales. Eyes slightly to strongly convex, only in *C. minimus* sp. n. protruding above margin of head in lateral view; setae between some ommatidia short (shorter than diameter – e.g. in *C. fundatus* sp. n.) or elongate (longer than diameter – e.g. in *C. gibbus* sp. n.). Gular suture in most species visible.

Pronotum (Figs 6a, b, 40–57). With characteristic shape: broadest at base, distinctly narrowed to more or less two-thirds of length and strongly expanded apically (except *C. minimus* sp. n.). Apical margin in most species strongly scabrous with a few (8–10) tubercles on dorsal and lateral edge; anterior surface of pronotum forming distinct flat wall (visible in anterior view) (Fig. 6b). In lateral view, a pair of conspicuously protruding or flattened tubercles are present near midpoint (Figs 6a, 49–57). Anterior area, in lateral view, with transverse groove and sparse, shallow punctures (Figs 49–57).

Elytra (Figs 22–39). Longer than wide (el/bew 1.47–1.68) with eleven intervals. Widest at base, through the middle of well-developed humeral calli; lateral margins subparallel to ca. fourth-fifths of length before strongly narrowing to apex. Third interval, near middle of length, with distinct tubercle (except *C. minimus* sp. n.); height of the tubercle subequal to width of two or three intervals, the length more or less from one-third to one-quarter length of elytra. Intervals convex, in some species intervals 3, 5, 7, 9 more convex with numerous, irregular, small tubercles (flattened or acuminate). Seventh interval narrowed on short distance behind humeral angles, apically with more or less distinct tubercle (next as – posterior calli), protruding beyond outline of elytra in dorsal view (except *C. minimus* sp. n.); 9th interval behind humeral angles weakly protruding, clearly visible in dorsal view on this section.

Legs (Figs 7, 8, 10, 11, 12). Fore coxae contiguous (Fig. 7). Femora elongate at base and strongly broadened medially with enlarged tooth (Figs 8, 10). Tooth on fore femora with margins and apex obtuse, middle and hind with apex acute and sharp



Figures 1–12. General morphology of *Callistomorphus*: **1** *C. farinosus* Perr., head and rostrum, dorsal view **2** *C. malleus* sp. n., head and rostrum ventral view **3** *C. fundatus* sp. n., ventral view of eye with magnification of setae between ommatidia (**a** *C. fundatus* sp. n., **b** *C. gibbus* sp. n.) **4** *C. farinosus* Perr., apical part of rostrum with antennal insertion, dorsal view **5** *C. turbidus* sp. n., mouth parts **6** *C. gibbus* sp. n., head and pronotum, frontodorsal view; a medial tubercles on pronotum, b thickened front “wall” of pronotum (greened) **7** *C. rutai* sp. n., fore coxae **8** *C. gibbus* sp. n., hind femur, dorsal view **9** *C. fundatus* sp. n., abdomen **a** *C. torosus* sp. n. **b** *C. fundatus* sp. n., apical setae on last ventrite **10** *C. malleus* sp. n., hind leg, lateral view **11** *C. turbidus* sp. n., hind tarsus **12** *C. rutai* sp. n., tarsal claws.

outer edge. All tibiae elongate, slender, distinctly sinuate (Fig. 10). Tarsi elongate, as long as $0.5 \times$ length of tibiae; first tarsomere slightly longer than second, second and third of similar length. Claws untoothed, broadened basally (Figs 11, 12).

Abdomen (Figs 9a, b, 85–93, 101–107, 127–131). Subquadrate to longer than wide, al/aw 0.93–1.20. First suture fused medially, sometimes obsolete; sutures between ventrites 2–5 strongly depressed. Last ventrite short (except *C. fundatus* sp. n.) apically with pair of bundled, erect setae (Fig. 9a, b); in most species with shallow depressions laterally and apically between pair of erect setal tufts. Margin of last ventrite usually with distinct, sharp edge (Fig. 91). Pygidium concealed by elytra; in male generally subquadrate (Figs 101–107); in female wider than its length (Figs 127–131).

Male terminalia (Figs 94–100, 108–121). Penis (Figs 94–100) well sclerotised, distinctly curved in lateral view; basal piece (apodemal bridge) from weakly (e.g. *C. farinosus*) to fully sclerotised (e.g. *C. turbidus* sp. n.).

Apodemes shorter than penis body; basally narrow, than distinctly extended, laterally flattened.

Tegmen (Figs 108–114). With elongate apodeme, parameroid lobes divided in different ways (detailed in description of species).

Spiculum gastrale (Figs 115–121). With elongate apodeme and divided base. Hemisternites strongly sclerotised, in most species directly connected with base of spiculum.

Female terminalia (Figs 122–126, 132–144). Abdominal tergite VIII (Figs 122–126) usually subtriangular with maximum width at base (exception – *C. farinosus*). Lateral edges with conspicuous, strongly elongate setae. Spermatheca (Figs 132–134) strongly curved. Abdominal sternite VIII (Figs 135–139) with elongate apodeme and well-developed apical lobe with species-specific patterns of sclerotisation. Lateral edges of apical lobe with short, erect setae. Ovipositor (Figs 140–144) with elongate gono-coxite; styli elongate, apically with one or two bundles of elongate setae.

Sexual dimorphism. *Callistomorphus* is a genus with a very indistinct sexual dimorphism. Specimens within particular species vary in size and proportion of the body and values of these parameters overlap each other (Tab. 1). Both sexes have a similar last ventrite; length of rostrum and proportion of elytra are not diagnostic.

Distribution. The genus is endemic in New Caledonia, known only from the main island, Grande Terre. Localities where particular species were collected are shown in Fig. 145.

Biology. The detailed biology of species is unknown. Although other members of Eugnomini have been reared from dead wood, subcortical tissues, live stems, galls, and the leaves or fruits of many species of plants from different families (e.g. May 1987, Mazur et al. 2016), specimens of *Callistomorphus* were collected by beating or by sifting from the litter. Many species are suspected to have nocturnal activity, often being collected using light traps or by beating vegetation at night (see the data from the labels). According to the label data and the personal comments of Marek Wanat, members of the genus are most commonly found on plant leaves in humid and rain forest growing on limestone and/or ultramafic rocks (Bonvallot et al. 2013), some of them only at altitudes exceeding 500 metres above sea level.

Remarks. Members of the genus are variable in terms of their size, body proportions and colour. However, they are separated from the other genera of the tribe by

Table 1. Indices for species of *Callistomorphus* Perr., where: m – male, f – female.

	<i>C. farinosus</i>	<i>C. fundatus</i>	<i>C. gibbus</i>	<i>C. malleus</i>	<i>C. minimus</i>	<i>C. rutai</i>	<i>C. szoltysi</i>	<i>C. torosus</i>	<i>C. turbidus</i>
hw/hl	m: 1.07 f: 1.00–1.10	m: 1.07	m: 1.00–1.20 f: 1.00–1.33	m: 1.00–1.20 f: 0.45–0.55	f: 1.17	m: 1.08	f: 1.08	m: 0.92 f: 1.00	m: 0.92
eyl/hl	m: 0.50–0.53 f: 0.47–0.53	m: 0.43	m: 0.45–0.55 f: 0.45–0.55	m: 0.50–0.60	f: 0.56	m: 0.50	f: 0.50	m: 0.38 f: 0.46	m: 0.42
rl/pl	m: 1.09–1.12 f: 1.03–1.11	m: 1.04	m: 1.00–1.12 f: 1.12–1.24	m: 1.17–1.21	f: 1.21	m: 1.20	f: 1.20	m: 1.12 f: 1.07	m: 1.11
rl/arw	m: 4.00–4.22 f: 3.67–4.00	m: 3.38	m: 3.00–3.17 f: 4.00–4.50	m: 3.80–4.30	f: 3.40	m: 4.00	f: 3.35	m: 3.50 f: 3.33	m: 2.86
scl/rl	m: 0.74–0.78 f: 0.82–0.83	m: 0.85	m: 0.82–0.90 f: 0.70–0.85	m: 0.75–0.80	f: 0.76	m: 0.80	f: 0.80	m: 0.82 f: 0.83	m: 0.75
bpw/pl	m: 0.97–1.03 f: 0.97–1.00	m: 1.04	m: 1.06–1.15 f: 0.95–1.10	m: 1.00–1.05	f: 1.21	m: 1.08	f: 1.20	m: 1.04 f: 1.11	m: 1.17
bpw/apw	m: 1.46–1.52 f: 1.55–1.64	m: 1.35	m: 1.26–1.47 f: 1.28–1.38	m: 1.25–1.35	f: 1.70	m: 1.35	f: 1.43	m: 1.30 f: 1.35	m: 1.24
mpw/apw	m: 0.71 f: 0.70–0.73	m: 0.65	m: 0.63–0.71 f: 0.61–0.69	m: 0.66–0.68	f: 0.90	m: 0.65	f: 0.67	m: 0.65 f: 0.61	m: 0.59
mpw/bpw	m: 0.47–0.49 f: 0.45–0.49	m: 0.48	m: 0.48–0.50 f: 0.48–0.50	m: 0.48–0.53	f: 0.53	m: 0.45	f: 0.47	m: 0.50 f: 0.45	m: 0.48
el/bew	m: 1.52 f: 1.48–1.58	m: 1.65	m: 1.48–1.55 f: 1.50–1.68	m: 1.56–1.66	f: 1.68	m: 1.55	f: 1.55	m: 1.51 f: 1.55	m: 1.47
al/aw	m: 1.04–1.06 f: 1.02–1.06	m: 1.18	m: 0.94–1.20 f: 1.06–1.20	m: 1.08–1.17	f: 1.15	m: 1.05	f: 0.98	m: 1.00 f: 0.93	m: 1.06
lvw/lvl	m: 2.20–2.50 f: 2.33–2.55	m: 1.75	m: 2.14–2.37 f: 2.13–2.38	m: 2.25–2.57	f: 2.60	m: 2.75	f: 2.27	m: 2.56 f: 2.78	m: 2.13

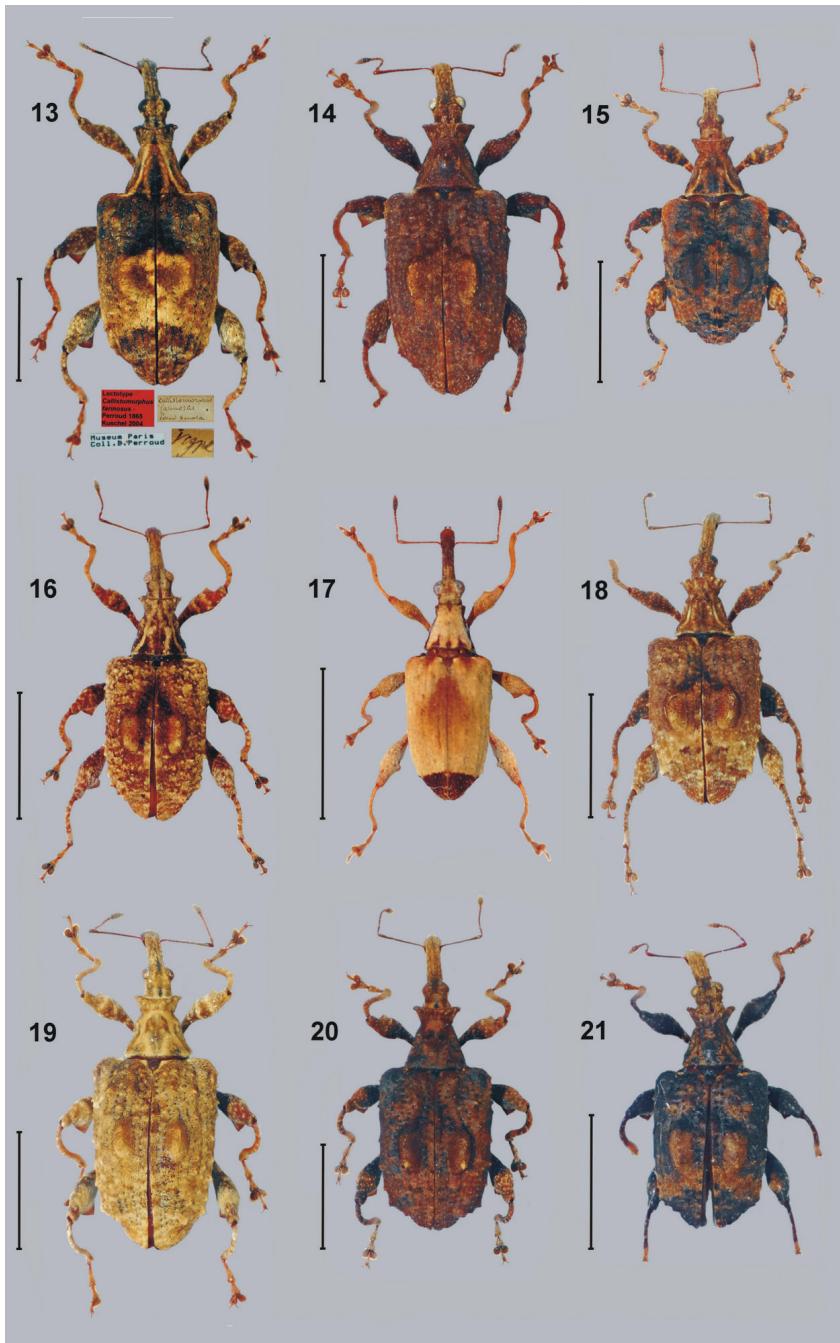
the set of characters presented in the above diagnosis. Many of the species are also the biggest members of the tribe. Despite their large size and characteristic body form, members of this genus are not common in museum collections or in the field. For example, during the French fieldwork conducted in the 1980s and 1990s, where fogging and standard collecting methods were used (pers. com. Hélène Perrin), no single specimen of *Callistomorphus* was found (see the label data of the specimens deposited in MNHN); fewer than 30 specimens of the genus were recently collected during three Polish expeditions (2006, 2008 and 2010) where a wide range of collecting methods (beating vegetation at night and day, sifting, sweep netting, light traps) were used. Most of these specimens represent new species which are described in this paper.

Callistomorphus farinosus Perroud, 1865

Figures 1, 4, 13, 22, 31, 40, 49, 58, 67, 76, 85, 94, 101, 108, 115, 122, 127, 132, 135, 140

Callistomorphus farinosus Perroud, 1865: 170, pl. 1, fig. 7

Diagnosis. The largest member of the genus. Last three antennomeres of funicle wider than long. Apical margin of pronotum widely concave medially in dorsal view. Elytra



Figures 13–21. Dorsal habitus colour photographs of New Caledonian species from the genus *Callistomorphus*: **13** *C. farinosus* Perr., lectotype, female with original labels **14** *C. fundatus* sp. n., male, holotype **15** *C. gibbus* sp. n., holotype, male **16** *C. malleus* sp. n., paratype, female **17** *C. minimus* sp. n., holotype, female **18** *C. rutai* sp. n., holotype, male **19** *C. szoltysi* sp. n., holotype, female **20** *C. torosus* sp. n., paratype, female **21** *C. turbidus* sp. n., holotype, male. Scale bar = 5 mm.

with characteristic whitish spot in the area from medial tubercles to 7th intervals, not reaching apical part. Penis body distinctly, regularly narrowed from base to apex in lateral view. Parameroid lobes of tegmen slightly divided apically. Female abdominal tergite VIII with maximum width near middle.

Redescription. Body length (lb) – 12.80–14.70 mm.

Body colour and vestiture (Fig. 13). As stated in diagnosis, whitish spot on elytra is clearly visible on generally darker ground coloration. Some specimens with T- or X-shaped blackish spot on elytra, extending from base to medial tubercles. Pronotum with distinct, light, oblique lines. All studied additional specimens also with distinctly lighter hind legs than lectotype. Darker area at apical part of elytra sometimes with transverse stripe of paler scales.

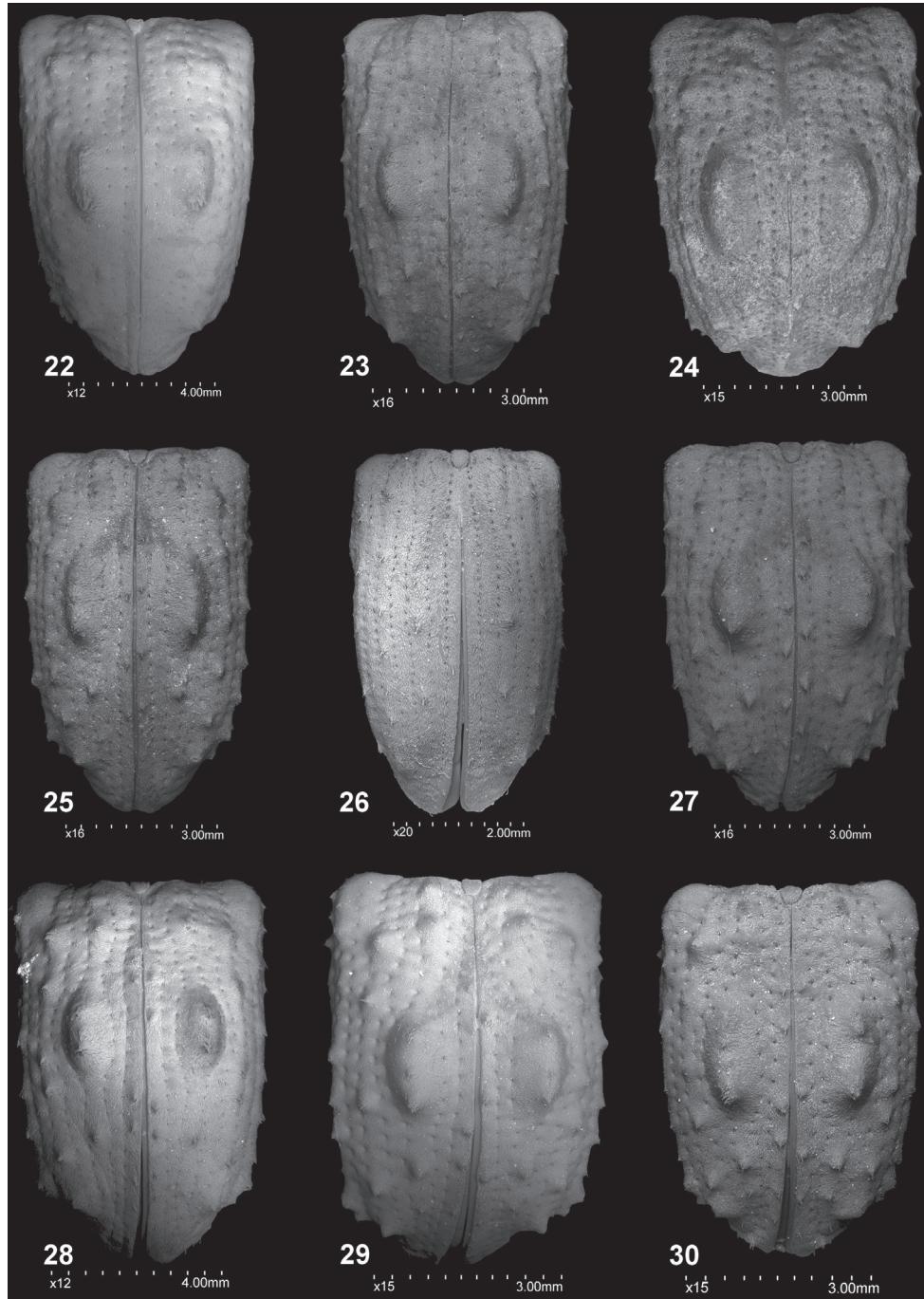
Head (Figs 1, 4, 58, 67, 76). Subquadrate to slightly longer than wide (hw/hl ♂: 1.07; ♀: 1.00–1.10). Frons as wide as 2 × width of eye in dorsal view. Eyes approximately as long as half-length of head (eyl/hl ♂: 0.50–0.53; ♀: 0.47–0.53), not protruding above margin of head in lateral view. Rostrum slightly longer than pronotum (rl/pl ♂: 1.09–1.12; ♀: 1.03–1.11), 3.50–4.10 × as long as width of rostrum apex; distinct, polished carina on entire length; regularly curved in lateral view. Scape shorter than rostrum (scl/rl = ♂: 0.74–0.78; ♀: 0.82–0.83). First funicle segment ca 1.8 × as long as 2nd, and almost as long as 2nd and 3rd taken together; 3rd shorter than 2nd; from 4th to 7th funicle segments as long as wide or little longer. Club almost as long as 2 × maximum width; as long as last four funicle segments combined.

Pronotum (Figs 40, 49). Subquadrate (bpw/pl ♂: 0.97–1.03; ♀: 0.97–1.00). Base slightly sinuate; approximately 1.50–1.60 × as wide as apical margin (bpw/apw ♂: 1.46–1.52; ♀: 1.55–1.64); apically with single tubercle at angles, medial portion widely incised. Width of medial constriction in relation to apical and basal margin: mpw/apw ♂: 0.71; ♀: 0.70–0.73, mpw/bpw ♂: 0.47–0.49; ♀: 0.45–0.49. Medial tubercle on pronotal disc wide and glabrous, sometimes weakly developed. Apical area beyond medial tubercles lies distinctly lower than base (clearly visible in lateral view); in lateral view apical margin medially extended forward with rounded apex.

Elytra (Figs 22, 31). Approximately 1.5 × as long as its width (el/bew ♂: 1.52; ♀: 1.48–1.58). Distinctly narrowed from humeral calli to apical part. Medial tubercles distinct, narrow, wider than width of 3rd interval; hind angle with higher elevation than fore, furnished with bundle of dense setae. Striae with single line of suboval punctures. Variable tubercles on odd intervals obtuse. Scutellum subtriangular.

Abdomen (Figs 85, 101). Abdomen slightly longer than wide (al/aw ♂: 1.04–1.06; ♀: 1.02–1.06). Pygidium as in Fig. 101, distinctly narrowed before apical part. Last ventrite short, more than 2 × wider than long (lvw/lvl ♂: 2.20–2.50; ♀: 2.33–2.55).

Male terminalia (Figs 94, 108, 115). Penis body little longer than apodemes; in dorsal view slightly narrowed to rounded apex; in lateral view distinctly curved at base; regularly narrowing apicad; apodemal bridge weakly sclerotised. Endophallus everted without visible sclerites. Parameroid lobes of tegmen divided apically, with similar length as apodeme. Spiculum gastrale with hooked basal piece. Hemisternites on spiculum gastrale irregular, small, strongly sclerotised.



Figures 22–30. Elytra, dorsal view: **22** *C. farinosus* Perr. **23** *C. fundatus* sp. n. **24** *C. gibbus* sp. n. **25** *C. malleus* sp. n. **26** *C. minimus* sp. n. **27** *C. rutai* sp. n. **28** *C. szoltysi* sp. n. **29** *C. torosus* sp. n. **30** *C. turbidus* sp. n.

Female terminalia (Figs 122, 127, 132, 135, 140). Apodeme of sternite VIII with separate basal part; apical lobe with characteristic shape of sclerotisation occupying medial area. Abdominal tergite VIII slightly broadened from base to more or less middle of length, remainder of tergite VIII distinctly narrowed to rounded apex; lateral margin with elongate setae. Spermatheca as in Fig 132. Pygidium with maximum width at base, distinctly narrowed to rounded apex. Ovipositor with relatively small gonocoxite; apical setae short; vagina stout.

Measurements. ♂: al 4.80–5.00, apw 2.10–2.40, arw 0.90, aw 4.60–4.70, bew 5.80–6.00, bpw 3.20–3.50, el 8.80–9.10, eyl 0.70–0.80, frw 0.70–0.80, hl 1.40–1.50, hw 1.50–1.60, lb 13.60–13.70, lvl 0.90–1.00, lww 2.20–2.30, mpw 1.50–1.70, pl 3.30–3.40, rl 3.60–3.80, scl 2.80.

♀: al 4.70–5.40, apw, 2.00–2.20, arw 0.90–1.00, aw 4.40–5.20, bew 5.30–6.40, bpw 3.10–3.60, el 8.40–9.50, eyl 0.70–0.80, frw 0.60–0.70, hl 1.50, hw 1.50–1.65, lb 12.80–14.70, lvl 0.90–1.00, lww 2.10–2.40, mpw 1.40–1.60, pl 3.20–3.60, rl 3.30–4.00, scl 2.70–3.30.

Type material. Lectotype, 1♀ (here designated, see Remarks) – “*Callistomorphus farinosus*, Perroud Kanala” – handwritten; “type” – handwritten; “♀” – printed; small red circle; Lectotype *Callistomorphus farinosus* Perroud, 1865; Museum Paris, coll. B. Perroud (MNHN).

Additional material. 1♀ – New Caledonia (S); 22°01.9'S, 166°28.0'E, Dzumac Mts 900 m (Mt Ouin road junction), 28.12.2006 night collecting, leg. M. Wanat & R. Dobosz (MNHW).

1♂ – New Caledonia (N), 20°57'19.1"S, 165°17'27."E, Pic d'Amoa (Povilla), 18.11.2010 450 m, end 0.5 km of road, leg. M. Wanat, R. Ruta (MNHW).

1♂ – New Caledonia (S), 22°02'13.6"S, 166°29'44.5"E, Mt. Dzumac (base), 1.5–3 km E of Ouin rd jct., 6.12.2010, 800 m, rainforest, leg. M. Wanat, R. Ruta (MNHW).

1♀ – New Caledonia (N); 20°57'23.7"S, 165°17'27.7"E, Pic d'Amoa (Povila), 450 m, end 0.5 km of road, 22.11.2008, leg. M. Wanat (MNHW).

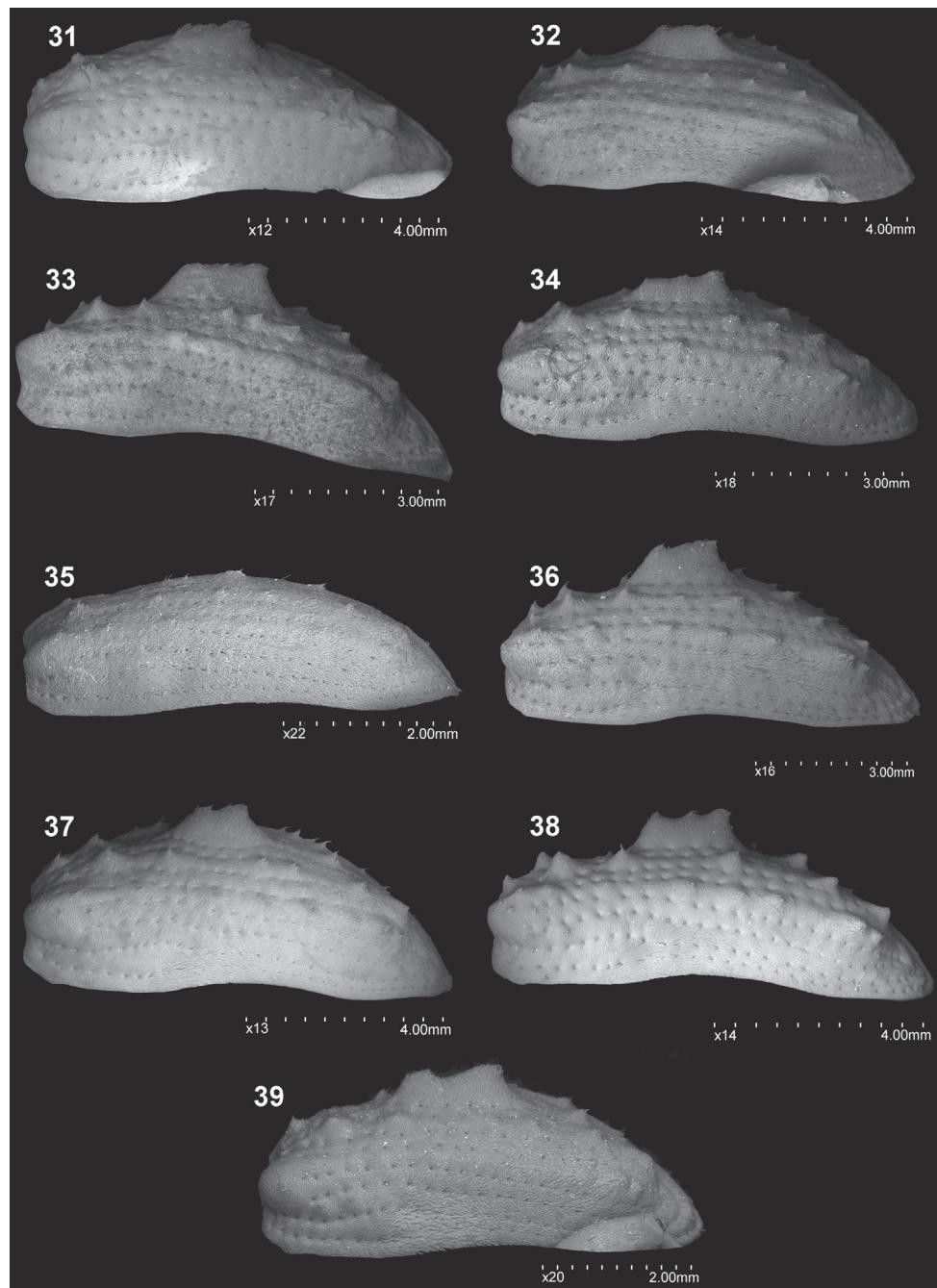
Remarks. Kuschel selected a female specimen from Perroud's original series as a syntype in 2004 but this action was never published. To ensure stability in nomenclature and to clarify identity of this species I herein designate the same female specimen as the lectotype. I take this action under the article 74.1 of the Code (ICZN).

Callistomorphus fundatus sp. n.

<http://zoobank.org/ECEF260B-10D9-48EF-A421-8E5FAFC567F6>

Figures 3, 9, 14, 23, 32, 41, 50, 59, 68, 77, 86, 95, 102, 109, 116

Diagnosis. This species can be distinguished from other members of the genus by the following set of characters: elytra elongate, 1.6 × as long as wide across humeral calli; colour of body generally brown; pronotum with apical margin almost straight, corrugated due to numerous, small tubercles, basal margin concave; last ventrite less than 2 × wider than long with shallow apical depression.



Figures 31–39. Elytra, lateral view: **31** *C. farinosus* Perr. **32** *C. fundatus* sp. n. **33** *C. gibbus* sp. n. **34** *C. malleus* sp. n. **35** *C. minimus* sp. n. **36** *C. rutai* sp. n. **37** *C. szoltysi* sp. n. **38** *C. torosus* sp. n. **39** *C. turbidus* sp. n.

Description. Body length (lb) – 11.40 mm.

Body colour and vestiture (Fig. 14). Generally brown with yellow shade in some areas. Striae and intervals each with single line of elongate yellowish setae. Legs with sparse setae of the same colour as elytra.

Head (Figs 3, 59, 68, 77). Subquadrate (δ : hw/hl = 1.07). Frons 2 × as wide as eye in dorsal view. Eyes shorter than half length of head (δ : eyl/hl = 0.43), not protruding above margin of head in lateral view. Rostrum slightly longer than pronotum (δ : rl/pl = 1.04), 3.38 × as long as maximum width at apex (rl/arw); with thin, polished carina on entire length; regularly curved in lateral view. Scape shorter than rostrum (δ : scl/rl = 0.85). First funicle segment approximately 1.4 × as long as 2nd; 3rd approximately 0.65 as long as 2nd; antennomeres from 4th to 7th successively little shorter than previous one, longer than wide. Club elongate, approximately 3.8 × as long as wide, as long as last four funicle segment combined.

Pronotum (Figs 41, 50). Slightly longer than wide (δ : bpw/pl = 1.04). Basal margin distinctly, widely concave; 1.35 × as wide as apical margin (δ : bpw/apw); apically straight with numerous, small tubercles; in lateral view apical margin straight anteriorly, then converging towards base. Medial tubercle on pronotal disc well developed, divided into two, strongly protruding appendices. Width of medial constriction in relation to apical and basal margin: δ : mpw/apw = 0.65, δ : mpw/bpw = 0.48.

Elytra (Figs 23, 32). Elongate (δ : el/bew = 1.65). Slightly narrowed from humeral calli to apical part. Medial tubercles distinct, higher than width of its base on 3rd interval. Striae with single line of suboval punctures. Odd intervals with distinct, tooth-shape, tubercles with elongate, slightly hooked, single scale on the top. Tubercles on 7th intervals conspicuous, protruding from outline of elytra in dorsal view. Scutellum distinctly elongate, ca 1.5 × as long as wide.

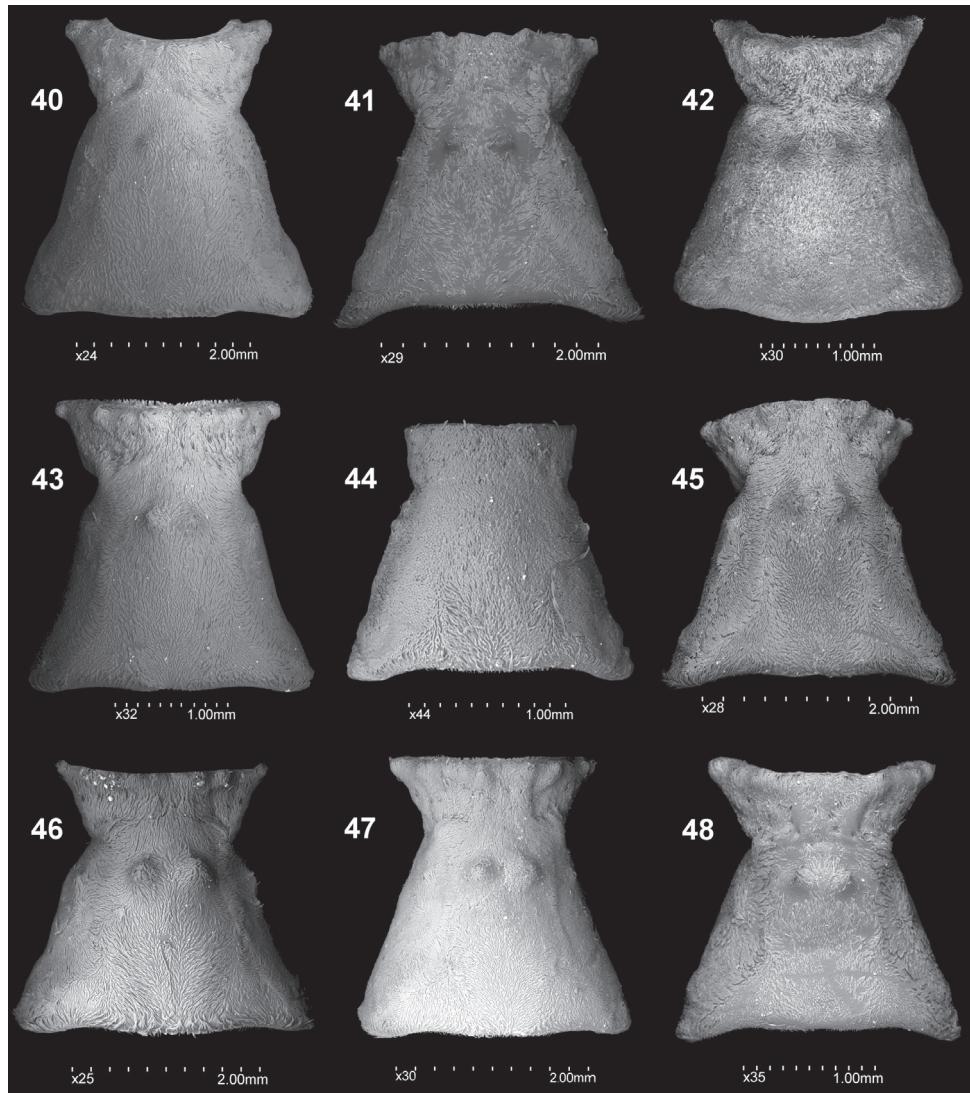
Abdomen (Figs 9b, 86, 102). Abdomen of male 1.18 × as long as wide (al/aw). Male pygidium as in Fig. 102. Last ventrite elongate, subtriangular, lvw/lvl = 1.75.

Male terminalia (Figs 95, 109, 116). Penis body distinctly longer than apodemes; almost subparallel from base to apical part, apically slightly narrowed to rounded apex; basal part partly sclerotised, except medial area; in lateral view distinctly, regularly curved, apically slightly upturned. Internal sac longitudinally crinkled, without any apparent structure or sclerites. Parameroid lobes of tegmen slightly shorter than apodeme, divided almost to base; the dorsal part of the tegminal ring with membrane and sharp, protruding process. Tegminal apodeme apically extended. Spiculum gastrale robust, slingshot-shape, apically strongly sclerotised; in lateral view apodeme apically curved; hemisternites fused with base of spiculum.

Female – unknown

Measurements. δ : al 4.50, apw, 2.00, arw 0.80, aw 3.80, bew 4.80, bpw 2.70, el 7.90, eyl 0.60, frw 0.70, hl 1.40, hw 1.50, lb 11.40, lvl 1.20, lvw 2.10, mpw 1.30, pl 2.60, rl 2.70, scl 2.30.

Type material. Holotype, δ (here designated) – New Caledonia (N); 20°57.2'S, 165°17.5'E; Pic d'Amoa 360 m; 14.01.2007 forest at light; leg. M. Wanat & R. Dobosz (MNHN).



Figures 40–48. Pronotum, dorsal view: **40** *C. farinosus* Perr. **41** *C. fundatus* sp. n. **42** *C. gibbus* sp. n. **43** *C. malleus* sp. n. **44** *C. minimus* sp. n.; **45** *C. rutai* sp. n. **46** – *C. szoltysi* sp. n. **47** *C. torosus* sp. n. **48** *C. turbidus* sp. n.

Etymology. This epithet is derived from the Latin word “*funda*” (slingshot) and refers to the shape of spiculum gastrale. A variable adjective.

Remarks. Only one specimen of this new species has been found within the studied collections. A set of characteristic features, including the almost uniform brown colour, elongate elytra and last ventrite, as well as terminal structures, indicates that this is a new species.

***Callistomorphus gibbus* sp. n.**

<http://zoobank.org/56D2BC10-7248-448F-8E13-8DBDF447CE08>

Figures 6, 15, 24, 33, 42, 51, 60, 69, 78, 87, 96, 103, 110, 117

Diagnosis. This species can be distinguished from other members of the genus by the following suite of characters: apical margin of pronotum concave in dorsal view, base sinuate, protruding towards elongate scutellum. Rostrum distinctly bent in middle of length.

Description. Body length (lb) – 7.90–9.60 mm.

Body colour and vestiture (Fig. 15). Generally dark brown with various, irregular spots of different shades of brown. Legs in some specimens with mottled coloration, from whitish to variable shades of orange and almost black. Tibiae generally paler, more or less orange. Pronotum sometimes with darker spots near base, medially and with pair of narrow, oblique stripes of white-yellow scales from hind angles to middle of length.

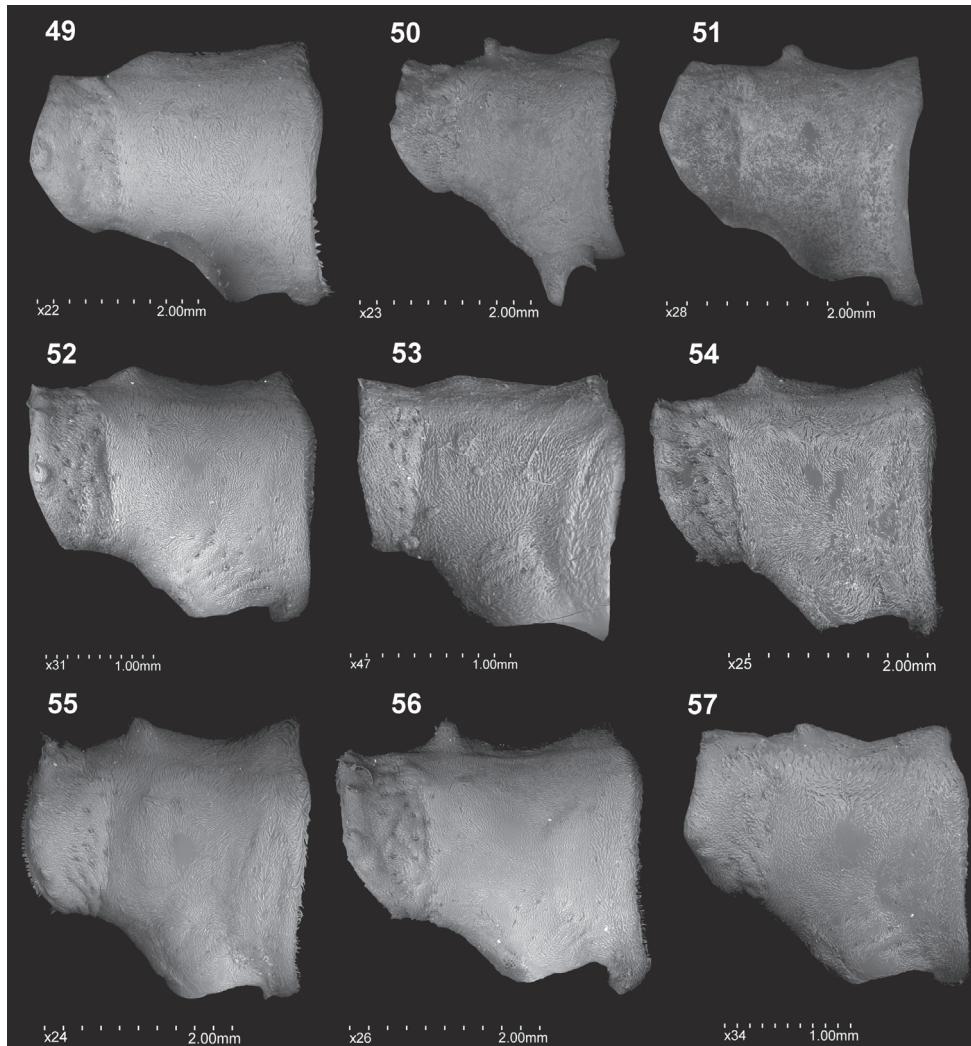
Head (Figs 6, 60, 69, 78). Subquadrate to wider than long (δ : hw/hl = 1.00–1.20). Frons wider than double width of eye. Eyes approximately as long as half of length (δ : eyl/hl = 0.45–0.55), not protruding above margin of head in lateral view, regularly rounded. Rostrum as long as pronotum or little shorter (δ : rl/pl = 1.00–1.12), from 3.00 to 3.17 × as long as maximum width (rl/arw); with polished, sharp longitudinal carina on entire length; in lateral view distinctly curved medially. Scape shorter than rostrum (δ : scl/rl = 0.82–0.90). First funicle segment slightly longer than 2nd, 3rd almost as half-length of 2nd, antennomeres from 4th to 7th with similar length, little longer than wide. Club slightly as long as last four funicle segment combined, ca 1.8 × as long as wide.

Pronotum (Figs 6, 42, 51). Wider than long (δ : bpw/pl = 1.06–1.15); base 1.26–1.47 × as wide as apical margin (bpw/apw); apical margin distinctly, widely concave with small tubercles; apical angles with rounded, distinct tubercle; in lateral view apical margin protruding towards head. Medial tubercle on pronotal disc well developed, divided into two, strongly protruding appendices. Width of medial constriction in relation to apical and basal margin in male: mpw/apw = 0.63–0.71, mpw/bpw = 0.48–0.50.

Elytra (Figs 24, 33). Approximately 1.5 × as long as its width (δ : el/bew = 1.48–1.55); slightly narrowed from humeral calli to apical part. Medial tubercles distinct, elongate; elytral disc with numerous, small acuminate tubercles; tubercles on 7th intervals easily visible, protruding from outline of elytra in dorsal view. Striae with suboval, deep punctures; surface of elytral disc distinctly rugose. Scutellum triangular, as long as wide at base.

Abdomen (Figs 87, 103). In male from 0.94 to 1.20 × as long as wide (al/aw). Male pygidium as in Fig. 87. Last ventrite 2.14–2.37 × wider than long (lvw/lvl).

Male terminalia (Figs 96, 110, 117). Penis body slightly longer than apodemes; from base to apical part almost subparallel, apically slightly narrowed to rounded apex; basal part sclerotised, except medial part; distinctly, regularly curved in lateral view, apices thin and distinctly upturned. Internal sac without any structure or sclerites.



Figures 49–57. Pronotum, lateral view: **49** *C. farinosus* Perr. **50** *C. fundatus* sp. n. **51** *C. gibbus* sp. n. **52** *C. malleus* sp. n. **53** *C. minimus* sp. n. **54** *C. rutai* sp. n. **55** *C. szoltysi* sp. n. **56** *C. torosus* sp. n. **57** *C. turbidus* sp. n.

Parameroid lobes of tegmen thin, distinctly shorter than apodeme, divided almost to base. Tegminal apodeme apically extended. Spiculum gastrale robust, similar to *C. fundatus* sp. nov; hemisternites fused with base of spiculum.

Female – unknown.

Measurements. ♂: al 3.20–3.60, apw, 1.40–1.90, arw 0.60–0.70, aw 2.90–3.50, bew 3.40–4.20, bpw 1.80–2.50, el 5.30–6.50, eyl 0.50–0.60, frw 0.50–0.60, hl 0.90–1.10, hw 1.00–1.20, lb 7.90–9.60, lyl 0.70–0.85, lvw 1.50–2.00, mpw 0.90–1.20, pl 1.70–2.20, rl 1.80–2.20, scl 1.60–1.80.

Type material. Holotype, ♂ (here designated) – New Caledonia (N); 21°08'56.0"S, 165°19'20.9"E; Aoupinié (refuge), 400 m, at light; 25.11.2006; leg. M. Wanat (MNHN).

Paratypes: 1♂ – New Caledonia (N); 21°08.9"S, 165°19.4'E; Aoupinié (refuge), 18.01.2007, 420 m, at light, leg. M. Wanat & R. Dobosz (MNHW).

1♂ – New Caledonia (N), 20°57.2'S, 165°17.5'E, Pic d'Amoa, 360 m, 14.01.2007, forest at light, leg. M. Wanat & R. Dobosz (MNHW).

1♂ – New Caledonia (S), 22°01'54.5"S, 166°28'02.6"E, Mt. Ouin Rd, 900 m, 0–0.5 km N of Dzumac jct, 5.12.2010, night coll., leg. M. Wanat & R. Dobosz (MNHW).

Etymology. This epithet is the Latin noun “*gibbus*” (protuberance, hump) and refers to a pair of large tubercles on elytra. A noun in apposition.

Remarks. The shape of pronotum together with the lateral profile of the rostrum are characteristic for this new species. The terminalia are quite similar to *C. fundatus* sp. n. but differ in the shape of the apex of the penis (in dorsal view more rounded, in lateral view more upwardly directed in *C. gibbus* sp. n.). One small specimen was quite similar to *C. turbidus* sp. n. in bodily proportions, but distinctly different in the shape of the pronotum, rostrum length and form of terminal structures.

Callistomorphus malleus sp. n.

<http://zoobank.org/9722BE21-8800-4C58-BCED-E28EEE21E3FE>

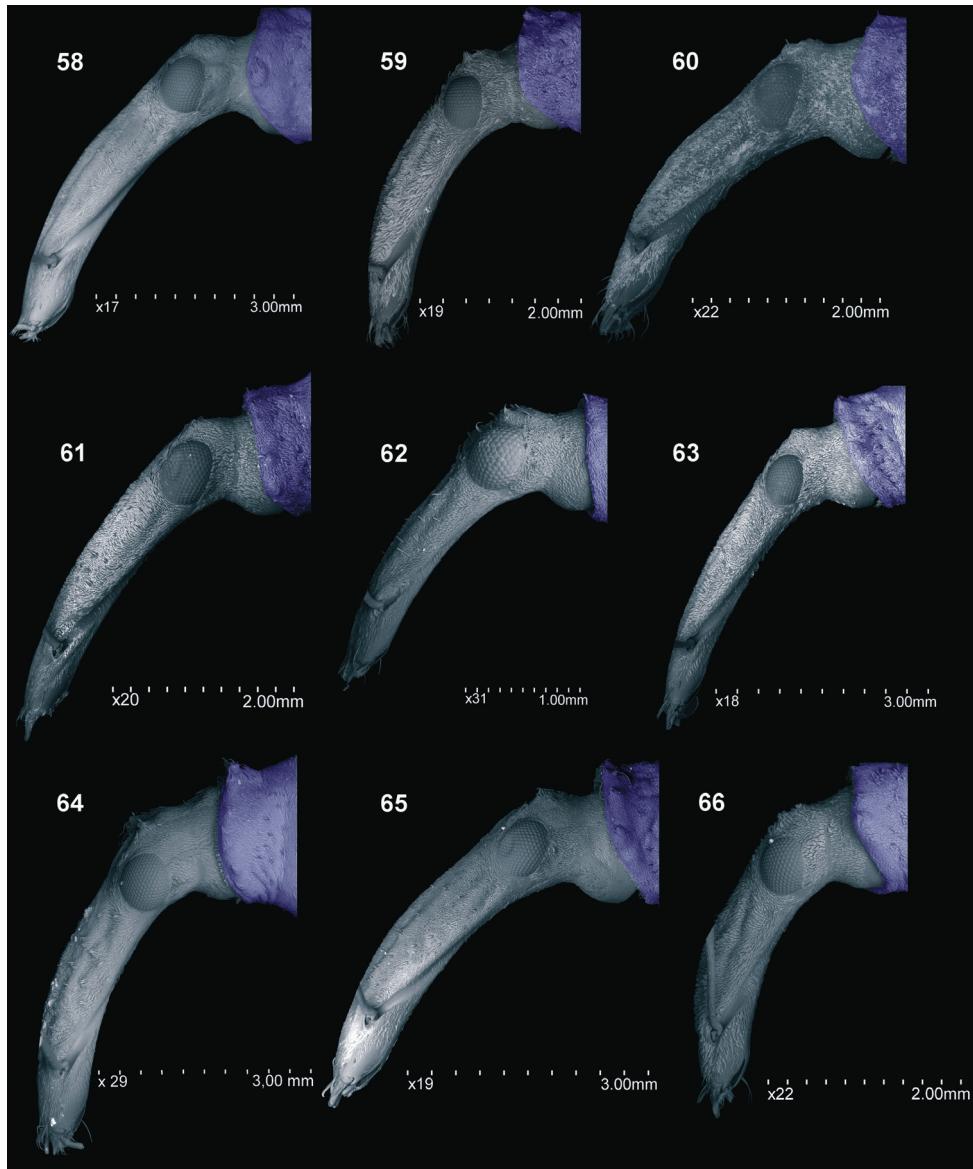
Figures 2, 10, 16, 25, 34, 43, 52, 61, 70, 79, 88, 97, 104, 111, 118, 123, 128, 133, 136, 141

Diagnosis. This species can be distinguished from other members of the genus by the following suite of characters: rostrum gently curved, regularly narrowed to apex in lateral view. Middle tubercles on elytra flattened, lower than maximal width at base. Apex of penis in lateral view expanded into small tubercles. Apical lobes of female abdominal sternite VIII with characteristic shape (Fig. 136).

Description. Body length (lb) – 8.60–10.50 mm.

Body colour and vestiture (Fig. 16). Colour variable, from dark brown to yellowish. Some specimens with whitish coating on apical and lateral parts of elytra. Similar, pale coating, in some specimens, also covered hind femora. Pronotum with longitudinal yellowish stripes.

Head (Figs 61, 70, 79). From subquadrate to elongate (hw/hl ♂: 1.00–1.20; ♀: 1.00–1.33), depending on protrusion the head from pronotum. Frons wider than double width of eye. Eyes approximately half as long as head or little longer (eyl/hl ♂: 0.50–0.60; ♀: 0.45–0.55), not protruding above margin of head in lateral view; regularly convex, widest near middle of length. Rostrum longer than pronotum (rl/pl ♂: 1.17–1.21; ♀: 1.12–1.24); in male 3.80–4.30 × as long as maximum width, in female 4.00–4.50 × as long as wide at apex (rl/arw); longitudinal carina indistinct, from base to antennal insertion covered by scales, apically bare, flattened, sometimes evanescent and visible only as polished, narrowed area. Scape shorter than rostrum (scl/rl ♂: 0.75–0.80; ♀: 0.70–0.85). First funicle segment ca 1.3 × as long as 2nd; 3rd



Figures 58–66. Head and rostrum, lateral view: **58** *C. farinosus* Perr. **59** *C. fundatus* sp. n. **60** *C. gibbus* sp. n. **61** *C. malleus* sp. n. **62** *C. minimus* sp. n. **63** *C. rutai* sp. n. **64** *C. szoltysi* sp. n. **65** – *C. torosus* sp. n. **66** – *C. turbidus* sp. n.

almost as half-length of 2nd, antennomeres from 4th to 7th with similar length, slightly longer than wide. Club as long as last four funicle segment combined, approximately 2.10 × as long as wide.

Pronotum (Figs 43, 52). Subquadrate (bpw/pl ♂: 1.00–1.05; ♀: 0.95–1.10). Base in male 1.25–1.35 ×, in female 1.28–1.38 ×, as wide as apical margin (bpw/apw); api-

cal margin straight or slightly concave; in lateral view apical margin straight anteriorly, then converging towards base. Medial tubercle on pronotal disc well developed but weakly protruding. Width of medial constriction in relation to apical and basal margin: mpw/apw ♂: 0.66–0.68; ♀: 0.61–0.69, mpw/bpw ♂: 0.48–0.53; ♀: 0.48–0.50.

Elytra (Figs 25, 34). Elongate (el/bew ♂: 1.56–1.66; ♀: 1.50–1.68); lateral margins subparallel basally to apical convergence. Medial tubercle distinct but flattened, lower than width on base; smaller, numerous tubercles on elytral disc acuminate; tubercles on 7th intervals clearly visible, protruding from outline of elytra in dorsal view. Striae with small, suboval, shallow punctures; surface of elytral disc slightly glabrous. Scutellum slightly longer than wide.

Abdomen (Figs 88, 104, 128). From slightly (in male) to distinctly (in female) longer than wide (al/aw ♂: 1.08–1.17; ♀: 1.06–1.20 × as long as wide. Male pygidium as in Fig. 104, female as in Fig. 129. Last ventrite longer than wide (lvw/lvl ♂: 2.25–2.57; ♀: 2.13–2.38).

Male terminalia (Figs 97, 111, 118). Penis body slightly longer than apodemes; from base to apical part almost subparallel, apically slightly narrowed to rounded apex; basal part sclerotised, except medial area; in lateral view distinctly, regularly curved, apically expanded into small tubercles. Internal sac without any structure or sclerites. Parameroid lobes of tegmen thin, distinctly shorter than apodeme, divided almost to base and surrounded by thin membrane. Tegminal apodeme apically extended. Spiculum gastrale robust, apodeme laterally flattened, distinctly bent distally; hemisternites fused with base of spiculum.

Female terminalia (Figs 123, 128, 133, 136, 141). Apical lobe of abdominal sternite VIII with characteristic, T-shape sclerotisation. Abdominal tergite VIII with elongate, straight, dense setae near apex; sides with strongly elongate setae; apex with small, pointed tubercles. Spermatheca elongate, strongly bent. Gonocoxite placed diagonally to partly sclerotised vagina, strongly elongate, apically with bundle of erect setae.

Measurements. ♂: al 3.50–4.00, apw, 1.60–1.80, arw 0.60–0.70, aw 3.00–3.7, bew 3.50–4.30, b pw 2.00–2.40, el 5.80–6.90, eyl 0.60, frw 0.40–0.50, hl 1.00–1.20, hw 1.15–1.20, lb 8.60–10.40, lvl 0.70–0.80, lvw 1.60–2.00, mpw 1.05–1.20, pl 1.90–2.40, rl 2.30–2.80, scl 1.80–2.20.

♀: al 3.80–4.10, apw, 1.60–1.80, arw 0.60–0.70, aw 3.30–3.80, bew 3.90–4.30, b pw 2.20–2.40, el 6.00–7.20, eyl 0.50–0.60, frw 0.50–0.60, hl 0.9–1.20, hw 1.10–1.25, lb 9.50–10.50, lvl 0.80, lvw 1.70–2.00, mpw 1.10–1.20, pl 2.10–2.50, rl 2.50–2.80, scl 1.90–2.10.

Type material. Holotype, ♂ (here designated) – New Caledonia (S); 22°04'08.9"S, 166°26'48.0"E; Dzumac road; S of Mts Couvélé rd jct; 870→670 m beating; 31.10.2008; leg. M. Wanat (MNHN).

Paratypes:

1♂ – New Caledonia (S); 22°05.9'S, 168°38.3'E; Riviére Bleue Parc; 23.12.2006, 190 m, refuge; sifting forest litter; leg. R. Dobosz (USMB).

1♂ – New Caledonia (S); 22°14.9'S, 166°49.7'E; Pic du Pin, base; 25.12.2006, 280 m, forest & plantation; leg. R. Dobosz & M. Wanat (USMB).

1♂ – New Caledonia (S); 22°10'19.2"S, 166°45'40.0"E; Bois du Sud, 220 m, at light; 25.10.2008; leg. M. Wanat (MNHW).

1♀ – New Caledonia (S); 22°10'22.4"S, 166°45'47.9"E; Bois du Sud, 220–250 m, beating along track entering forest reserve; 20.10.2008; leg. M. Wanat (MNHW).

1♀ – New Caledonia (S); 22°05.8"S, 166°40.2"E; Rivière Bleue: Gue de la; 22.12.2006, 140 m Pourina; night coll. (lamp & beating); leg. M. Wanat & R. Dobosz (MNHW).

1♀ – New Caledonia (S); 22°01.9"S, 166°28.0"E; Dzumac Mts, 900 m; Mt. Ouin, road junction; 28.12.2006, night collecting; leg. M. Wanat & R. Dobosz (MNHW).

2♀ – New Caledonia (S); 22°12'21.2"S, 166°40'46.9"E; Col des Deux Tétons, 30.10.2010; humid forest, 220–250 m; leg. M. Wanat & R. Ruta (MNHW).

1♀ – New Caledonia (S); 22°06.0"S, 166°39.3"E; Rivière Bleue, Pont Germain to kaori géant (left river side), 160–180 m; 22.01.2007; leg. M. Wanat (MNHW).

Etymology. This epithet is derived from the Latin noun “*malleus*” (hammer) and refers to the shape of female sternite VIII. A noun in apposition.

Remarks. The species is variable in size and colour but easily distinguished by the elongate elytra with relatively small medial tubercles and weakly curved rostrum. Also, penis and female sternite VIII are characteristic.

Callistomorphus minimus sp. n.

<http://zoobank.org/5D16E00A-66CC-441B-AD90-D0BF4399C7A6>

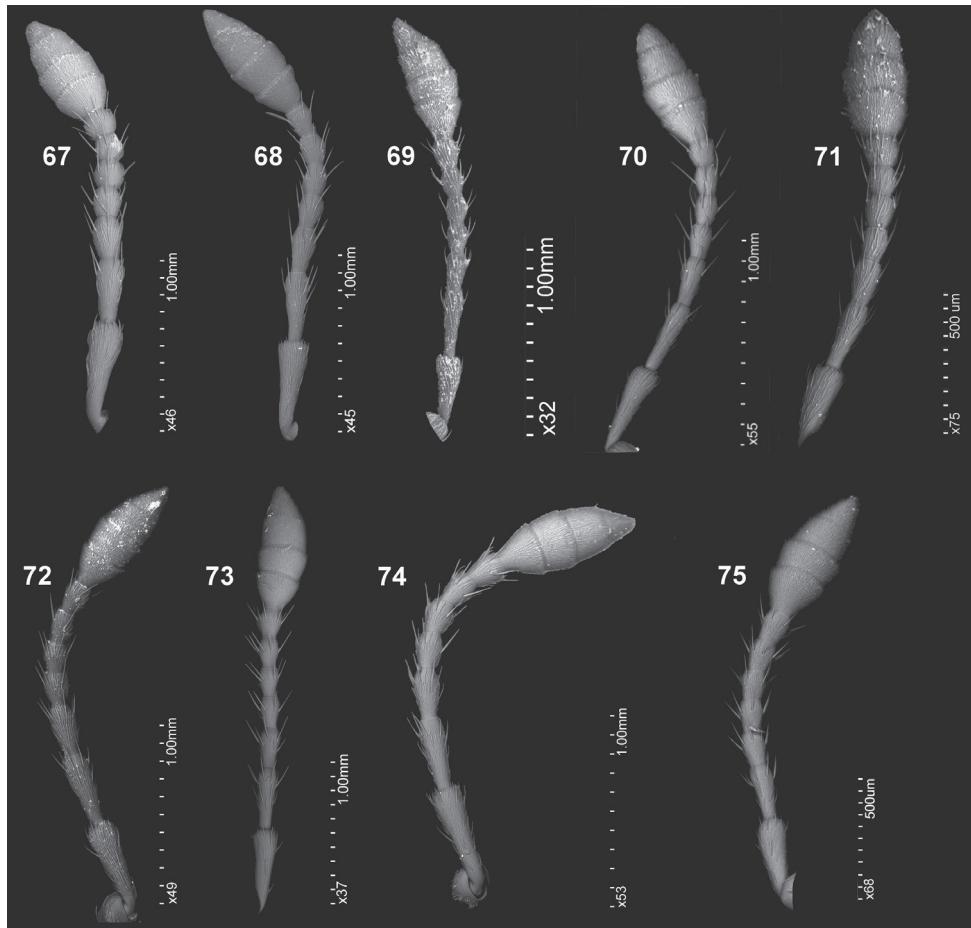
Figures 17, 26, 35, 44, 53, 62, 71, 80, 89, 124, 129, 137, 142

Diagnosis. The smallest member of the genus with several characteristic features. Eyes strongly convex, distinctly protruding above margin of head in lateral view. Pronotum distinctly narrowed from base to approximately three-quarters of length, apically sides only slightly expanded towards anterior margin; dorsal surface glabrous, medially only with small, obtuse tubercle. Elytra slender, elongate; without distinct medial tubercles, only with single, small tubercles on intervals. Apical part of elytra and sides of pronotum dark brown, in contrast to colour of the rest parts of body.

Description. Body length (lb) – 7.20 mm.

Body colour and vestiture (Fig. 17). Body covered almost entirely with yellowish scales. Rostrum brown. Antennae light brown. Lateral part of pronotum dark brown; base of pronotum in dorsal view with two, short, brownish stripes reaching to one-fifth of its length; between them small, brown spot. Elytra uniformly yellowish except: brownish apical angles ahead of humerus; base of intervals 3–5; indistinct, suboval darker spot from 1st to 3rd intervals before midlength. Apical part of elytra from four-fifth of length dark brown. Scutellum light brown. Mesepimeron, mesanepisternum and mesoventrite brown; metanepisternum together with metaventrite yellowish as most part of elytra. Legs uniformly yellowish.

Head (Figs 62, 71, 80). Slightly wider than long (hw/hl ♀: 1.17). Frons narrower than double width of eye; longitudinal carina between eyes distinct, surface between



Figures 67–75. Antennae: **67** *C. farinosus* Perr. **68** *C. fundatus* sp. n. **69** *C. gibbus* sp. n. **70** *C. malleus* sp. n. **71** *C. minimus* sp. n. **72** *C. rutai* sp. n. **73** *C. szoltysi* sp. n. **74** *C. torosus* sp. n. **75** *C. turbidus* sp. n.

concave. Eyes strongly convex, circular, slightly longer than half length of head (ey/hl ♀: 0.56), distinctly protruding above margin of head in lateral view. Rostrum longer than pronotum (rl/pl ♀: 1.20), 3.40 × as long as maximum width at apex (rl/arw); longitudinal carina indistinct, polished only from antennal insertion to apex. Scape shorter than rostrum (scl/rl ♀: 0.76). First funicle segment ca 1.2 × as long as 2nd and 2 × as long as 3rd; antenniferous 4th and 5th slightly longer than wide; last two as long as wide. Club suboval, 2 × as long as wide, as long as last four funicle segment combined.

Pronotum (Figs 44, 53). Shorter than width at base (bpw/pl ♀: 1.21); 1.70 × as wide as apical margin (bpw/apw). Apical margin straight in dorsal view, not expanded, without tubercles; in lateral view anteriorly almost straight, then converging towards base; anterior transverse groove deeply concave. Medial tubercle not separate, only as slightly convex, single tubercle.

Elytra (Figs 26, 35). Elongate (el/bew ♀: 1.68). Regularly narrowed from base to apical part; posterior calli weakly developed, not protruding beyond outline of elytral in dorsal view. Surface of striae and intervals not visible due to very dense scales. Medial tubercles absent, on striae only single, small tubercles completely covered with scales. Scutellum slightly longer than wide, slightly protruding above margin of elytra in lateral view.

Abdomen (Figs 89, 129). Slightly longer than wide (al/aw 1.15). Second ventrite with sparse, erect, strongly elongate scales, clearly visible on the background of adjacent, shorter scales. Last ventrite 2.60 × wider than long (lv/lvl). Pygidium as in Fig. 129.

Female terminalia (Figs 124, 137, 142). Sternite VIII distinctly expanded apically with characteristic shape. Abdominal tergite VIII distinctly narrowed apically with rounded apex; sides with strongly elongate setae. Spermatheca lost in dissection. Ovipositor slender, almost straight; gonocoxite elongate; vagina well sclerotised.

Male – unknown

Measurements. ♀: al 3.00, apw 1.00, arw 0.50, aw 2.60, bew 2.85, bpw 1.70, el 4.80, eyl 0.50, frw 0.40, hl 0.80, hw 1.05, lb 7.40, lvl 0.50, lww 1.30, mpw 0.90, pl 1.40, rl 1.70, scl 1.30.

Type material. Holotype, ♀ (here designated) – New Caledonia (S); 21°37'17.8"S, 165°52'38.6"E; Plateau de Dogny, 9.11.2010, 960 m; leg. R. Ruta (MNHN).

Etymology. This epithet is the Latin adjective “*minimus*” (small, little), the new species is the smallest member of the genus.

Remarks. *C. minimus* sp. n. is a very characteristic species. It is easy to distinguish from other members of the genus by small size, shape of pronotum (not extended apically), reduced tubercles on elytra and pronotum and contrasting coloration of the body.

Callistomorphus rutai sp. n.

<http://zoobank.org/3CC352F4-668B-4C9C-8152-F554C3A8A00C>

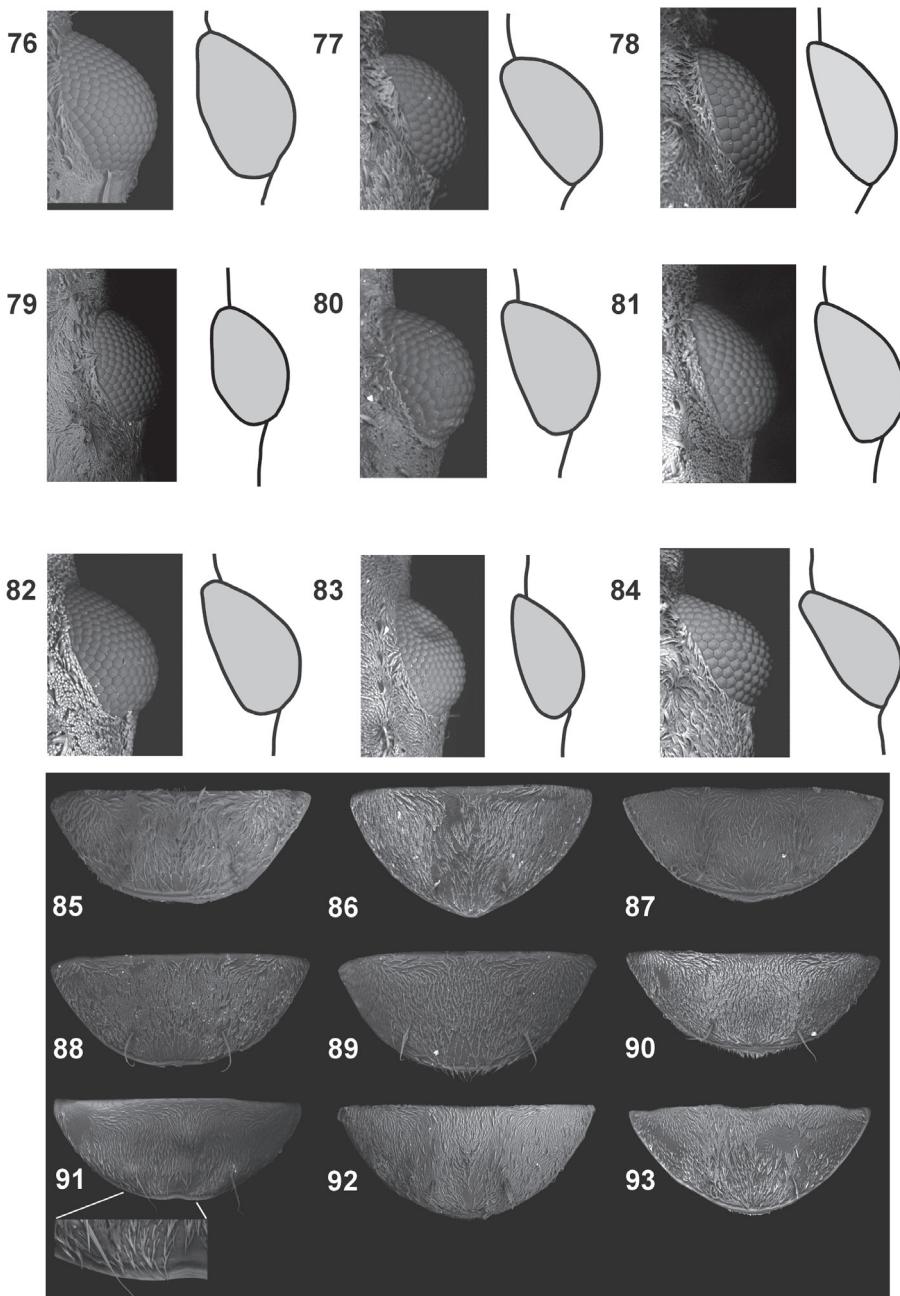
Figures 12, 18, 27, 36, 45, 54, 63, 72, 81, 90, 98, 105, 112, 119

Diagnosis. This species can be distinguished from other member of the genus by the following set of characters: medial tubercle on elytra very high; smaller tubercles numerous, very distinct and sharp; rostrum slender, slightly curved; penis narrowed before widely rounded apex; parameroid lobes of tegmen distinctly divided from midlength.

Description. Body length (lb) – 10.80 mm.

Body colour and vestiture (Fig. 18). Colour variable, the body dappled with many small spots, from dark brown to yellowish, especially on distal part of elytra and hind legs. In front of medial tubercles on elytra darker spot from suture to base of tubercles. Pronotum with longitudinal yellowish stripes. Striae with distinct, single, short scales in each point of row.

Head (Figs 63, 72, 81). Slightly wider than long (δ : hw/hl = 1.08). Frons narrower than twice width of eye. Eyes convex, as long as half-length of head (eyl/hl δ : 0.50),



Figures 76–93. Outline of the eye, dorsal view: **76** *C. farinosus* Perr., male **77** *C. fundatus* sp. n., male **78** *C. gibbus* sp. n. **79** *C. malleus* sp. n. **80** *C. minimus* sp. n. **81** *C. rutai* sp. n. **82** *C. szoltysi* sp. n. **83** *C. torosus* sp. n. **84** *C. turbidus* sp. n. Last ventrite: **85** *C. farinosus* Perr., male **86** *C. fundatus* sp. n., male **87** *C. gibbus* sp. n., male **88** *C. malleus* sp. n., male **89** *C. minimus* sp. n., female **90** – *C. rutai* sp. n., male **91** *C. szoltysi* sp. n., female **92** *C. torosus* sp. n., male **93** *C. turbidus* sp. n., male.

not protruding above margin of head in lateral view. Rostrum longer than pronotum (rl/pl ♂: 1.20), 4.00 × as long as maximum width at apex (rl/arw); longitudinal carina clearly visible only at apical part, posteriorly completely covered with scales. Scape shorter than rostrum (scl/rl ♂: 0.80). First funicle segment ca 1.30 × as long as 2nd; 3rd 0.70 × as long as 2nd; antennomeres from 4th to 7th with similar length, elongate. Club 2.60 × as long as wide, as long as last four funicle segment combined.

Pronotum (Figs 45, 54). Slightly wider than long (bpw/pl ♂: 1.08). Base 1.35 × as wide as apical margin (bpw/apw); apical margin in dorsal view straight with numerous, distinct tubercles (on SEM photography (Fig. 45) apical margin of pronotum is seen as convex because the image was taken in different angle); in lateral view apical margin straight anteriorly, then converging towards base. Medial tubercle on pronotal disc distinct, strongly protruding, separate apically. Width of medial constriction in relation to apical and basal margin in male: mpw/apw = 0.65, mpw/bpw = 0.45.

Elytra (Figs 27, 36). Slightly more than 1.50 × as long as its width (el/bew ♂: 1.55). Subparallel from base to apical part; posterior calli distinct, strongly protruding beyond outline of elytral in dorsal view. Odd intervals with distinct, pointed tubercles that are easily visible in dorsal and lateral views, each furnished with single, hooked, elongate scale. Striae weakly impressed, formed by oval punctures, each with single, whitish scale inside. Medial tubercles distinct, strongly protruding, as high as almost half its length. Scutellum ca 1.20 × as long as wide.

Abdomen (Figs 90, 105). Slightly longer than wide (al/aw ♂: 1.05) in male. Last ventrite 2.75 × wider than long (lvw/lvl). Pygidium as in Fig. 105.

Male terminalia (Figs 98, 112, 119). Penis body distinctly longer than apodemes; almost subparallel from base to apical part; narrowed from fourth-fifth of length, apically widely rounded; basal part unsclerotised; distinctly, regularly curved in lateral view, apically strongly upturned, apex rounded. Internal sac without any structure or sclerites. Parameroid lobes of tegmen with extended common base, as long as apodeme, from half of length divided. Spiculum gastrale basally separate into two extended lobes; hemisternites indistinct.

Female – unknown

Measurements. ♂: al 4.30, apw 2.00, arw 0.75, aw 4.10, bew 4.80, b pw 2.70, el 7.40, eyl 0.60, frw 0.60, hl 1.20, hw 1.30, lb 10.80, lvl 0.80, lvw 2.20, mpw 1.30, pl 2.50, rl 3.00, scl 2.40.

Type material. Holotype, ♂ (here designated) – New Caledonia (S); 22°11'S, 166°30'E; Koghi Mts.; humid forest, 500–550 m; 21.01.2004, leg. M. Wanat (MNHN).

Etymology. This species is dedicated to my colleague Rafał Ruta, PhD (Wrocław, Poland), a great field researcher and specialist in Scirtidae (Coleoptera), who collected some specimens used in this paper, including the holotype of *C. minimus* sp. n.

Remarks. In lateral view the head and rostrum are similar to those of *C. malleus* sp. n. (rostrum elongate, slightly curved). However, *C. rutai* sp. n. has more prominent medial tubercles on the pronotum and elytra, the outline of elytra in dorsal view is more robust, and the shape of the penis is characteristic.

***Callistomorphus szoltysi* sp. n.**

<http://zoobank.org/9A493952-9F21-4C2C-B786-21A31DCBCBDD>

Figures 19, 28, 37, 46, 55, 64, 73, 82, 91, 125, 130, 134, 138, 143

Diagnosis. Together with *C. farinosus* Perr. and *C. torosus* sp. n. this new species is one of the largest members of the genus. Easy to distinguish by several features: body colour generally whitish; apical margin of pronotum distinctly rounded in lateral view, slightly concave in dorsal view; antennae slender with long, protruding setae; medial tubercles on elytra relatively small; elytra strongly convex in lateral view. Male abdominal sternite VIII with short apodeme, apical lobe enlarged.

Description. Body length (lb) – 12.30 mm.

Body colour and vestiture (Fig. 19). Generally whitish, with elytra entirely speckled with small, light-brown irregular spots. Pronotum with elongate light-brown spot near medial tubercles; sides darker.

Head (Figs 64, 73, 82). Slightly wider than long (hw/hl ♀: 1.08). Frons narrower than double width of eye. Eyes convex, as long as half length of head (eyl/hl ♀: 0.50), not protruding above margin of head in lateral view. Rostrum longer than pronotum (rl/pl ♀: 1.20); approximately 3.35 × as long as maximum width at apex (rl/arw), distinctly, regularly curved; longitudinal carina on rostrum distinct, shining on entire length, evanescent before apex of rostrum. Scape shorter than rostrum (scl/rl ♀: 0.80). Funicle slender, all antennomeres longer than wide, with elongate, straight, distinctly protruding setae; first funicle segment approximately 1.20 × as long as 2nd; 3rd 0.7 × as long as 2nd; antennomeres from 4th to 7th with similar length, 7th distinctly wider than 6th. Club 2.75 × as long as wide, longer than last four funicle segments combined.

Pronotum (Figs 46, 55). Wider than long (bpw/pl ♀: 1.20). Apical margin in dorsal view slightly concave with distinct, numerous tubercles, apical margin distinctly rounded in lateral view; base ca 1.43 × as wide as apical margin (bpw/apw). Medial tubercles on pronotal disc distinctly elevated, portions of pronotal disc without medial tubercles distinctly concave (easily visible when viewed laterally). Width of medial constriction in relation to apical and basal margin in female: mpw/apw = 0.67, mpw/bpw = 0.47.

Elytra (Figs 28, 37). Slightly more than 1.50 × as long as its width (el/bew ♀: 1.55); subparallel from base to apical part; posterior calli well developed, protruding beyond outline of elytral in dorsal view; in lateral view strongly convex. Odd intervals with distinct, pointed tubercles furnished with single, hooked, elongate scale; these tubercles are easily visible in dorsal and lateral view. Striae formed by oval punctures, each with single, whitish scale inside. Medial tubercles relatively small, short and weakly elevated. Scutellum slightly longer than wide; surrounded by narrow, asetose area, this in turn surrounded by elongate concentrically oriented scales.

Abdomen (Fig. 91, 130). Subquadrate, al/aw 0.98. Last ventrite 2.27 × wider than long (lvw/lvl); medial area with wide, shallow cavity, above cavity small, slightly elevated, single tubercle. Apical margin with distinct, easily visible sharp edge; slightly concave apically. Pygidium wider than long, as in Fig. 130.

Female terminalia (Figs 125, 134, 138, 143). Abdominal sternite VIII with enlarged apical lobe, as long as half-length of apodeme; medially with wide, distinctly sclerotised area; sides from half of length to apex with distinct punctures, each bearing short, apically hooked setae. Abdominal tergite VIII subtriangular, apically with numerous, elongate setae. Spermatheca as in Fig. 137. Ovipositor with stout gonocoxite, stylus short.

Male – unknown

Measurements. ♀: al 4.50, apw 2.10, arw 0.90, aw 4.60, bew 5.50, bpw 3.00, el 8.50, eyl 0.60, frw 0.65, hl 1.50, hw 1.40, lb 12.30, lvl 1.10, lww 2.50, mpw 1.40, pl 2.50, rl 3.00, scl 2.40.

Type material. Holotype, ♀ (here designated) – New Caledonia (S); 22°05.9'S, 166°40.7'E; Rivière Bleue Parc Kaori géant, 180 m; humid forest, 22.12.2006, rainforest; leg. R. Dobosz & M. Wanat. Additional museums (USMB) label – 5958/848. (MNHN).

Etymology. With great pleasure I dedicate this species to Henryk Szoltys (Brynek, Poland), excellent coleopterologist, field researcher and my first entomology teacher.

Remarks. This large member of the genus is easy to distinguish from other similarly-sized species (*C. farinosus* Perr. and *C. torosus* sp. n.) by the whitish colour of the dorsal vestiture, funicle antennomeres with protruding, elongate setae, the robust pronotum and distinctly smaller medial tubercles on elytra.

Callistomorphus torosus sp. n.

<http://zoobank.org/A67A412B-AD00-48A1-8F00-ECEA8B4BA6AD>

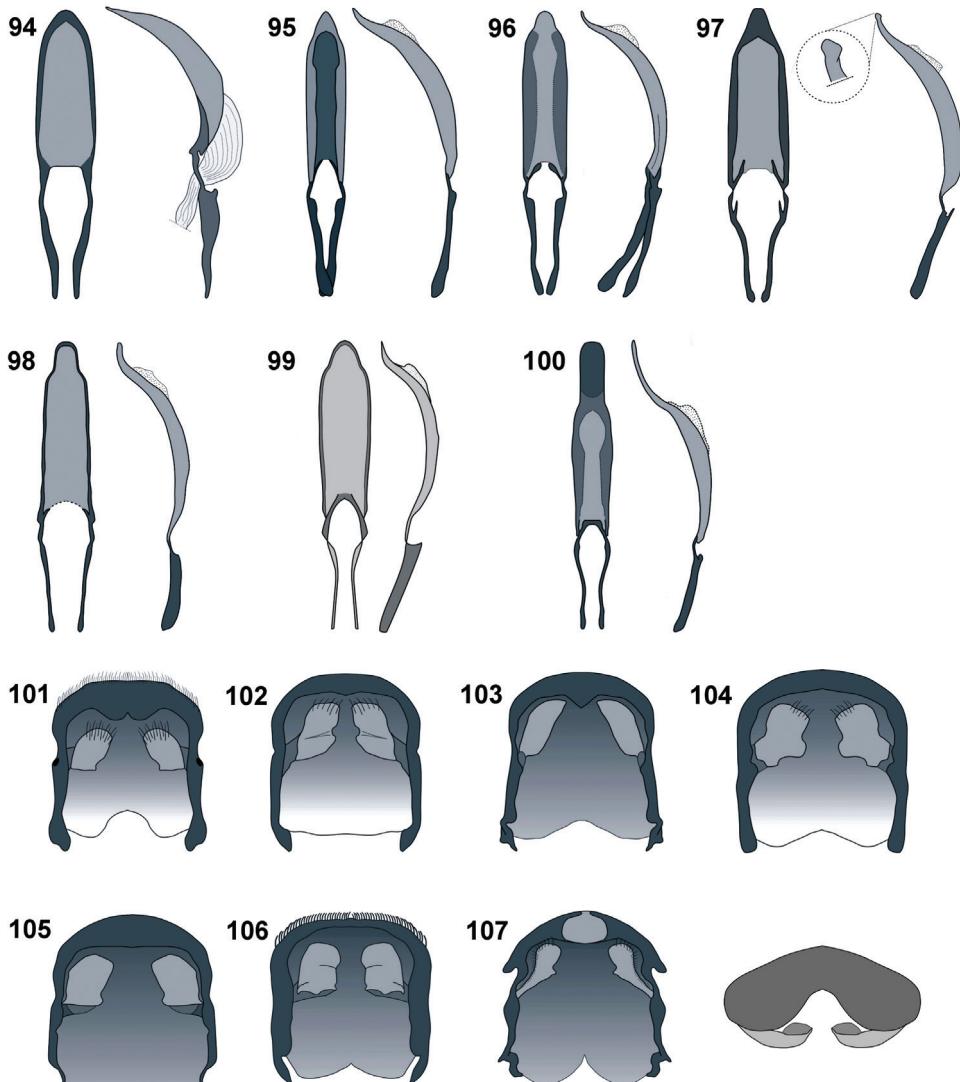
Figures 20, 29, 38, 47, 56, 65, 74, 83, 92, 99, 106, 113, 120, 126, 131, 139, 144

Diagnosis. Together with *C. farinosus* Perr. and *C. szoltysi* sp. n. it is one of the largest members of the genus. Body uniformly dark brown. Eyes weakly convex. Elytra in lateral view weakly convex; medial tubercles large; in dorsal view sides of elytra with distinctly protruding small tubercles. Apical part of penis in lateral view strongly upturned, narrowed, apically pointed. Ovipositor gonocoxite and stylus of similar length, set diagonally to each other.

Description. Body length – 11.30–12.00 mm.

Body colour and vestiture (Fig. 20). Generally dark brown. Indistinct, darker, subtriangular spot between intervals 1–3 situated anteriorly to medial tubercles. White spot on last two intervals present, extended from approximately one-third to two-thirds of length. Apical part of mesepimeron whitish, in contrast to generally dark brown colour of body. Ventral part (metaventrite and ventrites) densely covered by light, variable (from whitish to yellowish) scales.

Head (Figs 65, 74, 83). Subquadrate in female, slightly shorter than wide in male (hw/hl ♂: 0.92; ♀: 1.00). Eyes flattened, slightly in male, more distinctly in female; shorter than half length of head (eyl/hl ♂: 0.38; ♀: 0.46); not protruding above margin of head in lateral view. Frons as wide as double width of eyes or slightly wider. Rostrum slightly longer than pronotum (rl/pl ♂: 1.12; ♀: 1.07); from 3.33 (female) to 3.50 (male) × as long as maximum width at apex (rl/arw), distinctly, regularly curved; longitudinal carina



Figures 94–107. Penis: **94** *C. farinosus* Perr. **95** *C. fundatus* sp. n. **96** *C. gibbus* sp. n. **97** *C. malleus* sp. n. **98** *C. rutai* sp. n. **99** *C. torosus* sp. n. **100** *C. turbidus* sp. n. Male pygidium, ventral view: **101** *C. farinosus* Perr. **102** *C. fundatus* sp. n. **103** *C. gibbus* sp. n. **104** *C. malleus* sp. n. **105** *C. rutai* sp. n. **106** *C. torosus* sp. n. **107** *C. turbidus* sp. n – ventral and frontal view.

on rostrum distinct, medially covered with scales, surface between eyes and on apical part of rostrum shining. Scape shorter than rostrum (scl/rl ♂: 0.82; ♀: 0.83). First funicle segment 1.60 × as long as 2nd; 3rd 0.65 × as long as 2nd; 4th slightly longer than wide; from 5th to 7th as long as wide. Club slender, 2.50 × as long as wide; as long as last four funicle segment combined. Setae on antennomeres distinct, elongate, moderately protruding.

Pronotum (Figs 47, 56). Subquadrate in male, slightly longer than wide in female (bpw/pl ♂: 1.04; ♀: 1.11). Apical margin straight with distinct tubercles; base from $1.30 \times$ (♂) to $1.35 \times$ (♀) as wide as apical margin (bpw/apw). Medial tubercles distinct, strongly protruding, apically obtuse. Width of medial constriction in relation to apical and basal margin: mpw/apw = 0.61 (♀), 0.65 (♂); mpw/bpw = 0.45 (♀), 0.50 (♂).

Elytra (Figs 29, 38). Slightly more than 1.50 \times as long as its width (el/bew ♂: 1.51; ♀: 1.55). Subparallel from base to apical part; 7th interval with strongly protruding tubercle before apex of elytra – posterior calli well developed protruding beyond outline of elytral in dorsal view; in lateral view elytra weakly convex. Odd intervals with distinct tubercles, that are pointed on basal half of elytral disc, and more obtuse on apical part. Striae easily visible, formed by distinct oval punctures. Medial tubercles large; slightly longer than one-quarter length of elytra; in lateral view, more or less one-third of elytral height medially. Scutellum short, subquadrate.

Abdomen (Figs 92, 106, 131). Subquadrate in male, slightly shorter than wide in female (al/aw ♂: 1.00; ♀: 0.93). Last ventrite much wider than long (lvw/lvl ♂: 2.56; ♀: 2.78); both sexes with sharp apical margin; in male apical area distinctly concave, in female apical cavity deeper. Pygidium of male as in Fig. 106, female as in Fig. 131.

Male terminalia (Figs 99, 113, 120). Penis body longer than apodemes; from base to fourth-fifth of length slightly dilated, remainder of penis distinctly narrowed to rounded apex, its basal part sclerotised; in lateral view strongly curved, apically distinctly upward. Internal sac without any distinct structure or sclerites. Parameroid lobes of tegmen divided almost from base. Spiculum gastrale anchor-shaped; hemistermites well sclerotised, fused with base of spiculum.

Female terminalia (Figs 126, 139, 144). Abdominal sternite VIII forked apically, apical lobe enlarged, sclerotised on sides, with erect setae. Abdominal tergite VIII elongate; apex widely rounded. Ovipositor – gonocoxite and stylus of similar length, set diagonally to each other. Spermatheca lost in dissection.

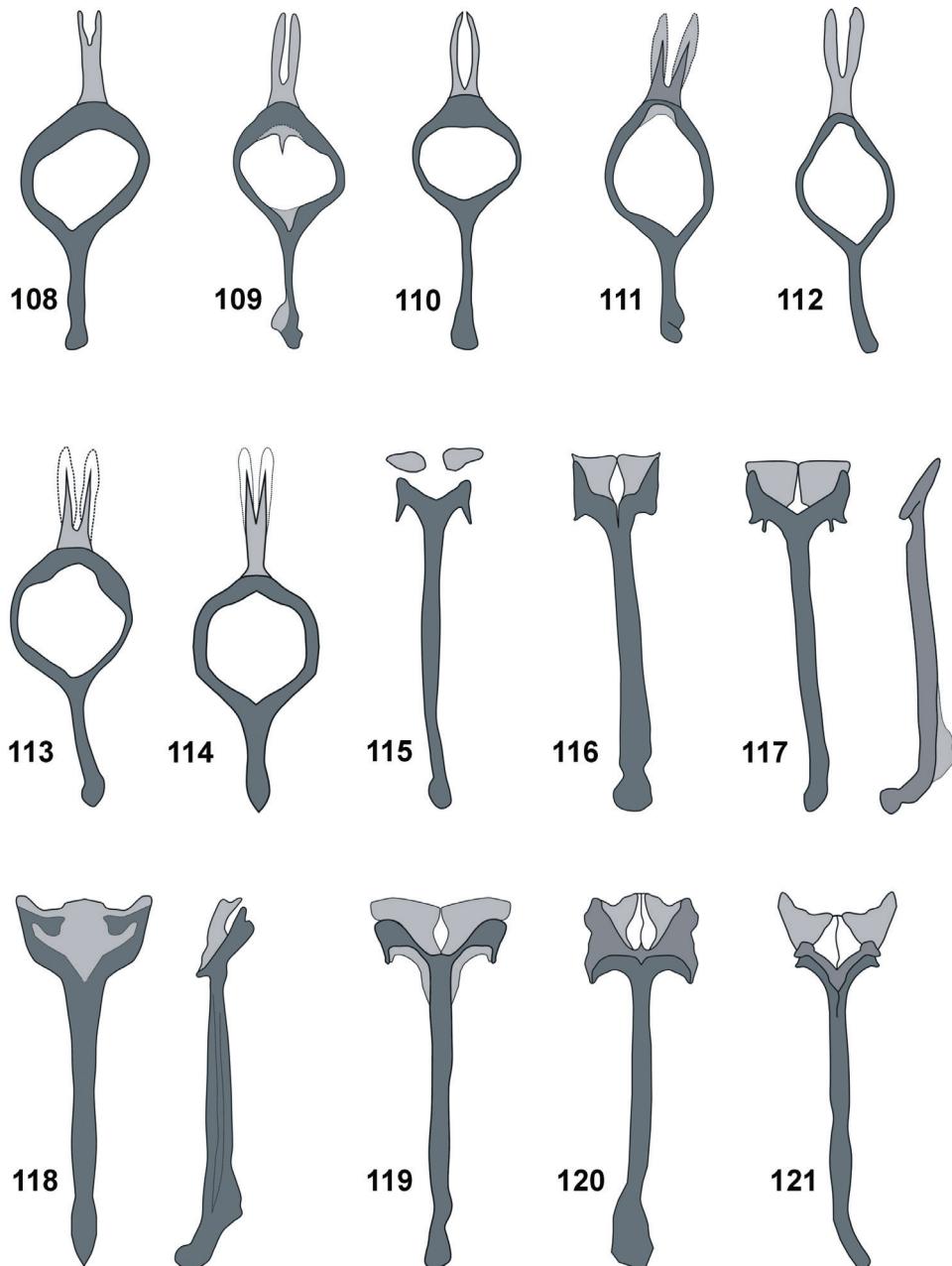
Measurements. ♂: al 4.10, apw 2.00, arw 0.80, aw 4.10, bew 4.90, bpw 2.60, el 7.20, eyl 0.50, frw 0.60, hl 1.30, hw 1.20, lb 11.00, lvl 0.90, lvw 2.30, mpw 1.30, pl 2.50, rl 2.90, scl 2.30.

♀: al 4.30, apw 2.30, arw 0.85, aw 4.60, bew 5.30, bpw 3.10, el 8.00, eyl 0.60, frw 0.60, hl 1.30, hw 1.30, lb 12.00, lvl 0.90, lvw 2.50, mpw 1.40, pl 2.80, rl 3.00, scl 2.50.

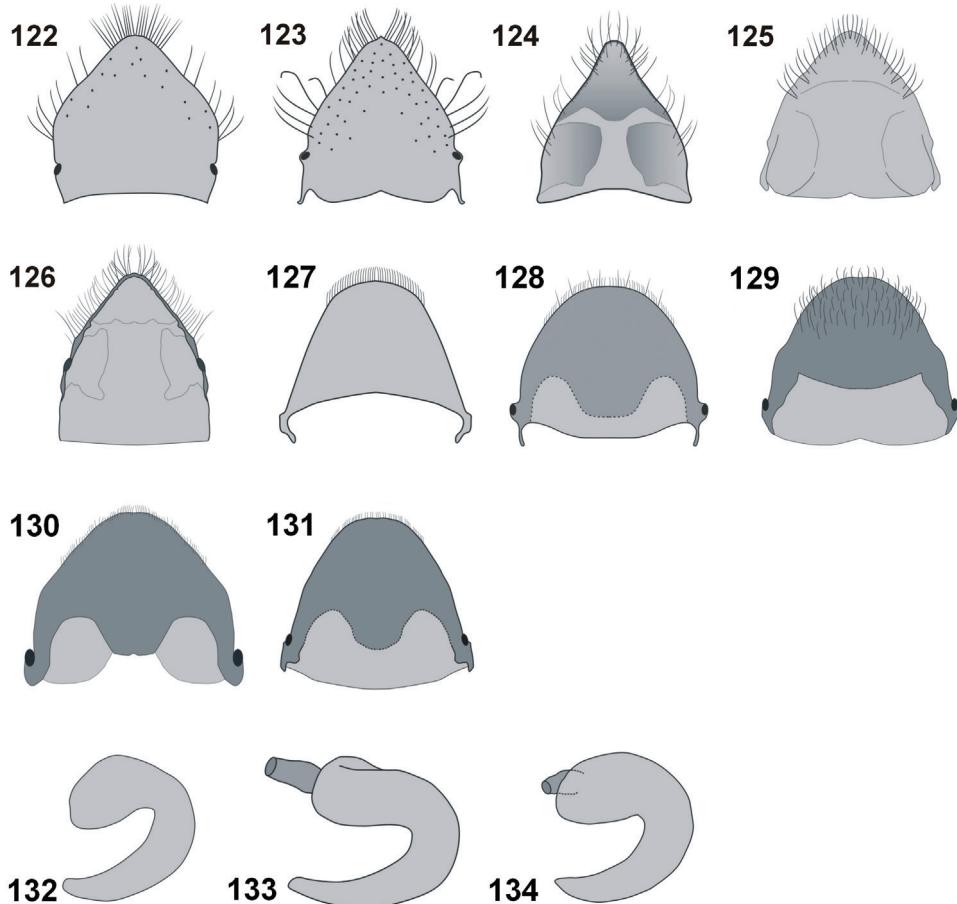
Type material. Holotype, ♂ (here designated) – New Caledonia (N); 20°23.9'S, 164°32.0'E; Mandjélla (subsummit), 11.01.2007, 700–750 m, night beating; leg. M. Wanat & R. Dobosz (MNHN).

Paratype, ♀ – New Caledonia (N); 20°23.9'S, 164°31.9'E; Mandjélla (summit), 10.01.2007, 750–780 m, beating, montane rainforest; leg. M. Wanat & R. Dobosz (MNHW).

Etymology. This epithet is derived from the Latin adjective “*torosus*” (muscular) and refers to “muscular” shape and size.



Figures 108–121. Male. Tegmen: 108 *C. farinosus* Perr. 109 *C. fundatus* sp. n. 110 *C. gibbus* sp. n. 111 *C. malleus* sp. n. 112 *C. rutai* sp. n. 113 *C. torosus* sp. n. 114 *C. turbidus* sp. n. Spiculum gastrale: 115 *C. farinosus* Perr. 116 *C. fundatus* sp. n. 117 *C. gibbus* sp. n. 118 *C. malleus* sp. n. 119 *C. rutai* sp. n. 120 *C. torosus* sp. n. 121 *C. turbidus* sp. n.



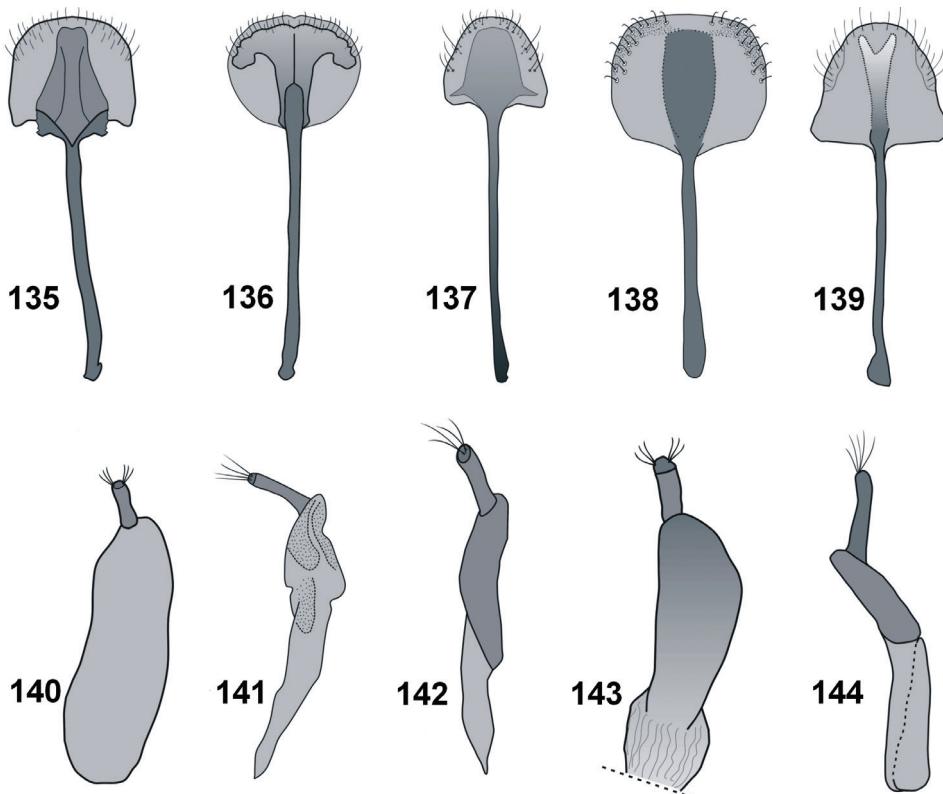
Figures 122–134. Female. Abdominal tergite VIII: 122 *C. farinosus* Perr. 123 *C. malleus* sp. n. 124 *C. minimus* sp. n. 125 *C. szoltysi* sp. n. 126 *C. torosus* sp. n. Pygidium: 127 *C. farinosus* Perr. 128 *C. malleus* sp. n. 129 *C. minimus* sp. n. 130 *C. szoltysi* sp. n. 131 *C. torosus* sp. n. Spermatheca: 132 *C. farinosus* Perr. 133 *C. malleus* sp. n. 134 *C. szoltysi* sp. n.

Callistomorphus turbidus sp. n.

<http://zoobank.org/12FC9A5D-67E0-4F51-A97C-DA725829B1FB>

Figures 5, 11, 21, 30, 39, 48, 57, 66, 75, 84, 93, 100, 107, 114, 121

Diagnosis. Easy to distinguish by combination of several features: apical and basal margin of pronotum slightly concave, apical margin in lateral view distinctly protruding towards head; rostrum relatively short and stout, less than 3 × as long as maximum width apically; strongly curved; penis strongly upwards before two-thirds of length; pygidium apically with distinct depression in ventral view; lateral margin of pygidium in ventral view irregular.



Figures 135–144. Female. Abdominal sternite VIII: **135** *C. farinosus* Perr. **136** *C. malleus* sp. n. **137** *C. minimus* sp. n. **138** *C. szoltysi* sp. n. **139** *C. torosus* sp. n. Ovipositor: **140** *C. farinosus* Perr. **141** *C. malleus* sp. n. **142** *C. minimus* sp. n. **143** *C. szoltysi* sp. n. **144** *C. torosus* sp. n.

Description. Body length (lb) – 8.50 mm.

Body colour and vestiture (Fig. 21). Generally dark brown. Indistinct, paler, stripe from scutellum to base of medial tubercles on third intervals; oblique paler stripe behind medial tubercles reaching paler spot on side of elytra. Pronotum with two, indistinct, lighter, narrow, longitudinal stripes of scales. Head and rostrum covered with paler scales. Tibiae orange, distinctly paler than dark brown femora. Ventrites dark brown with bundle of paler scales on 3rd and 4th ventrites.

Head (Figs 5, 66, 75, 84). Slightly longer than wide (hw/hl ♂: 0.92). Eyes convex with maximum width before middle; shorter than half length of head (eyl/hl ♂: 0.42); not protruding above margin of head in lateral view. Frons slightly wider than double width of eyes. Rostrum slightly longer than pronotum (rl/pl ♂: 1.11); strongly curved and stout (rl/arw ♂: 2.86); longitudinal carina on rostrum very distinct, sharp and polished from base to antennal insertion. Scape shorter than rostrum (scl/rl ♂: 0.75). First funicle segment short, only 1.2 × as long as 2nd; 3rd 0.6 × as 2nd; from 3rd to 7th

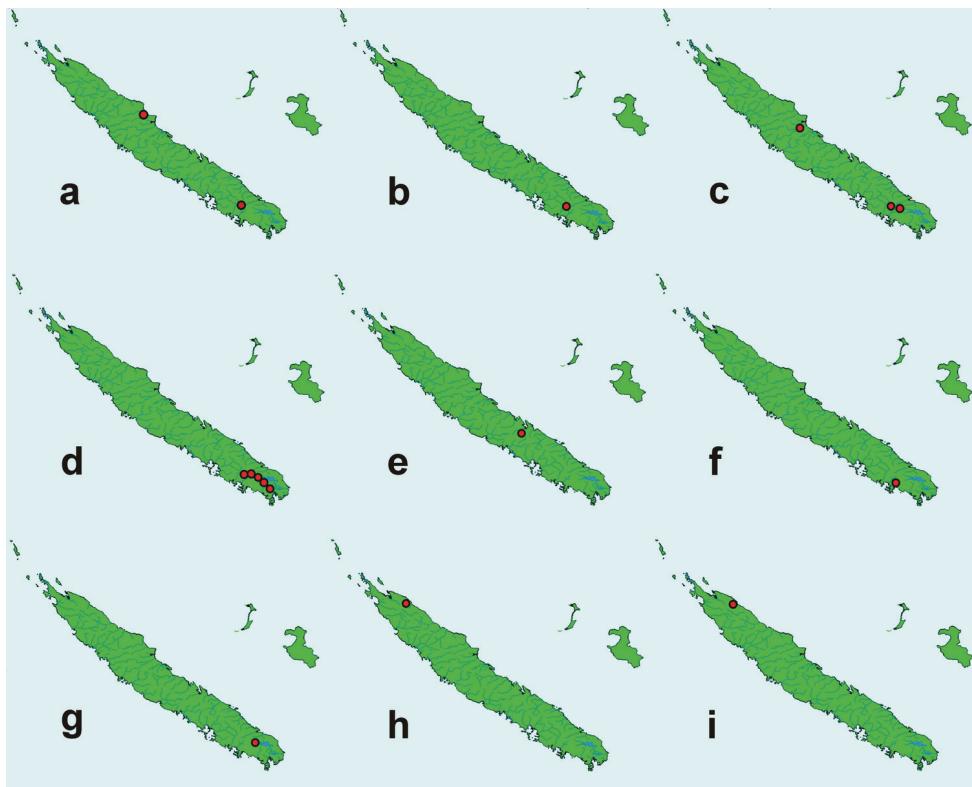


Figure 145. Distribution maps of New Caledonian species of *Callistomorphus*: **a** *C. farinosus* Perr. **b** *C. fundatus* sp. n. **c** *C. gibbus* sp. n. **d** *C. malleus* sp. n. **e** *C. minimus* sp. n. **f** *C. rutai* sp. n. **g** *C. szoltysi* sp. n. **h** *C. torosus* sp. n. **i** *C. turbidus* sp. n.

with similar length; club as long as last four funicle segment combined; setae on antennomeres distinct, elongate, moderately protruding.

Pronotum (Figs 48, 57). Slightly wider than long (bpw/pl ♂: 1.17). Base $1.24 \times$ as wide as apical margin (bpw/apw); apical margin concave with weakly developed tubercles, only on apical angles tubercles distinct and protruding; in lateral view apical margin protruding towards head; basal margin slightly, but visibly, concave medially; basal angles, in dorsal view, lying clearly below middle part of basal margin. Medial tubercles weakly developed, obtuse; in lateral view slightly protruding above margin of pronotum. Width of medial constriction in relation to apical and basal margin in male: mpw/apw = 0.59; mpw/bpw = 0.48.

Elytra (Figs 30, 39). Relatively short (el/bew ♂: 1.47); slightly narrowed behind humeral angles; posterior calli developed, protruding beyond outline of elytra in dorsal view. Surface with very rough sculpture; striae composed of subcircular, shallow punctures; surface bordering striae and intervals indistinct, especially on basal half in front of medial tubercles. Apically striae evanescent, only as shallow

punctures. Medial tubercles distinct, lower than width at base. Scutellum slightly longer than wide.

Abdomen (Figs 93, 107). Slightly longer than wide (al/aw ♂: 1.06). Last ventrite 2.13 × wider than long (lvw/lvl); apical margin sharp; medially on apical portion wide, shallow cavity. Pygidium with a specific shape; apically, in ventral view, with deep cavity.

Male terminalia (Figs 100, 107, 114–121). Penis body distinctly longer than apodemes; base fully sclerotised; from base slightly dilated, maximum width before midlength; before two-thirds of length distinctly narrowed, then subparallel to widely rounded apex; distinctly curved in lateral view, upward before two-thirds of length. Internal sac without any visible structures or sclerites. Parameroid lobes and tegminal apodeme with similar length; divided beyond middle of length. Spiculum gastrale Y-shaped; hemisternites fused with base of spiculum. Hemisternites of sternite VIII elongate, clavate.

Female – unknown

Measurements. ♂: al 3.40, apw 1.70, arw 0.70, aw 3.20, bew 3.80, bpw 2.10, el 5.60, eyl 0.50, frw 0.55, hl 1.20, hw 1.10, lb 8.50, lvl 0.80, lww 1.70, mpw 1.00, pl 1.80, rl 2.00, scl 1.50.

Type material. Holotype, ♂ (here designated) – New Caledonia (N); 20°24'00.3"S, 164°31'40.4"E; Mt. Mandjélla 700–780 m; montane rainforest; 20.11.2008, leg. M. Wanat. (MNHN).

Etymology. This epithet is derived from the Latin adjective “*turbidus*” (confused, impatient) and refers to my feelings after I wasted too much time trying to create any suitable name for this creature.

Remarks. By the short, distinctly curved rostrum, small size and very characteristic male terminalia (unique form of pygidium, strongly upwardly-directed penis body in lateral view), this species is easy to distinguish within the genus. A female is unknown but may be easily distinguished based on the description presented above.

Key to species of the genus *Callistomorphus*

- | | | |
|---|--|--------------------------|
| 1 | Elytra and pronotum glabrous, without prominent tubercles (Figs 26, 35); eyes strongly convex, distinctly protruding above margin of head in lateral view (Fig. 62); length of body less than 7.50 mm..... | <i>C. minimus</i> sp. n. |
| – | Elytra and pronotum strongly scabrous with distinct medial tubercles and numerous, small tubercles on entire elytra (e.g. Figs 25, 33); eyes more or less convex but not protruding above margin of head in lateral view (e.g. Fig. 58); body length greater than 7.50 mm..... | 2 |
| 2 | Apical margin of pronotum strongly concave in dorsal view, protruding towards head in lateral view (e.g. Figs 42, 51) | 3 |
| – | Apical margin of pronotum straight or slightly concave in dorsal view, not protruding towards head in lateral view (e.g. Figs 43, 52) | 6 |

- 3 Body length greater than 10 mm; medial tubercles on elytra relatively short, subequal to one-fifth of elytral length (e.g. Fig. 37)..... 4
- Body length less than 10 mm; medial tubercles relatively elongate, subequal to one-third of elytral length (e.g. Fig. 33) 5
- 4 Medial tubercles on pronotum weakly protruding, obtuse (Fig. 49); body generally dark brown with distinct, large, whitish spot on middle of elytra (Fig. 13) *C. farinosus*
- Medial tubercles on pronotum strongly protruding, rounded (Fig. 55); body generally whitish without any distinct spot on elytra (Fig. 19)
- *C. szoltysi* sp. n.
- 5 Base of pronotum medially rounded (Fig. 42), medial tubercles on pronotum strongly protruding, rounded (Fig. 51); rostrum elongate, more than 3 × as long as wide ($rl/arw = 3.00\text{--}3.30$) *C. gibbus* sp. n.
- Base of pronotum slightly concave (Fig. 48), medial tubercles on pronotum weakly protruding, obtuse (Fig. 57); rostrum short, less than 3 × as long as wide ($rl/arw = 2.85$) *C. turbidus* sp. n.
- 6 Rostrum weakly curved, almost straight, slightly narrowed to apex, 4.00 × as long as maximum width or longer (e.g. Fig. 61)..... 7
- Rostrum regularly curved, indistinctly narrowed to apex, 3.30–3.60 × as long as maximum width (e.g. Fig. 59) 8
- 7 Medial tubercles on elytra short, less than 2 × width of intervals in the middle of elytra; numerous, small tubercles on entire elytra mostly obtuse (Fig. 34); penis body apically expanded into small tubercles in lateral view (Fig. 97)
- *C. malleus* sp. n.
- Medial tubercles on elytra tall, greater than 2 × width of intervals in the middle of elytra; numerous, small tubercles on entire elytra mostly sharp, pointed (Fig. 36); penis body apically rounded in lateral view (Fig. 98)
- *C. rutai* sp. n.
- 8 Elytra elongate, 1.64 × as long as wide (Fig. 23); base of pronotum slightly concave; last ventrite of male subtriangular, 1.86 × wider than long (Fig. 86)..... *C. fundatus* sp. n.
- Elytra shorter, 1.55 × as long as wide (Fig. 29); base of pronotum straight; last ventrite in both sexes shorter, 2.20–2.30 × wider than long (Fig. 92)
- *C. torosus* sp. n.

For a clear presentation of measurements, important for distinguishing particular species, all indices are presented in Table 1. All available specimens have been measured.

Taxonomic position of the genus *Callistomorphus* Perroud

As was mentioned in the introduction, the genus *Callistomorphus* was forgotten or ignored for decades in most of the previously published research on Eugnomini.

Currently, the tribe seems to be not monophyletic, without any clear synapomorphies uniting all the genera. Voss (1937) and Marshall (1937) indicated that the essential feature is the elongation and flexibility of the maxillary palpi, but at the same time they emphasised the weakness of this feature for defining Eugnomini, as it does not occur in the genus *Pactola*. Short maxillary palpi are also present in a close relative of *Pactola* – *Pactolotypus* Broun, 1909, as well as in some species of *Eugnomus* and *Rasilinus* Mazur, 2016 (Mazur 2016 and Mazur – unpublished data). Marshall (1937) distinguished several other features that he suggested as characteristic for Eugnomini, but there are numerous exceptions if we assume the genera currently included in the tribe (Alonso-Zarazaga and Lyal 1999). However, most of these features are represented in *Callistomorphus*.

Cawthra (1966) redefined Eugnominae (sensu Voss 1937) and established a systematic positioning of the tribe, which was subsequently adopted by Alonso-Zarazaga and Lyal (1999) with minor changes. Additionally, Cawthra (1966) included the five genera of Meriphinae Marshall, 1937 in Eugnominae, which are currently treated as a subtribe of Eugnomini (Alonso-Zarazaga and Lyal 1999). The distinguishing characteristics of Eugnomini sensu Cawthra (1966) (without Meriphina), with their relationship to *Callistomorphus* and the exceptions within the tribe, are presented below.

1. Maxilla with elongate second segment of the palpus – present in *Callistomorphus*; maxilla not elongate in some *Eugnomus*, *Pactola*, *Pactolotypus*, *Rasilinus*, *Udeus* Champion, 1902.
2. Head elongate behind the eyes with the temples as long as, or longer than, the eyes – present in *Callistomorphus*; head not elongate in: *Koghicola* Mazur, 2014, *Omoides* Boheman, 1859, some *Pactola*, *Pactolotypus*, *Udeus*.
3. Antennal scrobes oblique, turning rapidly downwards and continued on the lower side of rostrum – present in *Callistomorphus*; within Eugnomini different (not continued) only in *Goneumus* Marshall, 1937.
4. Funicle with seven antennomeres – present in *Callistomorphus*; six-segmented in *Nyxetes* Pascoe, 1870, *Oreocalus* May, 1993, *Pactolotypus*.
5. Hind wings well developed – present in *Callistomorphus* and all other genera except flightless *Pactolotypus*, some *Eugnomus* and *Stephanorhynchus*.
6. Elytra with large tubercles or conspicuous cones – very characteristic for many genera, including *Callistomorphus* also, but absent in some others, including: *Ancytalia* Zimmerman, 1994, *Eugnomus*, *Goneumus*, *Hoplocneme*, *Koghicola*, *Omoides*, *Oreocalus*, some *Pactola*, *Pactolotypus*, *Rhopalomerus*, *Tysius* Pascoe, 1875, *Udeus*.
7. Front coxae contiguous – present in *Callistomorphus*, but coxae separate (sometimes slightly) in *Gonoropterus* Broun, *Omoides*, *Pactolotypus* and *Udeus*.
8. At least posterior femora distinctly extended, strongly toothed – characteristic also for *Callistomorphus*, weakly extended with small tooth in *Ancistropterus* White, 1846, *Eugnomus* and *Goneumus*.
9. Hind tibiae strongly, regularly curved or distinctly sinuate – present in *Callistomorphus*, hind tibiae straight in many genera, including: *Ancistropterus*, *Ancytalia*,

Eugnomus, *Goneumus*, *Hoplocneme*, *Icmalius* Broun, 1893, *Nyxetes*, *Pactolotypus*, *Rhopalomerus*, *Scolopterus*, *Tysius*, *Udeus*.

10. Apex of fore tibiae not mucronate in male – lack of mucro in *Callistomorphus*, tibiae are mucronate in *Ancistropterus*, *Omoides*, some *Rhopalomerus* and *Udeus*.

Callistomorphus is a genus that seems to be closely related to *Stephanorhynchus*, as was previously suggested by Voss (1936). In both genera, the head is distinctly constricted near the base, the claws are unarmed, and all the characteristics mentioned above are shared. Additionally, the structures of the medial tubercles on the elytra and the shapes of the legs are similar (Characteristics 8–10, see above). Both genera are easy to distinguish by the shape of the rostrum (elongate in *Callistomorphus* and short in *Stephanorhynchus*); the mandible (of a normal size and overlapping in *Stephanorhynchus*); dorsal part of rostrum (better developed and pronounced ridge in *Stephanorhynchus*); pronotum (subapical constriction only slightly marked in *Stephanorhynchus*); anterior surface of pronotum (not flattened in *Stephanorhynchus*).

Currently, Eugnomini needs a detailed revision and a comprehensive diagnosis. Since the last study of Cawthra (1966), some genera were included in Eugnomini but these actions were in some cases questioned by other authors (e.g. the genus *Apionodes* Marshall, 1948 was transferred from Anthonomini to Eugnomini by Kojima and Morimoto (1993) and was then shifted back to Anthonomini by Alonso-Zarazaga and Lyal (1999), currently it is a synonym of *Pseudopoophagus* Voss, 1935 in Eugnomini (Caldara 2013); *Oropterus* White, 1846 was incorrectly transferred to Eugnomini by Alonso-Zarazaga and Lyal (2002); and *Acanthopterus* was transferred from Eugnomini to Aterpini, without the appropriate argumentation, by Kuschel (2014)). The lack of a clear diagnosis and the unrecognised taxonomic status of some genera makes further research difficult, especially in the area of New Caledonia, where many undescribed taxa strongly resemble Eugnomini sensu Cawthra (1966). Revisions of all the genera currently placed within the tribe will allow the connections between the three main areas inhabited by the Eugnomini – Australia, New Zealand and New Caledonia – and their relationships with the single, specific genera (*Omoides*, *Udeus*) occurring only in the New World to be examined.

Acknowledgements

I would like to thank the following people for kindly offering me the material used in this study: Marek Wanat (MNHW) and Roland Dobosz (USMB). I offer special thanks to the late Guillermo (Willy) Kuschel (New Zealand). Before he passed away on 1 August 2017, Willy kindly sent me many specimens of Eugnomini from New Caledonia, New Zealand and South America to add to my study (together with the lectotype of *C. farinosus* Perr. designated in this paper). I received also many warm words and the incentive for further work with Eugnomini. Thank you, Willy. I am also grateful to Magdalena Kowalewska-Groszkowska, from the Museum and Institute

of Zoology Polish Academy of Sciences (Warsaw, Poland), for her kind assistance in taking the SEM microphotographs, Douglas Willcox for the linguistic corrections and reviewers for all their useful advices.

References

- Alonso-Zarazaga MA, Lyal CHC (1999) A world catalogue of families and subfamilies of Curculionoidea (Insecta: Coleoptera), excepting Scolytidae and Platypodidae. Entomopraxis, Barcelona, 318 pp.
- Alonso-Zarazaga MA, Lyal CHC (2002) Addenda and Corrigenda to 'A World Catalogue of Families and Genera of Curculionoidea (Insecta: Coleoptera)'. Zootaxa 63: 1–37. <https://doi.org/10.11646/zootaxa.63.1.1>
- Bonvalot J, Gay J-Ch, Habert E (2013) Atlas de la Nouvelle-Calédonie. Institut de recherche pour le développement, Noumea, New Caledonia, 270 pp.
- Caldara R (2013) Curculionidae: Curculioninae. P. 134. In: Löbl I, Smetana A (Eds) Catalogue of Palaearctic Coleoptera. Vol. 8. Brill, Leiden, 700 pp.
- Cawthra EM (1966) A redefinition of the subfamily Eugnominae to include the Meriphinae. Transactions. Royal Society of New Zealand Zoology 7(12): 171–178.
- Gemminger M, Harold EF (1871) Catalogus coleopterorum hucusque descriptorum synonymicus et systematicus, vol. 8, Curculionidae, Monachii, 2181–2690.
- Klima A (1934) Curculionidae: Erirrhininae. In: Schenkling S (Ed.) Coleopterorum Catalogus auspiclis et auxilio W. Junk, 140, 167 pp.
- Kojima H, Morimoto K (1993) On Systematic Position of the Genus *Apionodes* Marshall (Coleoptera, Curculionidae), with description of a new species from Taiwan. Esakia 33: 87–94.
- Kuschel G (2014) The New Caledonian and Fijian species of Aterpini and Gonipterini (Coleoptera: Curculionidae). Zoolgia Neocaledonica 8. Biodiversity studies in New Caledonia, 133–163.
- Lacordaire T (1863) Histoire Naturelle des Insectes. Genera des Coleoptères ou exposé méthodique et critique de tous les genres proposés jusqu'à ici dans cet ordre d'insectes. Paris, Roret 66: 1–37.
- Marschall AF (1873) Nomenclator zoologicus continens nomina systematica generum animalium tam viventium quam fossilium, secundum ordinem alphabeticum disposita, sub auspiciis et sumptibus C. R. Societatis zoologico-botanicae conscriptus a comite Augusto de Marschall. Vindobonae, typis C. Ueberreuter (M. Salzer), 494 pp.
- Marshall GAK (1937) New Curculionidae (Col.) from New Zealand. Transactions of the Royal Society of New Zealand 67(3): 316–340. [pl. 45]
- May BM (1987) Immature stages of Curculionoidea (Coleoptera): rearing records 1964–1986. The New Zealand entomologist 9: 44–56. <https://doi.org/10.1080/00779962.1987.9722492>
- May BM (1993) Larvae of Curculionoidea (Insecta: Coleoptera): a systematic overview. Fauna of New Zealand, 28. Manaaki Whenua Press, Lincoln, Canterbury, New Zealand, 225 pp.

- Mazur MA (2014) Review of the New Caledonian species of the genus *Pactola* Pascoe, 1876 (Coleoptera: Curculionidae: Eugnomini), with description of two new species. Zootaxa 3814(2): 202–220. <https://doi.org/10.111646/zootaxa.3814.2.3>
- Mazur MA (2016) A new genus and nine new species of Eugnomini (Coleoptera, Curculionidae) from New Caledonia. ZooKeys 554: 87–118. <https://doi.org/10.3897/zookeys.554.6120>
- Mazur MA, Tron F, Mille Ch (2016) *Pactola kuscheli* sp. n. (Coleoptera: Curculionidae), a potential cause for the decline of the threatened New Caledonian conifer, *Agathis montana* de Laubenfels, 1969 (Araucariaceae). Austral Entomology 56(3): 268–276. <https://doi.org/10.1111/aen.12234>
- Perroud BP, Montrouzier P (1865) Essai sur la faune entomologique de Kanala (Nouvelle Calédonie) et descriptions de quelques espèces nouvelles ou peu connues. Annales de la Société Linnéenne de Lyon 11: 46–257.
- Scudder SH (1882) Nomenclator zoologicus. An alphabetical list of all generic names that have been employed by naturalists for recent and fossil animals from the earliest times to the close of the year 1879. In two parts: I. Supplemental List. 11. Universal Index. Bulletin of the United States National Museum 19, I–XIX + 1–376 (part I) + 1–340 (part II).
- Voss E (1936) Über die tribus Scolopterini sowie einige verwandte Gattungen und Gruppen von neu-Seeland (Coleoptera: Curculionidae). Arbeiten über morphologische und taxonomische Entomologie, Berlin-Dahlem 3(1): 60–62, (2): 110–121.
- Voss E (1937) Nochmals die Tribus Scolopterini, sowie zur Abgrenzung der Subfamilie Eugnominae (Coleoptera: Curculionidae). Arbeiten über morphologische und taxonomische Entomologie, Berlin-Dahlem 4(1): 37–43.
- Wanat M (2001) Genera of Australo-Pacific Rhadinocybinae and Myrmacelinae, with biogeography of the Apionidae (Coleoptera: Curculionoidea) and phylogeny of the Brentidae (s. lato), Mantis, Olsztyn, 432 pp.

A revision of the new genus *Amiga* Nakahara, Willmott & Espeland, gen. n., described for *Papilio arnaca* Fabricius, 1776 (Lepidoptera, Nymphalidae, Satyrinae)

Shinichi Nakahara^{1,2}, Gerardo Lamas², Stephanie Tyler^{1,3}, Mario Alejandro Marín⁴, Blanca Huertas⁵, Keith R. Willmott¹, Olaf H. H. Mielke⁶, Marianne Espeland⁷

1 McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, Florida 32611 USA **2** Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru **3** School of Architecture, Rice University, 6100 Main Street, Houston, Texas 77005 USA

4 Departamento de Biología Animal and Museu de Zoología, Instituto de Biología, Universidade Estadual de Campinas – UNICAMP, 13083-970 Campinas, São Paulo, Brazil **5** Life Sciences Department, Natural History Museum, Cromwell Road, London SW7 5BD, UK **6** Laboratório de Estudos de Lepidoptera Neotropical, Departamento de Zoológica, Universidade Federal do Paraná, Caixa postal 19020, 81.531 Curitiba, Paraná, Brazil **7** Arthropoda Department, Zoological Research Museum Alexander Koenig, Adenauer Allee 160, 53113 Bonn, Germany

Corresponding author: Shinichi Nakahara (snakahara@ufl.edu)

Academic editor: T. Simonsen | Received 20 November 2018 | Accepted 3 January 2019 | Published 31 January 2019

<http://zoobank.org/ECFCCAF6-8D99-457B-B9F8-2443089D0182>

Citation: Nakahara S, Lamas G, Tyler S, Marín MA, Huertas B, Willmott KR, Mielke OHH, Espeland M (2019) A revision of the new genus *Amiga* Nakahara, Willmott & Espeland gen. n., described for *Papilio arnaca* Fabricius, 1776 (Lepidoptera, Nymphalidae, Satyrinae). ZooKeys 821: 85–152. <https://doi.org/10.3897/zookeys.821.31782>

Abstract

We here propose a new, monotypic genus, *Amiga* Nakahara, Willmott & Espeland, **gen. n.**, to harbor a common Neotropical butterfly, described as *Papilio arnaca* Fabricius, 1776, and hitherto placed in the genus *Chloreuptychia* Forster, 1964. Recent and ongoing molecular phylogenetic research has shown *Chloreuptychia* to be polyphyletic, with *C. arnaca* proving to be unrelated to remaining species and not readily placed in any other described genus. *Amiga arnaca* **gen. n. et comb. n.** as treated here is a widely distributed and very common species ranging from southern Mexico to southern Brazil. A neotype is designated for the names *Papilio arnaca* and its junior synonym, *Papilio ebusa* Cramer, 1780, resulting in the treatment of the latter name as a junior objective synonym of the former. A lectotype is designated for *Euptychia sericeella* Bates, 1865, which is treated as a subspecies, *Amiga arnaca sericeella* (Bates, 1865), **comb. n. et stat. n.**, based on molecular and morphological evidence. We also describe

two new taxa, *Amiga arnaca adela* Nakahara & Espeland, **ssp. n.** and *Amiga arnaca indianacristoi* Nakahara & Marín, **ssp. n.**, new subspecies from the western Andes and eastern Central America, and northern Venezuela, respectively.

Keywords

DNA barcodes, Euptychiina, species delimitation, subspecies, systematics, taxonomy

Introduction

Butterflies are considered to have the best-studied taxonomy of any insect group, but the nymphalid subfamily Satyrinae includes some of the remaining groups still in most need of research, in part owing to its high diversity. Many new satyrine taxa have recently been discovered and described, including some that are among the most common elements of the butterfly fauna around us (e.g., Cong and Grishin 2014; Freitas et al. 2016).

Chloreuptychia Forster, 1964 is a genus in the Satyrinae subtribe Euptychiina, currently (Lamas 2004) containing some of the most brightly coloured euptychiine species, which possess a bluish-lilac reflection on their wings. Butler (1867) made one of the first attempts to classify those species later placed in *Chloreuptychia* by Forster (1964) in a systematic context. The “Division IV” proposed by Butler (1867) was distinguished from other closely related species by “Wings dorsally fuscous, mostly with a violet sheen; ventrally with ocellated spots, those of the hindwings often with their centers elongated and silver”, and he further separated this “Division IV” into two subdivisions. The “subdivision 1” was characterized by “Wings ventrally with regular-shaped ocelli, not elongated” and included *Euptychia sericeella* Bates, 1865 and *Papilio ebusa* Cramer, 1780, “subdivision 2” was characterized by “Hindwings ventrally with ocelli centered with irregular and elongated spots” and included *P. chloris* Cramer, 1780, *P. herse* Cramer, 1775, *E. callichloris* Butler, 1867, *E. hewitsonii* Butler, 1867, *E. agatha* Butler, 1867, and *E. tolumnia* Cramer, 1777. Both subdivisions also contained some species currently (Lamas 2004) not placed in *Chloreuptychia*. Subsequently, Butler (1877) grouped species related to species currently placed in *Chloreuptychia* under his “*arnaea* [sic] group”, although without providing a diagnosis, including *Euptychia arnaea* [sic] Fabricius, 1776, *E. sericeella*, *E. chloris*, *E. herse*, *E. callichloris*, *E. hewitsonii*, *E. agatha*, and *E. tolumnia*, in addition to three unrelated species. Unlike in Butler (1867), *Euptychia arnaea* [sic] and *E. sericeella* were apparently considered as conspecific in Butler (1877). Weymer (1911) recognized *E. arnaea* [sic], *E. sericella* [sic], *E. chloris*, *E. marica* Weymer, 1911, *E. herse*, and *E. callichloris* in his “*Arnaea* [sic] group”, and *E. tolumnia*, *E. catharina* Staudinger, [1886], and *E. hewitsonii* in his “*Tolumnia* group”, in which the latter group was characterized by the presence of forewing androconial scales (scent-scales) in males. Forster (1964) erected the genus *Chloreuptychia* by designating *P. chloris* as the type species of the genus, and recognized *E. arnaea* [sic], *E. sericella* [sic], *P. chloris*, *E. herse*, *E. marica*, *E. catharina*, *E. tolumnia*,

and *E. hewitsonii* in his new genus. This classification was followed by Miller (1968). Lamas (2004) recognized 10 species in *Chloreuptychia*, namely *C. agatha*, *C. arnaca*, *C. callichloris*, *C. catharina*, *C. chlorimene* (Hübner, [1819]), *C. herseis* (Godart, [1824]), *C. hewitsonii*, *C. marica*, *C. sericeella*, and *C. toolumnia*, in addition to two undescribed species from Peru. Importantly, Lamas (2004) listed replacement names provided by subsequent authors for the preoccupied names *P. herse* and *P. chloris*, namely *C. herseis* and *P. chlorimene* respectively, both of which were ignored in earlier studies. Recently, *C. amethysta* Brévignon & Benmesbah, 2012 was described as a new species, bringing the total number of described species for this genus to eleven (Lamas 2004; Brévignon and Benmesbah 2012).

Previous authors apparently placed species in *Chloreuptychia* based mainly on the bluish-lilac reflection on the wing surface, without testing monophyly and/or synapomorphies, and the genus has proved to be highly polyphyletic based on recent broad collaborative research on the group (Espeland et al. 2019; unpubl. data). In order to contribute towards a better understanding of the Euptychiina systematics, we here describe a new genus to harbor *P. arnaca*, and review the taxonomy of this common component of the butterfly community in the Neotropics. Neotypes for the names *P. arnaca* and *P. ebusa* are designated, and two new subspecies are described based on wing pattern and DNA data.

Material and methods

Morphological study

We studied external morphology by soaking legs, labial palpi, and abdomens in hot 10% KOH solution for 5–10 minutes and dissecting them, storing them in glycerine after examination. Membranous structures of the phallus and female genitalia were stained with chlorazol black prior to examination to better visualize membranous structures. Drawings of external morphology were done using a camera lucida attached to a Leica MZ 16 stereomicroscope at FLMNH. Terminology for wing venation and wing pattern elements follows Nakahara et al. (2018b); nomenclature of genitalia follows Nakahara et al. (2018a).

The following collection acronyms are used throughout the text:

BME	Bohart Museum of Entomology, University of California, Davis, CA, USA
CBF	Colección Boliviana de Fauna, La Paz, Bolivia
CMNH	Carnegie Museum of Natural History, Pittsburgh, USA
DZUP	Departamento de Zoología, Universidade Federal do Paraná, Curitiba, Brazil
FLMNH	McGuire Center for Lepidoptera and Biodiversity, Florida Museum of Natural History, University of Florida, Gainesville, USA
FRPI	Francisco Piñas collection, Quito, Ecuador

HERENCIA	Corporación Herencia Natural y Cultural collection, Florencia, Colombia
ICNA	Ichiro Nakamura collection, Williamsville, USA
INABIO	Instituto Nacional de Biodiversidad, Ecuador (formerly MECN)
LBCB	L. & C. Brévignon collection, Cayenne, French Guiana
MEFLG	Museo Entomológico ‘Francisco Luis Gallego’, Medellín, Colombia
MHNNKM	Museo de Historia Natural ‘Noel Kempff Mercado’, Santa Cruz, Bolivia
MNHU	Museum für Naturkunde, Leibniz-Institut für Evolutions- und Biodiversitätsforschung an der Humboldt Universität, Berlin, Germany (formerly ZMHU)
MUA	Museo Universitario, Universidad de Antioquia, Medellín, Colombia
MUSM	Museo de Historia Natural, Universidad Nacional Mayor de San Marcos, Lima, Peru
NHMUK	Natural History Museum, London, UK (formerly BMNH)
PUCE	Museo de Entomología, Pontificia Universidad Católica del Ecuador, Quito, Ecuador
RMNH	Rijksmuseum van Natuurlijke Historie (presently Netherlands Centre for Biodiversity Naturalis), Leiden, Netherlands
UMG	Hunterian Museum, University Museum of Glasgow, Glasgow, UK
USNM	National Museum of Natural History, Smithsonian Institution, Washington, DC, USA
ZSM	Zoologische Staatssammlung München, Munich, Germany
ZUEC	Museu de Zoologia da Universidade Estadual de Campinas ‘Adão José Cardoso’, Campinas, Brazil

Phylogeny and species delimitation

DNA was extracted from leg or thorax tissue, either dried or stored in 96% ethanol. Voucher specimens are deposited at FLMNH, DZUP and ZUEC.

DNA extraction methods, PCR conditions and primers used for amplification of cytochrome c oxidase I (COI), elongation factor 1-alpha (EF1-a), glyceraldehyde 3-phosphate dehydrogenase (GAPDH) and ribosomal protein S5 (RPS5) follow Nakahara et al. (2015, 2018a, 2018b). Sequences for additional specimens were taken from Peña et al. (2010), Matos-Maraví et al. (2013) and Espeland et al. (2019) (Table 1). The complete concatenated Sanger dataset contained 19 taxa, including eight *A. arnaca* specimens, and 2934bps. As it has previously been shown that using the standard genes above might not provide sufficient support for the deeper relationships of Euptychiina (Peña et al. 2010), we also inferred a phylogeny using the 368 loci (182, 350bps) for 17 of the taxa analyzed by Espeland et al. (2019). This dataset contains single specimens of *Amiga* gen. n., *Chloreuptychia chlorimene*, *C. herseis*, and *C. catharina* as well as outgroups to better show the placement of *arnaca* relative to other members

Table I. GenBank accession numbers for specimens used for molecular analysis in this study.

Voucher code	Genus	Species/ Subspecies	Genes			
			COI	EF1a	GAPDH	RPS5
LEP-16938	<i>Pseudodebis</i>	<i>valentina</i>	SAMN09745417	SAMN09745417	SAMN09745417	SAMN09745417
LEP-10646	<i>Taygetis</i>	<i>cleopatra</i>	MK305304	N/A	N/A	N/A
BC-DZ-250	<i>Archeupterychia</i>	<i>cluena</i>	SAMN09745463	SAMN09745463	SAMN09745463	SAMN09745463
LEP-19580	<i>Chloreupterychia</i>	<i>herseis</i>	SAMN09745427	N/A	N/A	N/A
LEP-14945		<i>herseis</i>	MK279723	N/A	N/A	N/A
KW 081111 51		<i>herseis</i>	MK279714	N/A	N/A	N/A
LEP-04394		<i>herseis</i>	MK279719	MK305298	MK305291	MK305285
LEP-09835	<i>Euptychoides</i>	<i>eugenia</i>	SAMN09745408	SAMN09745408	SAMN09745408	SAMN09745408
LEP-10685		<i>eugenia</i>	MK305305	N/A	N/A	N/A
LEP-10059		<i>eugenia</i>	MK305306	N/A	N/A	N/A
YPH0575	<i>Nhambikuara</i>	<i>cerradensis</i>	MF489987	N/A	N/A	N/A
NW149-11	<i>Taydebis</i>	<i>peculiaris</i>	GQ864811	GQ864905	GQ865036	GQ865499
CP06 70	<i>Megeupterychia</i>	<i>monopunctata</i>	GU205852	GU205908	GU205964	GU206024
LEP-16939	<i>Magneupterychia</i>	<i>philippa</i>	SAMN09745418	SAMN09745418	SAMN09745418	SAMN09745418
LEP-10710	<i>Chloreupterychia</i>	<i>agatha</i>	MK305307	N/A	N/A	N/A
LEP-04406		<i>agatha</i>	N/A	MK305299	MK305292	MK305286
KW 140708-02		<i>chlorimene</i>	SAMN09745398	SAMN09745398	SAMN09745398	SAMN09745398
KW 140705-07		<i>agatha</i>	MK305308	N/A	N/A	N/A
02-SRNP-5948	Amiga	<i>arnaca adela</i>	ADE52482	N/A	N/A	N/A
07-SRNP-100105		<i>arnaca adela</i>	AFA15201	N/A	N/A	N/A
BC-DZ_Willmott-055		<i>arnaca arnaca</i>	MK291952	N/A	N/A	N/A
BC-DZ_Willmott-056		<i>arnaca arnaca</i>	MK291953	N/A	N/A	N/A
BC-DZ_Willmott-057		<i>arnaca arnaca</i>	MK291954	N/A	N/A	N/A
CP06-76		<i>arnaca arnaca</i>	GU205829	GU205885	GU205941	GU206001
DNA99-015		<i>arnaca arnaca</i>	AY508527	AY509054	N/A	N/A
LEP-04408		<i>arnaca arnaca</i>	MK291955	N/A	N/A	N/A
LEP-09788		<i>arnaca adela</i>	MK291956	N/A	MK305293	MK305287
LEP-09930		<i>arnaca adela</i>	MK291957	MK305300	MK305294	MK305288
LEP-09931		<i>arnaca adela</i>	MK291958	N/A	N/A	N/A
LEP-10696		<i>arnaca arnaca</i>	MK291959	MK305301	MK305295	
LEP-10697		<i>arnaca arnaca</i>	MK291960	N/A	N/A	N/A
LEP-10703		<i>arnaca arnaca</i>	MK291961	MK305302	MK305296	MK305289
LEP-15082		<i>arnaca arnaca</i>	MK291962	N/A	N/A	N/A
LEP-16997		<i>arnaca sericeella</i>	MK291963	MK305303	MK305297	MK305290
LEP-34357		<i>arnaca arnaca</i>	MK291964	N/A	N/A	N/A
LEP-37404		<i>arnaca arnaca</i>	MK291965	N/A	N/A	N/A
LEP-37411		<i>arnaca arnaca</i>	MK291966	N/A	N/A	N/A
LEP-37416		<i>arnaca arnaca</i>	MK291967	N/A	N/A	N/A
LEP-37525		<i>arnaca adela</i>	MK291968	N/A	N/A	N/A
LEP-55465		<i>arnaca adela</i>	MK291969	N/A	N/A	N/A
MGCL-LOAN-028		<i>arnaca adela</i>	MK291970	N/A	N/A	N/A
MGCL-LOAN-090		<i>arnaca arnaca</i>	MK291971	N/A	N/A	N/A
MGCL-LOAN-139		<i>arnaca adela</i>	MK291972	N/A	N/A	N/A
MGCL-LOAN-144		<i>arnaca adela</i>	MK291973	N/A	N/A	N/A
MGCL-LOAN-162		<i>arnaca arnaca</i>	MK291974	N/A	N/A	N/A
MGCL-LOAN-217		<i>arnaca arnaca</i>	MK291975	N/A	N/A	N/A
YB-BCI23691		<i>arnaca adela</i>	KP848781	N/A	N/A	N/A
YB-BCI35406		<i>arnaca adela</i>	AKN57330	N/A	N/A	N/A
YB-BCI35436		<i>arnaca adela</i>	AKN57333	N/A	N/A	N/A
YB-BCI46591		<i>arnaca adela</i>	AKN57332	N/A	N/A	N/A
YB-BCI46628		<i>arnaca adela</i>	AKN57334	N/A	N/A	N/A
YB-BCI49395		<i>arnaca adela</i>	AKN57335	N/A	N/A	N/A
YB-BCI6807		<i>arnaca adela</i>	ADK42359	N/A	N/A	N/A
YB-BCI766		<i>arnaca adela</i>	ADK42362	N/A	N/A	N/A
KW 140618-01		<i>arnaca arnaca</i>	SAMN09745390	SAMN09745390	SAMN09745390	SAMN09745390

of *Chloreuptychia*. These are available on Mendeley Data (<https://doi.org/10.17632/m7gc59vnp3.1>).

Sequences generated by Sanger sequencing were assembled using Geneious 10 (Biomatters), and aligned using MAFFT v. 7 (Katoh 2013). Phylogenies were inferred for each gene separately (Sanger data only) as well for the concatenated data. The genes were partitioned to codon position and partitions and models were selected using ModelFinder (Kalyaanamoorthy et al. 2017) in IQ-Tree 1.6.7 (Nguyen et al. 2015). Thereafter 200 tree searches were performed in IQ-tree and the tree with the highest likelihood was selected. Support was calculated based on 2000 ultrafast bootstrap replicates with the *-bnni* option to reduce the risk of overestimating branch support (Hoang et al. 2017). The trees were rooted with *Cyllopsis hedemanni* R. Felder, 1869 based on prior information (Espeland et al. 2019). The hybrid enrichment data were cleaned, assembled and aligned according to Espeland et al. (2018, 2019). A phylogeny was inferred using IQ-tree as above, but with 1000 ultrafast bootstrap replicates, also rooting with *Cyllopsis hedemanni*. All nodes with a support lower than 75 were collapsed and this tree was subsequently used as a constraint tree for the concatenated Sanger data, which was analyzed in IQ-Tree as above, leading to the final dataset containing 31 taxa. GenBank accession numbers for sequences used in this study can be found in Table 1.

For species delimitation, a dataset consisting only of COI sequences with unique haplotypes was used. Sequences were aligned as above. The alignment was shortened to minimize the amount of missing data at both ends and the final dataset consisted of 30 sequences with a length of 615 bps. This included 16 *Amiga arnaca* comb. n. specimens and multiple outgroups. Sequences were not available for one of the proposed taxa (*A. arnaca indianacristoi* ssp. n.). Single threshold GMYC (Generalized Mixed Yule Coalescent; Pons et al. 2006; Fujisawa and Barraclough 2013), bPTP (bayesian Poisson Tree Processes; Zhang et al. 2013) and ABGD (Automated Barcode Gap Discovery; Puillandre et al. 2012) were used to assess the threshold between infra- and interspecific relationships in *A. arnaca* comb. n. GMYC assigns branching events to either a yule process (interspecific) or the coalescent (intraspecific). The reduced COI dataset was partitioned into codon positions, and model selection and phylogenetic inference was done as above. The resulting tree was rendered ultrametric using semi-parametric penalized likelihood (Sanderson 2002) by applying the *chronos* function in the APE package (Paradis et al. 2004, Popescu et al. 2012) in R. The fit of four clock models (strict clock, discrete clock with 10 rate categories, correlated clock and relaxed clock) was tested using the Φ information criterion by Paradis (2013). For all four clock models three different values (0.01, 0.1, 1) of the smoothing parameter (lambda) were tested. A strict clock model was found to be the best fit and the smoothing parameter did not affect the species delimitation result, so only GMYC results for the strict clock tree with lambda = 1 are shown below. Support values of species clusters delimited by GMYC were calculated using information-theoretic multimodel inference (Fujisawa and Barraclough 2013). GMYC was performed using the SPLITS package v. 1.0-19 (from <http://r-forge.r-project.org/projects/splits>) in R. bPTP models branching events were based on the number of substitutions (Zhang et al. 2013), and conse-

quently do not require an ultrametric input tree. We used the ML tree inferred above as input for bPTP analyses on the bPTP webserver (<https://species.h-its.org/ptp/>). The Markov Chain Monte Carlo (MCMC) was run for a total of 500,000 generations with thinning set to 1000 and burnin to 0.1. ABGD tries to find a barcode gap in the distribution of pair wise differences (Puillandre et al. 2012) and does not require an input tree. The reduced COI alignment was used as input for ABGD analyses on the ABGD webserver (<http://wwwabi.snv.jussieu.fr/public/abgd/abgdweb.html>) using the Kimura distance with transition/transversion ratio set to 2. Pmin, Pmax, Steps and Nb bins were kept as default, and the relative gap width (X) was set to 1. The genetic distances were calculated based on the Tamura-Nei model using Geneious version 11.1.5 (Biomatters Ltd.) based on COI data (Table 2).

Results and discussion

Molecular phylogeny and species delimitation

The ML tree based on four genes and with the 368 gene hybrid enrichment tree used as a constraint tree is shown in Figure 1A. Although deeper relationships are mostly not well supported it is clear that *C. arnaca* is not closely related to the remaining *Chloreuptychia* species, as also found by Espeland et al. (2019) based on 368 loci, as well as phylogeny inferred based on hybrid enrichment data generated for this study (see Suppl. material 1).

All three species delimitation methods delimited the same three “species” within *Amiga* gen. n., with allopatric distributions: eastern Central America to western Ecuador (*A. arnaca adela* ssp. n.), east of the Andes (*A. arnaca arnaca* comb. n.), and Mexico to Honduras (*A. arnaca sericeella* comb. n. et stat. n.), although support values are not very high (Fig. 1B). We here decide to consider these taxa as subspecies since *A. arnaca* comb. n. is a morphologically very distinct species itself, and although morphological differences exist between the subspecies they are not very prominent in comparison with other groups of sympatric, closely related euptchiine species. This taxonomic arrangement is reinforced by three subspecies being recovered only in the gene tree inferred using COI and one nuclear gene (GAPDH), but not in any of the trees inferred using EF1a, RPS5 or in the combined tree (Fig. 1A, B; Suppl. material 1). Because nuclear genes evolve slowly and lineage sorting is slower compared to mitochondrial genes, we consider these data to provide evidence for the subspecific status of the taxa discussed below. Braby et al. (2012) defined subspecies in butterflies as partially isolated, allopatric, lineages within a species that are phenotypically distinguishable with at least one fixed diagnosable character state correlated with genetic structure, which matches exactly what we find here. In addition to the three subspecies delimited above we consider another allopatric lineage (*A. arnaca indianacristoi* ssp. n.) as a subspecies based on morphological differences only, as we could not obtain sequence data from this particular taxon.

Table 2. Genetic distances calculated based on the Tamura-Nei model.

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17		
1	02-SRNP-5948 Amiga arnaca adela (Costa Rica)	0.003	0.003	0.076	0.073	0.067	0.061	0.064	0.058	0.024	0.024	0.058	0.061	0.058	0.058	0.044	0.044		
2	07-SRNP-00105 Amiga arnaca adela (Costa Rica)	0.003	0.003	0.063	0.065	0.058	0.058	0.074	0.058	0.026	0.026	0.027	0.057	0.06	0.056	0.062	0.043	0.043	
3	BC-DZ_Willmott-055 Amiga arnaca arnaca (Maranhão, Brazil)	0.076	0.063	0.005	0.022	0.032	0.034	0.033	0.06	0.06	0.062	0.032	0.033	0.03	0.037	0.055	0.055	0.061	
4	BC-DZ_Willmott-056 Amiga arnaca arnaca (Para, Brazil)	0.073	0.065	0.005	0.024	0.032	0.034	0.031	0.06	0.06	0.06	0.032	0.032	0.03	0.035	0.053	0.053	0.066	
5	BC-DZ_Willmott-057 Amiga arnaca arnaca (Espírito Santo, Brazil)	0.067	0.058	0.022	0.024	0.029	0.022	0.028	0.063	0.062	0.062	0.026	0.021	0.026	0.028	0.05	0.052	0.022	
6	CP06-76 Amiga arnaca arnaca (Amazonas, Peru)	0.061	0.058	0.032	0.032	0.029	0.027	0.006	0.059	0.059	0.059	0.002	0.005	0.002	0.006	0.046	0.046	0.031	
7	DNA99-015 Amiga arnaca arnaca (Napo, Ecuador)	0.064	0.074	0.034	0.034	0.022	0.027	0.023	0.073	0.073	0.073	0.026	0.023	0.025	0.023	0.055	0.055	0.034	
8	LEP-04408 Amiga arnaca arnaca (Morona-Santiago, Ecuador)	0.058	0.058	0.035	0.031	0.028	0.026	0.006	0.023	0.006	0.056	0.002	0.002	0.002	0.002	0.043	0.043	0.031	
9	LEP-09788 Amiga arnaca adela (Guayas, Ecuador)	0.024	0.026	0.006	0.06	0.063	0.059	0.073	0.06	0	0	0.059	0.061	0.057	0.064	0.041	0.041	0.066	
10	LEP-09930 Amiga arnaca adela (Pichincha, Ecuador)	0.024	0.026	0.006	0.06	0.062	0.059	0.073	0.06	0	0	0.059	0.061	0.057	0.064	0.041	0.041	0.066	
11	LEP-09931 Amiga arnaca adela (Esmeraldas, Ecuador)	0.024	0.027	0.062	0.06	0.062	0.059	0.073	0.056	0	0	0.058	0.061	0.057	0.064	0.041	0.041	0.066	
12	LEP-10696 Amiga arnaca arnaca (Zamora-Chinchipe, Ecuador)	0.058	0.057	0.032	0.03	0.026	0.002	0.026	0.002	0.059	0.059	0.058	0.003	0	0	0.005	0.045	0.03	
13	LEP-10697 Amiga arnaca arnaca (Pastaza, Ecuador)	0.061	0.06	0.033	0.032	0.021	0.005	0.023	0.005	0.061	0.061	0.061	0.003	0.003	0.005	0.046	0.046	0.032	
14	LEP-10703 Amiga arnaca arnaca (Zamora-Chinchipe, Ecuador)	0.058	0.056	0.03	0.03	0.026	0.002	0.025	0.002	0.057	0.057	0.057	0	0.003	0.005	0.044	0.044	0.03	
15	LEP-15082 Amiga arnaca arnaca (Morona-Chinchipe, Ecuador)	0.058	0.062	0.037	0.035	0.028	0.006	0.031	0.01	0.064	0.064	0.064	0.005	0.005	0.005	0.051	0.051	0.035	
16	LEP-16997 Amiga arnaca sericea (Copán, Honduras)	0.044	0.043	0.053	0.053	0.005	0.046	0.055	0.043	0.041	0.041	0.045	0.046	0.044	0.044	0.051	0.051	0.053	
17	LEP-34357 Amiga arnaca arnaca (St-Laurent du Maroni, French Guyana)	0.073	0.061	0.006	0.006	0.022	0.031	0.034	0.031	0.06	0.06	0.06	0.032	0.032	0.03	0.035	0.053	0.053	
18	LEP-37404 Amiga arnaca arnaca (San Martín, Peru)	0.064	0.056	0.027	0.027	0.017	0.022	0.011	0.023	0.023	0.061	0.061	0.059	0.021	0.018	0.023	0.023	0.044	0.024
19	LEP-37411 Amiga arnaca arnaca (San Martín, Peru)	0.064	0.059	0.029	0.024	0.019	0.024	0.011	0.023	0.023	0.061	0.061	0.059	0.021	0.018	0.023	0.023	0.044	0.027
20	LEP-37416 Amiga arnaca arnaca (San Martín, Peru)	0.064	0.056	0.027	0.024	0.017	0.023	0.011	0.021	0.021	0.061	0.061	0.059	0.021	0.018	0.023	0.023	0.044	0.024
21	LEP-37525 Amiga arnaca adela (Esmeraldas, Ecuador)	0.024	0.026	0.061	0.061	0.061	0.06	0.075	0.06	0	0	0	0.059	0.062	0.058	0.064	0.041	0.059	
22	LEP-55465 Amiga arnaca adela (Carchi, Ecuador)	0.024	0.026	0.061	0.061	0.061	0.06	0.075	0.06	0	0	0	0	0.058	0.064	0.041	0.059	0.059	
23	MGCL-LOAN-028 Amiga arnaca arnaca adela (Antioquia, Colombia)	0.049	0.049	0.052	0.049	0.049	0.049	0.042	0.077	0.039	0.036	0.036	0.036	0.039	0.046	0.039	0.042	0.028	0.052
24	MGCL-LOAN-090 Amiga arnaca arnaca (Para, Brazil)	0.073	0.062	0.003	0	0.022	0.031	0.034	0.031	0.06	0.06	0.06	0.03	0.032	0.03	0.035	0.053	0.003	
25	MGCL-LOAN-139 Amiga arnaca adela (Chocó, Colombia)	0.03	0.029	0.058	0.053	0.058	0.055	0.072	0.054	0.014	0.014	0.013	0.053	0.055	0.053	0.058	0.041	0.056	
26	MGCL-LOAN-144 Amiga arnaca adela (Chocó, Colombia)	0.03	0.029	0.058	0.053	0.058	0.055	0.072	0.054	0.014	0.014	0.013	0.053	0.055	0.053	0.058	0.041	0.056	
27	MGCL-LOAN-162 Amiga arnaca arnaca (Mines Gerais, Brazil)	0.067	0.059	0.025	0.02	0.006	0.027	0.022	0.026	0.061	0.061	0.06	0.025	0.025	0.025	0.026	0.046	0.024	
28	MGCL-LOAN-217 Amiga arnaca arnaca (Bahia, Brazil)	0.067	0.061	0.024	0.019	0.005	0.029	0.029	0.028	0.063	0.062	0.062	0.026	0.021	0.026	0.028	0.048	0.022	
29	YB-BG123691 Amiga arnaca adela (Panama)	0.033	0.028	0.058	0.059	0.056	0.056	0.075	0.056	0.015	0.015	0.055	0.058	0.054	0.054	0.06	0.044	0.056	
30	YB-BG135406 Amiga arnaca adela (Panama)	0.033	0.028	0.058	0.056	0.056	0.056	0.075	0.056	0.015	0.015	0.055	0.058	0.054	0.054	0.06	0.044	0.056	
31	YB-BG135436 Amiga arnaca adela (Panama)	0.03	0.027	0.055	0.057	0.055	0.051	0.072	0.053	0.012	0.012	0.05	0.053	0.049	0.052	0.044	0.053	0.053	
32	YB-BG146591 Amiga arnaca adela (Panama)	0.033	0.028	0.058	0.059	0.056	0.056	0.075	0.056	0.015	0.015	0.055	0.058	0.054	0.054	0.06	0.044	0.056	
33	YB-BC146628 Amiga arnaca adela (Panama)	0.033	0.028	0.058	0.059	0.056	0.056	0.075	0.056	0.015	0.015	0.055	0.058	0.054	0.054	0.06	0.044	0.056	
34	YB-BG149395 Amiga arnaca adela (Panama)	0.034	0.03	0.057	0.058	0.059	0.055	0.075	0.057	0.014	0.014	0.054	0.057	0.052	0.055	0.047	0.055	0.055	
35	YB-BG16807 Amiga arnaca adela (Panama)	0.03	0.026	0.056	0.057	0.054	0.054	0.072	0.055	0.013	0.013	0.054	0.056	0.052	0.058	0.042	0.054	0.054	
36	YB-BG1766 Amiga arnaca adela (Panama)	0.033	0.028	0.058	0.059	0.056	0.056	0.075	0.056	0.015	0.015	0.055	0.058	0.054	0.054	0.06	0.044	0.056	

Table 2. Continued.

	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36
1	02-SRNP-5948 Amiga amaca adda (Costa Rica)	0.064	0.064	0.064	0.024	0.024	0.049	0.073	0.03	0.067	0.067	0.033	0.033	0.033	0.034	0.034	0.03	0.033	
2	07-SRNP-100105 Amiga amaca adda (Costa Rica)	0.056	0.059	0.056	0.026	0.026	0.049	0.062	0.029	0.059	0.061	0.028	0.028	0.028	0.03	0.026	0.026	0.028	
3	BC-IDZ_-Willmott-055 Amiga amaca amaca (Maranhao, Brazil)	0.027	0.029	0.027	0.061	0.061	0.052	0.003	0.058	0.025	0.024	0.058	0.055	0.058	0.057	0.057	0.056	0.058	
4	BC-IDZ_-Willmott-056 Amiga amaca amaca (Para, Brazil)	0.027	0.024	0.024	0.061	0.061	0.049	0	0.053	0.053	0.02	0.019	0.059	0.056	0.057	0.059	0.058	0.057	
5	BC-IDZ_-Willmott-057 Amiga amaca amaca (Espírito Santo, Brazil)	0.017	0.019	0.017	0.061	0.061	0.059	0.022	0.058	0.058	0.006	0.005	0.056	0.055	0.056	0.056	0.059	0.054	
6	CP06-76 Amiga amaca amaca (Amazonas, Peru)	0.022	0.024	0.023	0.06	0.06	0.042	0.031	0.055	0.055	0.027	0.029	0.056	0.056	0.051	0.056	0.055	0.054	
7	DNA99-015 Amiga amaca amaca (Napo, Ecuador)	0.011	0.011	0.011	0.075	0.075	0.075	0.077	0.034	0.072	0.022	0.022	0.075	0.075	0.072	0.075	0.075	0.075	
8	LEP-04408 Amiga amaca amaca (Morona-Santiago, Ecuador)	0.023	0.023	0.021	0.06	0.039	0.031	0.054	0.054	0.026	0.028	0.056	0.056	0.056	0.057	0.055	0.057	0.056	
9	LEP-097588 Amiga amaca adda (Guayas, Ecuador)	0.061	0.061	0.061	0	0	0.036	0.06	0.014	0.014	0.061	0.063	0.015	0.015	0.015	0.014	0.013	0.015	
10	LEP-09930 Amiga amaca adda (Pichincha, Ecuador)	0.061	0.061	0.061	0	0	0.036	0.06	0.014	0.014	0.061	0.062	0.015	0.015	0.015	0.014	0.013	0.015	
11	LEP-09931 Amiga amaca adda (Esmeraldas, Ecuador)	0.059	0.059	0.059	0	0	0.036	0.06	0.013	0.013	0.06	0.062	0.015	0.015	0.012	0.015	0.015	0.015	
12	LEP-10696 Amiga amaca amaca (Zamora-Chinchipe, Ecuador)	0.021	0.021	0.021	0.059	0.059	0.039	0.03	0.053	0.053	0.025	0.026	0.055	0.055	0.05	0.055	0.054	0.054	
13	LEP-10697 Amiga amaca adda (Pastaza, Ecuador)	0.018	0.018	0.018	0.062	0.062	0.046	0.032	0.055	0.055	0.02	0.021	0.058	0.058	0.053	0.058	0.057	0.056	
14	LEP-10703 Amiga amaca amaca (Zamora-Chinchipe, Ecuador)	0.023	0.023	0.023	0.058	0.058	0.039	0.03	0.053	0.053	0.025	0.026	0.054	0.054	0.049	0.054	0.052	0.054	
15	LEP-15082 Amiga amaca amaca (Morona-Santiago, Ecuador)	0.023	0.023	0.023	0.064	0.064	0.041	0.042	0.053	0.041	0.041	0.046	0.048	0.044	0.044	0.044	0.042	0.044	
16	LEP-16997 Amiga amaca sericeola (Copan, Honduras)	0.044	0.044	0.044	0.041	0.041	0.028	0.053	0.041	0.041	0.046	0.048	0.044	0.044	0.044	0.044	0.042	0.044	
17	LEP-34357 Amiga amaca amaca (St-Laurant du Maroni, French Guiana)	0.024	0.027	0.024	0.059	0.059	0.052	0.003	0.056	0.056	0.024	0.022	0.056	0.056	0.053	0.056	0.055	0.054	
18	LEP-37404 Amiga amaca amaca (San Martin, Peru)	0.003	0	0	0.059	0.059	0.052	0.024	0.054	0.054	0.016	0.017	0.054	0.055	0.053	0.054	0.055	0.052	
19	LEP-37411 Amiga amaca amaca (San Martin, Peru)	0.003	0	0	0.061	0.061	0.052	0.024	0.051	0.051	0.012	0.014	0.058	0.055	0.057	0.058	0.058	0.058	
20	LEP-37416 Amiga amaca amaca (San Martin, Peru)	0	0	0	0.06	0.06	0.052	0.024	0.052	0.052	0.013	0.014	0.055	0.055	0.054	0.055	0.055	0.055	
21	LEP-37525 Amiga amaca amaca (Esmeraldas, Ecuador)	0.059	0.061	0.06	0	0	0.036	0.06	0.014	0.014	0.061	0.063	0.014	0.014	0.012	0.014	0.014	0.014	
22	LEP-55365 Amiga amaca adda (Carchi, Ecuador)	0.059	0.061	0.06	0	0	0.036	0.06	0.014	0.014	0.061	0.063	0.014	0.014	0.012	0.014	0.013	0.014	
23	MGCL-LOAN-N-028 Amiga amaca adda (Antioquia, Colombia)	0.052	0.052	0.052	0.036	0.036	0.049	0.03	0.03	0.056	0.059	0.03	0.03	0.03	0.03	0.03	0.03	0.03	
24	MGCL-LOAN-N-090 Amiga amaca amaca (Para, Brazil)	0.024	0.024	0.024	0.06	0.06	0.049	0.053	0.053	0.021	0.019	0.056	0.056	0.054	0.056	0.055	0.055	0.056	
25	MGCL-LOAN-N-139 Amiga amaca adda (Choco, Colombia)	0.054	0.051	0.052	0.014	0.014	0.03	0.053	0	0.051	0.053	0.005	0.005	0.003	0.005	0.005	0.003	0.005	
26	MGCL-LOAN-N-44 Amiga amaca adda (Choco, Colombia)	0.054	0.051	0.052	0.014	0.014	0.03	0.053	0	0.051	0.053	0.005	0.005	0.002	0.003	0.005	0.003	0.005	
27	MGCL-LOAN-N-162 Amiga amaca amaca (Minas Gerais, Brazil)	0.016	0.012	0.013	0.061	0.061	0.056	0.021	0.051	0.051	0.002	0.002	0.058	0.055	0.057	0.058	0.06	0.056	
28	MGCL-LOAN-N-217 Amiga amaca amaca (Bahia, Brazil)	0.017	0.014	0.014	0.063	0.063	0.059	0.019	0.053	0.053	0.002	0.002	0.059	0.056	0.058	0.059	0.062	0.058	
29	YB-BCI23691 Amiga amaca adda (Panama)	0.054	0.058	0.055	0.014	0.014	0.03	0.056	0.005	0.005	0.058	0.058	0	0	0	0	0.002	0	
30	YB-BCI3406 Amiga amaca adda (Panama)	0.055	0.055	0.055	0.014	0.014	0.03	0.056	0.002	0.002	0.055	0.056	0	0.002	0	0	0.002	0	
31	YB-BCI35436 Amiga amaca adda (Panama)	0.053	0.057	0.054	0.012	0.012	0.03	0.054	0.003	0.003	0.057	0.058	0.002	0.002	0	0	0.002	0	
32	YB-BCI46591 Amiga amaca adda (Panama)	0.054	0.058	0.055	0.014	0.014	0.03	0.056	0.005	0.005	0.058	0.059	0	0	0.002	0	0	0	
33	YB-BCI46628 Amiga amaca adda (Panama)	0.054	0.058	0.055	0.014	0.014	0.03	0.056	0.005	0.005	0.058	0.059	0	0	0.002	0	0.002	0	
34	YB-BCI49395 Amiga amaca adda (Panama)	0.055	0.058	0.055	0.014	0.014	0.03	0.055	0.005	0.005	0.06	0.062	0	0	0.002	0	0.002	0	
35	YB-BCI6807 Amiga amaca adda (Panama)	0.052	0.056	0.053	0.013	0.013	0.03	0.055	0.003	0.003	0.056	0.058	0.002	0.002	0	0.002	0.002	0	
36	YB-BCI766 Amiga amaca adda (Panama)	0.054	0.058	0.055	0.014	0.014	0.03	0.056	0.005	0.005	0.058	0.059	0	0	0.002	0	0.002	0	

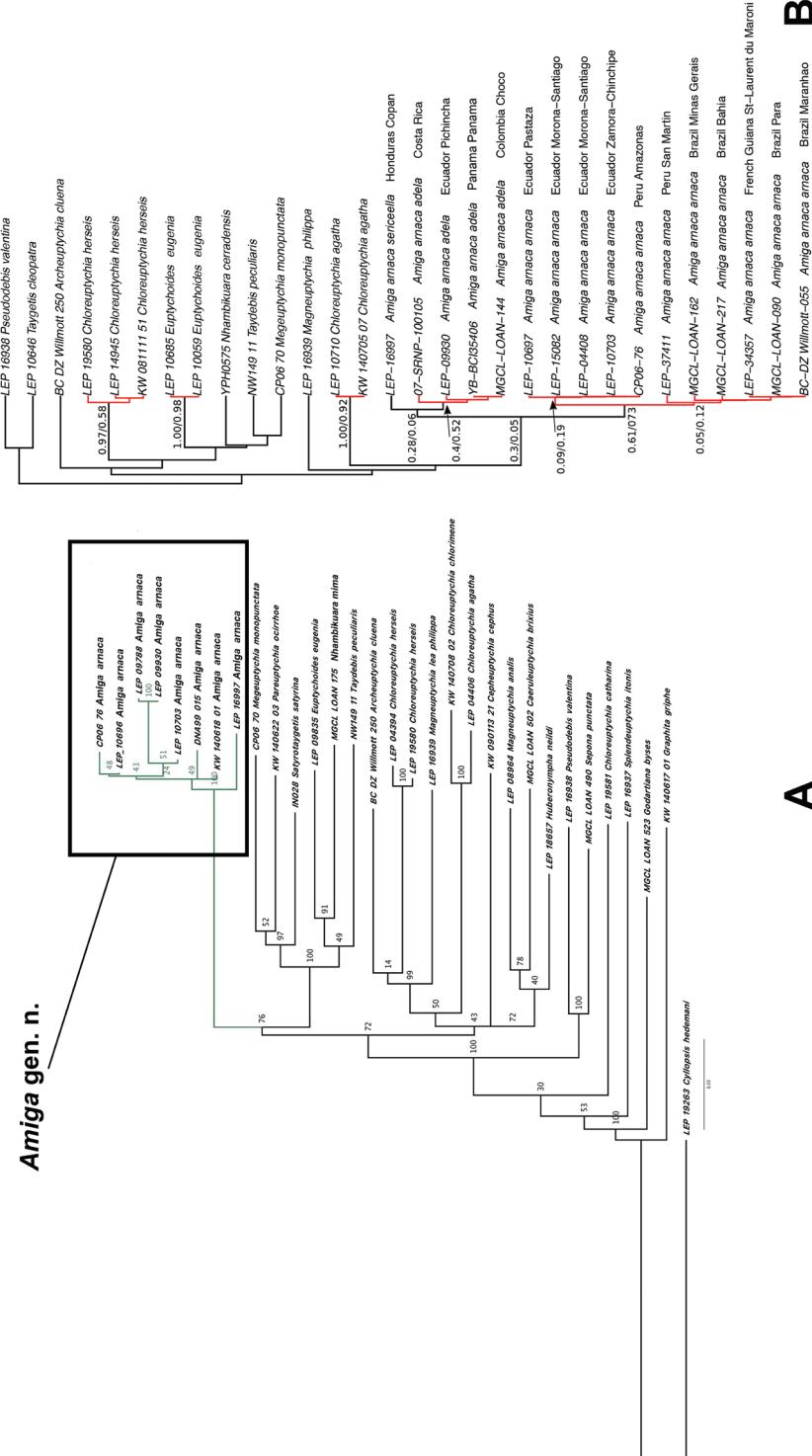


Figure 1. **A** Results of maximum likelihood analysis based on concatenated dataset of 4 genes (COI, EF1 α , RPS5, GAPDH) with hybrid enrichment data used as a constraint tree. Support values indicate ultrafast bootstrap. **B** Results from species delimitation analyses based on unique COI sequences only. Clades in red were delimited as separate units in all analyses (GMYC, bPTP and ABGD). Delimited clades within *A. annaca* comb. n. are here interpreted as subspecies. Support values indicate the probabilities that the specimens connected at that node constitute a separate unit (GMYC/bPTP).

Amiga Nakahara, Willmott & Espeland, gen. n.

<http://zoobank.org/ADBD4E75-4ACB-4C53-93D6-D557DA94CB4B>

Type species. *Papilio arnaca* Fabricius, 1776, by present designation

Systematic placement and diagnosis. Espeland et al. (2019) recovered *Amiga arnaca* comb. n. as sister to the “*Pareuptychia* clade”, whose composition partially corresponded to that found in Peña et al. (2010), with a high support (BS and PP > 0.95). The “*Pareuptychia* clade” itself was also well supported (BS and PP > 0.95), including *Satyrotaygetis satyrina* (Bates, 1865), *Magneuptychia inani* (Staudinger, [1886]), *Euptychoides albofasciata* (Hewitson, 1869), *Neonympha areolatus* (Smith, 1797), *Erichthodes antonina* (C. Felder & R. Felder, 1867), *Pareuptychia ocirrhoe* (Fabricius, 1776), *Megeuptychia antonoe* (Cramer, 1775), *Splendeuptychia doxes* (Godart, [1824]), *Nhamabikuara mima* (Butler, 1867), and *Euptychoides eugenia* (C. Felder & R. Felder, 1867). *Amiga* gen. n. is distinguished from all members of the “*Pareuptychia* clade” by the presence of bluish-lilac coloration on the dorsal hindwing and by the purplish sheen in the tornal half of the VHW. Furthermore, the absence of cornuti and membranous lamella antevaginalis of *Amiga* gen. n. appear to be unusual character states among the clade. The type species of *Chloreuptychia*, *Papilio chloris* Cramer, 1780 (= *Chloreuptychia chlorimene*) was recovered as sister to a moderately supported (BS and PP > 0.75 < 0.95), clade including the “*Pareuptychia* clade”, “*Taygetis* clade”, “*Splendeuptychia* clade” and “*Archeuptychia* clade”.

Description. MALE: Forewing length: 18.5–22 mm ($n = 6$)

Head: Eyes with sparse golden hair-like setae, with white scales along margin; frons dark brownish, covered with creamy brownish scales and hair-like scales towards antennae; first segment of labial palpi similar in width to second segment, similar in length to third segment, adorned with white long hair-like scales and brownish long hair-like scales ventrally, second segment longer than eye depth and covered with white hair-like scales, brownish hair-like scales, and white scales laterally and dorsally, with brownish hair-like scales and brownish scales along edge of distal two-thirds of dorsal surface, ventrally adorned with brownish hair-like scales and whitish hair-like scales longer than segment width, third segment roughly one-third of second segment in length and covered with brownish scales dorsally and ventrally, with white scales laterally; antennae approximately half of forewing length, with ca 34 segments ($n = 1$), scape about as twice as long as pedicel, white scales on each side of base of flagellomeres, distal 10–12 segments composing club.

Thorax: Brownish, dorsally scattered with grayish scales and lightly colored long hair-like scales; ventrally scattered with white scales and white long hair-like scales; foreleg (Fig. 5c) whitish, femur, tibia and tarsus similar in length; midleg and hindleg with femur white ventrally, tibia and tarsus grayish dorsally, ocher ventrally tibia and tarsus adorned with spines ventrally, pair of tibial spurs present at distal end of tibia.

Abdomen (Fig. 3a, b): Eighth tergite sclerotized in a narrow anterior band and slightly broader posterior patch, which appear as two separate plates.

Wing venation (Fig. 3): Basal half of forewing subcostal vein swollen; base of cubitus swollen; forewing recurrent vein present as small projection slightly above origin of M_2 ; hindwing humeral vein developed; origin of M_2 slightly towards M_1 than M_3 .

Wing shape: Forewing triangular, apex rounded, costal margin slightly convex, outer margin almost straight below M_2 , inner margin almost straight, but curving inwards towards thorax near base; hindwing somewhat rectangular, slightly elongate, costal margin almost straight, angled inwards at base, outer margin slightly undulating, inner margin slightly curved near tornus, anal lobe convex, slightly rounded.

Dorsal forewing: Ground color light brownish, slightly translucent, thus subtly revealing ventral bands and ocelli in cell M_1 .

Dorsal hindwing: Ground color similar to forewing, iridescent bluish lilac reflection covering most of dorsal hindwing, area near costa and area distal to marginal band revealing ground color; slightly translucent, thus subtly revealing ventral bands and ocelli.

Ventral forewing: Ground color pale grayish brown; pale reddish-brown discal band extending from radial vein, crossing discal cell, passing origin of Cu_2 , terminating at 2A; concolorous scales present along discocellular vein; pale reddish-brown postdiscal band extending from radial vein towards inner margin until reaching vein 2A, slightly wider than discal band; broad, faint, iridescent bluish-lilac reflection extending just distal of postdiscal band towards outer margin, prominent between postdiscal band and umbra; sinuate, narrow submarginal band, almost concolorous to basal two bands, extending from apex towards tornus, jagged above Cu_1 , almost straight below this vein; concolorous marginal band, not jagged, appearing narrower than submarginal band, traversing along marginal area from apex to tornus; fringe brownish; ocellus in cell M_1 , spilling out from veins M_1 and M_2 , black with two whitish pupils in center, ringed in yellowish orange, ocelli present in cell M_2 and M_3 , appearing as two slate-gray patches surrounded by yellowish-orange ring; umbra appearing as broad rather faint band concolorous to four ventral bands, visible around ocelli, extending to cell Cu_2 .

Ventral hindwing: Ground color similar to forewing; general wing pattern similar to forewing except as follows: iridescent bluish-lilac reflection extending from base of wing, towards outer and inner margin, especially area where iridescent bluish scales are present on dorsal surface; discal band passing cubital vein area basal to origin of Cu_2 ; postdiscal band passing origin of Cu_1 , bent inwards in cell Cu_2 ; submarginal band broadening towards tornus after passing Cu_1 ; five submarginal ocelli, those in cells M_1 and Cu_1 similar to that in VFW cell M_1 but with single pupil, those in cells M_2 and M_3 similar to those in VFW cells Rs, M_2 and M_3 but slate grayish patch appearing as single patch in middle.

Genitalia (Fig. 4c–g): Tegumen appears semi-circular in lateral view, anteriorly and dorsally convex, ventral margin rather straight; uncus longer than tegumen in lateral view, apparently without setae, middle section somewhat broadening in dorsal view, tapering posteriorly and terminating in single point; brachium tapering towards apex, apical point positioned above uncus in lateral view, parallel to uncus with apical edge curving inwards in dorsal view; combination of ventral arms from tegumen and

dorsal arms from saccus slightly curved distally; appendices angulares present; saccus narrow, concavity at base of ventral margin, anteriorly rounded, similar or shorter than uncus in length; juxta present as plate with deep concavity at dorsal margin in posterior view; valva distally setose, valva appearing roughly parallelogram in lateral view, ventral margin convex, dorsal margin distal of costa curved, costa curved inwards, apical process somewhat curving upwards; phallus roughly straight, similar in length to valva plus saccus, phallobase about one-third of phallus, ductus ejaculatorius visible as illustrated, posterior portion of aedeagus somewhat curved upwards, manica covering more than half of aedeagus, cornuti absent.

FEMALE: forewing length: 19–21 mm ($n = 6$)

Similar to male except as follows: Five tarsomeres present in foretarsus, with spines along some tarsomeres; forewing appearing somewhat rounded and broad; dorsal hindwing submarginal band somewhat more prominent; bluish lilac reflection appearing more purplish, extending to origin of M_1 or further anteriorly; feeble pearly reflection present on dorsal forewing (but see below for further information). **Female genitalia and abdomen** (Figs 4h–k): Inter-segmental membrane between 7th and 8th abdominal segments pleated and expandable, with weakly sclerotized region present; lamella antevaginalis membranous; lateral side of 8th abdominal segment sclerotized (referred to as “lamella postvaginalis” by Willmott et al. 2018), this sclerotized plate fused to lamella antevaginalis at anterior margin; ductus bursae membranous, somewhat inflated around origin of ductus seminalis, located at approximately one-fifth distance from ostium bursae to corpus bursae, ductus bursae apparently weakly sclerotized at region posterior to origin of ductus seminalis; corpus bursae roughly oval in dorsal view, with two relatively narrow signa, together with ductus bursae extending to juncture of 4th and 5th sternite.

Variation. This species exhibits geographic variation in wing pattern, some of which is recognized here with subspecific names. A broad, faint, iridescent bluish-lilac reflection between the ventral forewing postdiscal band and the umbra is present in specimens from the eastern Andes, whereas it is absent in many specimens from west of the Andes. The absence of this bluish-lilac reflection on the ventral forewing seems rather stable in specimens from western Colombia and western Ecuador. However, this character appears in a few specimens from Panama, and is present in some specimens from Costa Rica and Nicaragua, although the degree of reflection is variable. The bluish-lilac reflection seen mainly on both the dorsal forewing and hindwing is variable in color, varying from light blue to purple. Especially in female specimens, the extent of bluish-lilac reflection on the dorsal forewing is variable, being absent in some specimens, whereas covering most of the discal cell and cells Cu_1 and Cu_2 in others (see below for further information). There exists a feeble pearly reflection on the ventral forewing from the base to the postdiscal band in specimens from southeastern Brazil (see below for further information), although this is absent in a few specimens. The presence or absence of a ventral forewing ocellus in cell M_3 is variable, appearing as a trace in some specimens. The size of the ventral hindwing ocellus in cell M_1 is variable in comparison with the ventral hindwing ocellus in cell Cu_1 , ranging from similar in

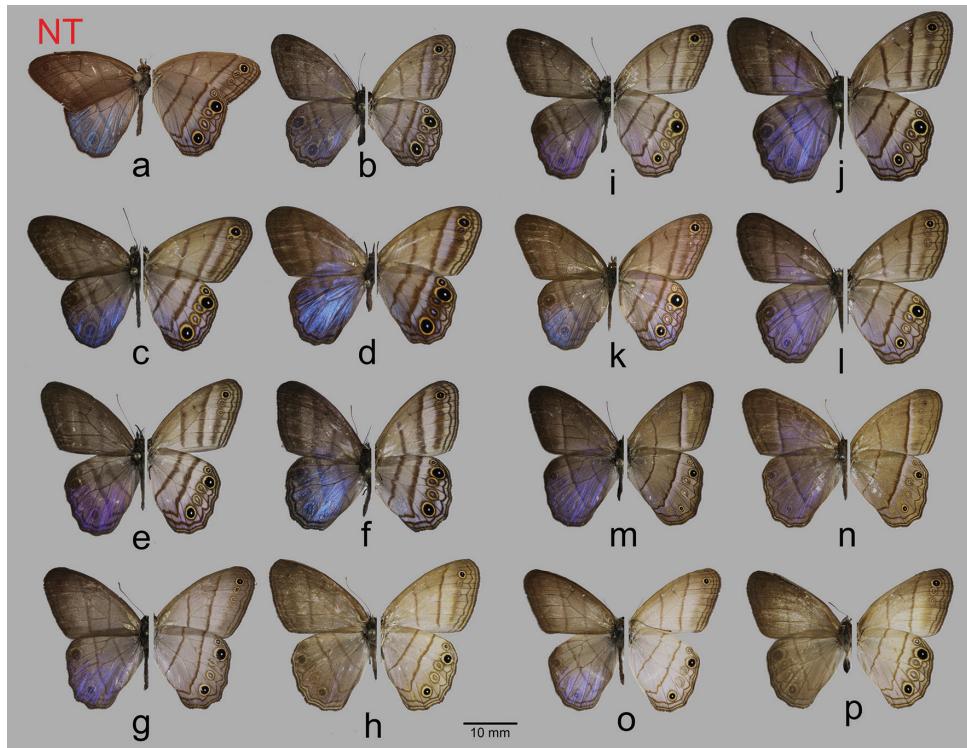


Figure 2. *Amiga arnaca* spp. specimens spanning its range (dorsal on left, ventral on right): **a** nominotypical subspecies from Suriname, neotype male (USNM) **b** nominotypical subspecies from Guyana, female (FLMNH-MGCL 263373) **c** nominotypical subspecies from E Ecuador, male (FLMNH-MGCL 257121) **d** nominotypical subspecies from Peru, female (FLMNH-MGCL 262953); **e** nominotypical subspecies from N Brazil, male (FLMNH-MGCL 1036223) **f** Nominotypical subspecies from N Brazil, female (FLMNH-MGCL 207984) **g** Nominotypical subspecies from SE Brazil, male (FLMNH-MGCL 1036213); **h** nominotypical subspecies from SE Brazil, female (FLMNH-MGCL 1036218) **i** *A. arnaca adela* from Costa Rica, male (FLMNH-MGCL 207991) **j** *A. arnaca adela* from Costa Rica, female (FLMNH-MGCL 207992) **k** *A. arnaca adela* from W Ecuador, holotype male (FLMNH-MGCL 151127) **l** *A. arnaca adela* from W Ecuador, female (FLMNH-MGCL 257087) **m** *A. arnaca sericeella*, male from Mexico (FLMNH-MGCL 207900) **n** *A. arnaca sericeella* from Mexico, female (FLMNH-MGCL 207896) **o** *A. arnaca indianacristoi* from NW Venezuela, paratype male (FLMNH-MGCL 263107) **p** *A. arnaca indianacristoi* from N Venezuela, paratype female (FLMNH-MGCL 1036235).

size to almost twice as large. The genitalia appear not to be informative in separating specimens from east and west of the Andes, although specimens from Central America, including *A. arnaca sericeella* comb. n. et stat. n., seem to have a rather curved dorsal margin of the uncus in lateral view (Fig. 4e).

Etymology. The new generic name is derived from the feminine Spanish noun “amiga”, meaning “a (female) friend”, alluding to the fact that this is a common, familiar butterfly. The generic name is regarded as feminine.

Biology. Janzen and Hallwachs (2018) report four grass species (Poaceae), *Ichnanthus nemorosus*, *Ichnanthus pallens*, *Lasiacis ruscifolia*, and *Paspalum decumbens*,

as hostplants for *Amiga* gen. n. in Costa Rica. In addition, DeVries (1987) reported three grass genera, namely *Eleusine*, *Ichnanthus*, and *Oplismenus*, as hostplants in Costa Rica. Singer and Ehrlich (1993) reported *Ichnanthus pallens* as a hostplant in Trinidad and Tobago. The egg, mature larva, and pupa of *Amiga* gen. n. were described and the latter two stages illustrated in DeVries (1987). Various images of the penultimate instar, ultimate instar, prepupa and pupa are figured by Janzen and Hallwachs (2018), based on material reared in Costa Rica. In Costa Rica, adult females of *Amiga* gen. n. were seen ovipositing late in the afternoon, and some eggs were observed to be parasitized by trichogrammatid wasps (DeVries 1987). The species occurs from sea level to at least 1850 m, and it is common, indeed ubiquitous, in undisturbed to heavily disturbed rain and cloud forest. Both sexes fly low (0.5 m) along shady trails throughout the middle of the day (09:00–15:00), and males are often observed perching singly on tops of leaves, maintaining apparent territories, and patrolling for ca 10 m along a trail.

Distribution (Fig. 6). This genus ranges from southern Mexico throughout virtually all of tropical Central and South America, where its southernmost distribution appears to be southern Brazil.

Taxonomy

Amiga gen. n. is regarded as monotypic, with total of four subspecies recognized, of which two are named and described herein.

Amiga Nakahara, Willmott & Espeland, gen. n.
(- denotes a subspecies, -- denotes a synonym)

arnaca (Fabricius, 1776) comb. n.

- - *ebusa* (Cramer, 1780)
- - *priamis* (D'Almeida, 1922)
- *adela* Nakahara & Espeland, ssp. n.
- *sericeella* (Bates, 1865) comb. n. et stat. n.
- *indianacristoi* Nakahara & Marín, ssp. n.

***Amiga arnaca arnaca* (Fabricius, 1776), comb. n.**

Figs 2a–h, 3, 4a–d, 4f–k, 5, 6

Papilio arnaca Fabricius (1776: 260–261). **Type locality:** Suriname. **Neotype ♂ (here designated):** // Suriname Brokopondo Brownsberg, rainforest km 6–12, 30.1.1982, Olle Pellmyr // USNMENT 00913953 // (USNM) [examined]
= *Papilio ebusa* Cramer (1780: 9; pl. CCXCII: figs F, G). **Type locality:** Suriname. **Neotype ♂ (here designated):** Suriname Brokopondo Brownsberg, rainforest km 6–12, 30.1.1982, Olle Pellmyr // USNMENT 00913953 // (USNM) [examined]

- = *Euptychia arnaea* [sic] form *priamis* D'Almeida (1922: 99). **Type locality:** Três Rios, Jacarepaguá [Rio de Janeiro (city), Rio de Janeiro (state), Brazil]. **Holotype ♂:** // *Euptychia ar-naea priamis* d'Alm. 1922. ♂ // Jacarépaguá, Tres-Rios. Rio, 19.. ♂ // HOLOTIPO// Coll. D'Almeida // No 5630 // DZ 34.684// (DZUP) [examined]
- Papilio arnaea* [sic]: Fabricius 1781: 85; Fabricius 1787: 37; Kirby 1871: 53; Butler and Druce 1874: 337; Butler 1876: 489; Kaye 1904: 181; Hall 1939: 34.
- Papilio aranea* [sic]: Fabricius 1793: 97.
- Satyrus aranea* [sic]: Godart [1824]: 492; Butler 1867: 489.
- Euptychia ebusa*: Butler 1867: 489; Möschler 1877: 323; Kirby 1879: 135; Godman and Salvini 1880–1881: 88–89; Dyar 1914: 143.
- Euptychia arnaea* [sic]: Kirby 1871: 53; Butler and Druce 1874: 337; Butler 1877: 122; Möschler 1877: 323; Godman and Salvini 1880–1881: 88–89; Sharpe 1890: 569; Kaye 1904: 181; Weymer 1911: 219, pl. 49d; Hall 1939: 34; Whitaker 1983 (misspelled as “arneae” in figs 1, 2); D'Abrera 1988: 770–771; Emmel and Austin 1990: 10; Mielke and Casagrande 1991: 181; Cock 2014: 11.
- Euptychia sericeella* [sic] form *priamis*: D'Almeida 1937: 254; Brown 1975: 41.
- Euptychia arnea* [sic]: Gaede 1931: 439; Barcant 1970: 143, pl. 13, fig. 18.
- Euptychia arnea* [sic] var. *priamis*: Gaede 1931: 439.
- Euptychia arnaca arnaca*: Bryk 1953: 63.
- Chloreuptychia arnea* [sic]: Forster 1964: 120, fig. 131.
- Chloreuptychia arnaea* [sic]: DeVries 1987: 271, pl. 48 figs 18, 19; 261, figs B, C; Ramos 1996: 40; Brown and Freitas 2000: 105.
- Cissia arnaea* [sic]: Singer and Ehrlich 1993: 251, fig. 1.
- Chloreuptychia arnaca*: Lamas 1994: 165; Lamas and Grados 1996: 58; Lamas et al. 1996: 65; Lamas et al. 1999: 10; Lamas 2004: 218; Beccaloni et al. 2008: 328; Brévignon 2008: 70; Marín and Uribe 2009: 24; Peña et al. 2010: 246; Francini et al. 2011: 65; Paluch et al. 2011: 235; Brévignon and Benmesbah 2012: 52; Cock 2014: 11; Freitas et al. 2016: 320; Paluch et al. 2016: 4.

Identification and taxonomy. *Papilio arnaca* Fabricius, 1776 was described based on an unspecified number of specimens from Suriname, in Johann Dominicus Schulze's collection (Fabricius 1776). Fabricius' description was not accompanied by any illustration of this species, and he did not specify either the sex nor the number of specimens he examined. However, his Latin description is somewhat precise and the identity of the species may be guessed from the description, given the mention of the following wing pattern characters: “forewing, towards the apex there are three ocelli: the distalmost (“exteriori”) bi-pupilled”; “hindwings bluish; under surface with five ocelli”; “Hindwings bluish above, iridescent; below bluish with two oblique dark stripes. Submargin with five ocelli, the first and fourth the largest and black, the remainder dark”. The mention of multiple ocelli on the (ventral) forewing excludes the possibility of this specimen being other “*Chloreuptychia*” species, which also possess bluish iridescent coloration, but have only a single ocellus on the ventral forewing. Fabricius (1793) considered *P. lea* Cramer, 1777 and *P. arnaca* as probably being conspecific, and these two names were associated by some subsequent authors (e.g., God-

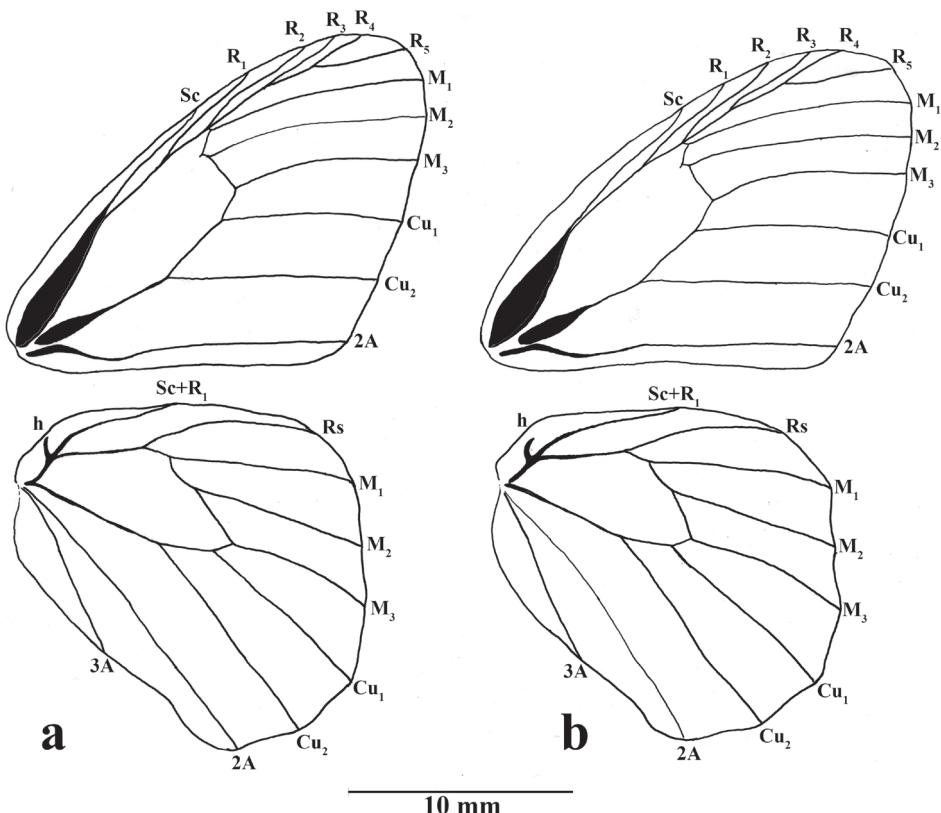


Figure 3. *Amiga arnaca* comb. n. wing venation: **a** male (FLMNH-MGCL specimen 257164); **b** female (FLMNH-MGCL specimen 257166).

man and Salvin 1880–1881), although the mention of five ventral hindwing ocelli for *P. arnaca* is inconsistent with the six ocelli on the ventral hindwing of *P. lea*. On the other hand, *Neonympha iris* C. Felder & R. Felder, 1867 and *Euptychia tricolor* Hewitson, 1850, two species now placed in *Magneuptychia* Forster, 1964, also match the aforementioned wing pattern characters provided in Fabricius' original description. These two species do occur in Suriname, and based on the description provided for *P. arnaca*, it is difficult to exclude the possibility of Fabricius having examined one of these two species. Regardless of this fact, the name *arnaca* has been applied in numerous publications and collections to the species as it is identified here (e.g., Whittaker 1983). Considering this situation, stabilizing the nomenclature as currently perceived by many others is crucial regarding the specific epithet *arnaca* and a neotype is therefore designated for this name below.

A worn specimen (whose sex cannot be confidently determined) in William Hunter's entomological collection is at the UMG, and it was photographed by GL as a potential type specimen of *P. arnaca* (see Warren et al. 2018). GL assumed that William Hunter may have received a "duplicate" from Schulze through Fabricius, who did in-

deed supply Hunter with duplicates, resulting in many Fabrician type specimens being found in Hunter's insect collection (Hancock 2015; Tuxen 1967). However, we have found no evidence to support that this specimen was originally in Johann Dominicus Schulze's collection, and the Surinamese provenance of the specimen is questionable given its rather narrow ventral bands, which are typical of *A. arnaca indianacrystoi* ssp. n. rather than of specimens from Suriname. The specimen in Glasgow is missing its head and abdomen, in addition to having worn and faded wings, thus somewhat obscuring its true identity. Given this situation, combined with the fact that no authentic Schulze specimens appear to be in existence (e.g., Benmesbah et al. 2018), in addition to the explanation above, we therefore designate a male specimen from Suriname (type locality) as a neotype for *P. arnaca* following Article 75.3 of the ICBN (1999) (**neotype designation**): //Suriname Brokopondo Brownsberg, rainforest km 6-12, 30.1.1982, Olle Pellmyr // USNMNT 00913953// (USNM). (Fig. 2a).

After introducing this species to science, the specific epithet was misspelled as “Arnaea” by Fabricius himself in 1781 and 1787, and as “Aranea” in 1793. Subsequently, the specific epithet *arnaca* has been erroneously spelled in various ways in a disturbingly high number of publications (e.g., Butler and Druce 1874; Butler 1877; Godman and Salvin 1881; Sharpe 1890; Kaye 1904; Weymer 1911; D'Almeida 1922; Gaede 1931; Forster 1964; Brown 1975; Whittaker 1983; DeVries 1987; see also above), including some influential works on the classification of this group. This confusion surrounding its species-group name adds a special urgency for a neotype designation for this common butterfly.

Papilio ebusa Cramer, 1780 was described in Pieter Cramer's *De uitlandsche Kapellen voorkomende in de drie Waeereld-Deelen Asia, Africa en America*. The original description describes the bluish-lilac reflection on both wing surfaces, although no further description of any wing element was provided in Cramer's Dutch and French description. Instead, Cramer compared *P. ebusa* to *P. junia* Cramer, 1780, an immediately preceding species described and named in Cramer (1780), but regarded as a junior subjective synonym of *P. lea* Cramer, 1777 by Lamas (2004). Evidently, *P. ebusa* and *P. junia* are not conspecific judging from the illustrations in Cramer (1780: 9; pl. CCXCII: figs D–G), and the illustrations of *P. ebusa* combined with Cramer's description enable this taxon to be confidently identified. *Papilio chloris* Cramer, 1780 (now known as *Chloreuptychia chlorimene* (Hübner, [1819])), is perhaps the only taxon known from Suriname which might have resulted in a similar illustration; however, the illustration of *P. chloris* provided by Cramer (1780: CCXCIII: figs A, B) excludes this possibility. Based on the Dutch and French description provided for *P. ebusa*, Cramer based his illustration on what he thought was a female specimen, although the illustration of the dorsal surface (Fig. F) showing the bluish-lilac reflection only on the hindwing indicates that this illustrated specimen is likely to be a male (but see also above for further information). In addition, whether the original description was based on a single specimen or several specimens cannot be unambiguously determined. During our attempt to locate syntype(s) of *P. ebusa*, two specimens with rounded labels indicating “[Johan] Calkoen” with the locality “Brasilia” were found

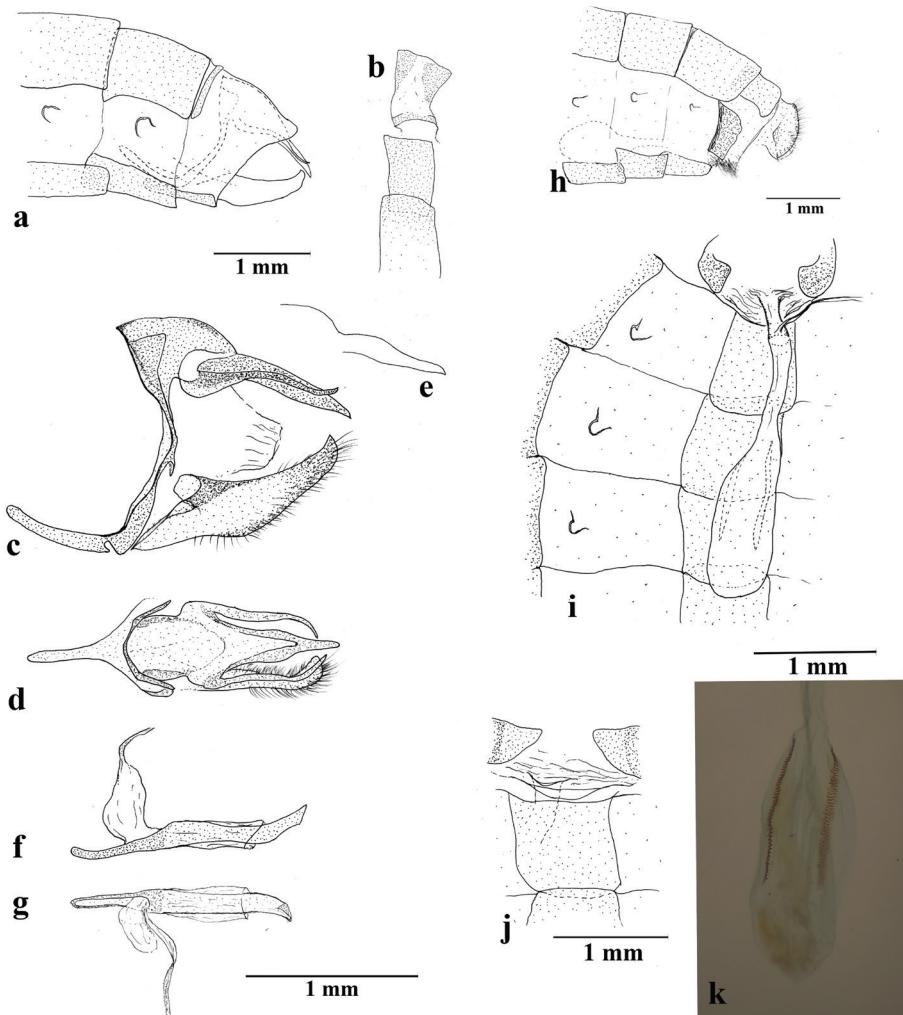


Figure 4. *Amiga arnaca arnaca* comb. n. abdomen and genitalia (*A. arnaca adela* ssp. n. for Fig. 4e): **a** male abdomen terminal sclerites in lateral view **b** male terminal tergites in dorsal view **c** male genitalia in lateral view **d** male genitalia in dorsal view **e** uncus in lateral view, based on KW-15-73 (FLMNH-MGCL Specimen 207904) **f** phallus in lateral view **g** phallus in dorsal view **h** female abdomen terminal sclerites in lateral view, based on SN-17-235 (FLMNH-MGCL Specimen 263371) **i** female genitalia in dorsal view **j** lamella antevaginalis in ventral view **k** signa. Illustrated genitalia: SN-17-148 for male (FLMNH-MGCL specimen 257164); SN-17-150 for female (FLMNH-MGCL specimen 257166), unless indicated otherwise.

in RMNH. Along with the collection of Joan Raye Heer van Breukelerwaard, Johan Calkoen's collection includes Cramer types, although given the locality "Brasilia", these two specimens are most likely not syntypes of *P. ebusa*. Considering that we were unable to find any additional possible sytype(s) of *P. ebusa*, we here designate a neotype for this name. Although treated as a valid species in the past (e.g., Butler 1867; Godman and Salvin 1880–1881), in order to maintain its status as a junior synonym

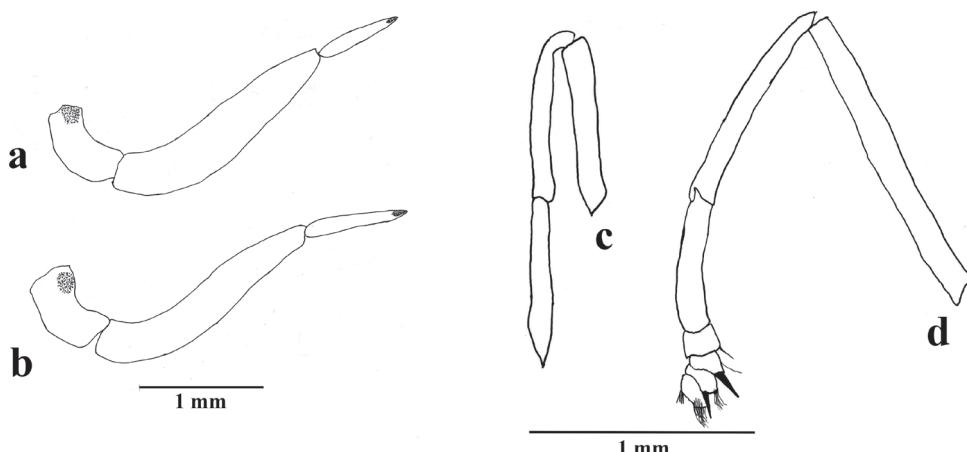


Figure 5. *Amiga arnaca arnaca* comb. n. appendages: **a** male palpus with Reuter's sensitive patch and Vom Rath's organ indicated by dots **b** female palpus with Reuter's sensitive patch and Vom Rath's organ indicated by dots **c** male foreleg **d** female foreleg (illustration: FLMNH-MGCL specimen 257163 for male; FLMNH-MGCL specimen 257167 for female).

of *P. arnaca*, first recognized by Kirby (1871) and followed by most subsequent authors (e.g., Weymer 1911; Gaede 1931; Lamas 2004), we designate the specimen designated as the neotype of *P. arnaca* as the neotype of *P. ebusa* as well and retain its synonymy as a junior objective synonym (**neotype designation**).

D'Almeida (1922) described *Euptychia arnaea* [sic] form *priamis* based on a single male from Três Rios, Jacarepaguá, Rio de Janeiro, Rio de Janeiro, Brazil, currently housed at the DZUP. Following Article 73.1.2. of the ICBN (1999), we consider this male specimen to be the holotype fixed by monotypy based on the statement of “one male collected at the type locality” provided in the original description (D'Almeida 1922). Lamas (2004) regarded this taxon as a junior subjective synonym of *Papilio arnaca* without providing any justification. D'Almeida's (1922) original description provides some wing pattern characters which he considered to separate *f. priamis*, namely “Underside, feeble pearly reflections extending from the base to the line of ocelli”; “Underside, the two rays in the middle are narrow”. These two wing pattern characters are seen in the holotype male, and indeed, the overall phenotype of specimens from the Brazilian states of Minas Gerais, Espírito Santo, and Rio de Janeiro does look somewhat different compared to the neighbouring nominotypical subspecies. Although the feeble pearly reflection extending from the base of the ventral forewing is not seen in the nominotypical subspecies, a few specimens from the aforementioned states in southeastern Brazil appear to lack this reflection (e.g., FLMNH-MGCL-1036218). The narrow ventral bands of many specimens from southeastern Brazil resemble those of *A. arnaca indianacristoi* ssp. n., although the ventral bands are slightly variable in width and a few specimens (e.g., FLMNH-MGCL-262982, 263014) possess bands that are similar in width to the nominotypical subspecies. Thus, the majority of the specimens from Minas Gerais, Espírito Santo, and Rio de Janeiro are distinguishable

from the nominotypical subspecies based on the aforementioned characters except for specimens from Bahia consistently possessing wider ventral bands and/or lacking the feeble pearly reflections on the ventral surface. Nevertheless, we decided not to treat *A. arnaca* from Minas Gerais, Espírito Santo, and Rio de Janeiro as a distinct subspecies because, based on molecular data, this taxonomy would result in the nominotypical subspecies being paraphyletic. Whether subspecies should simply represent geographical variation or should also represent an evolutionary unit (i.e. a monophyletic group) is not a focus of this study and this question merits further in-depth discussion and more data. To be consistent in terms of the subspecies concept used in this study, we consider that subspecies should ideally represent clades, unless there is a strong counter-argument, and thus retain the synonymy introduced in Lamas (2004).

Distribution (Fig. 6). The nominotypical subspecies occurs from eastern Colombia south to Bolivia, and in Brazil, southern Venezuela and the Guianas, where it is typically common and widespread in lowland to submontane forest.

Examined specimens (718 ♂, 207 ♀). See Appendix for the data of these specimens.

***Amiga arnaca adela* Nakahara & Espeland, subsp. n.**

<http://zoobank.org/737B03DC-05CC-4D17-B734-13E3E3B38918>

Figs 2i–l, 3d, 6

Description and diagnosis. MALE: forewing length 19–21 mm ($n = 5$): Differs from the nominotypical subspecies in the following respects: broad, faint, iridescent bluish-lilac reflection between the ventral forewing postdiscal band and the umbra is absent (but see also below).

FEMALE: forewing length 21–22 mm ($n = 4$): Differs from the nominotypical subspecies by the same ventral forewing character provided for the male.

Variation. As explained under the variation section under the genus, the absence of the bluish-lilac reflection on the ventral forewing is consistent in specimens from western Colombia and western Ecuador. However, this character appears in a few specimens from Panama, Costa Rica, and Nicaragua (e.g., FLMNH-MGCL 208036, 257145, 263067), although the degree of reflection is variable.

Types. HOLOTYPE ♂: // ECUADOR: *Esmeraldas*, W Maldonado–Selva Alegre rd., El Cerro 235 m, $0^{\circ}58'22''N, 78^{\circ}55'19''W$ 21, 25.vii.2011, K. Willmott, & J. Hall FLMNH-MGCL-151127 // DNA voucher LEP-09931 // (FLMNH, to be deposited in INABIO). (Fig. 2k).

Other examined specimens (244 ♂, 104 ♀). See Appendix for the data of these specimens. These specimens are not included in the type series as labelling will likely not be completed for over 300 specimens.

Etymology. This species-group name is based on the Greek adjective “adelos”, meaning “indistinct” or “inconspicuous”, in reference to its lack of bluish reflection on the ventral forewing. This species-group name is treated as a Latinized feminine adjective in accordance with the feminine generic name.

Distribution (Fig. 6). This subspecies occurs from Nicaragua to western Ecuador.

***Amiga arnaca sericeella* (Bates, 1865), comb. n. et stat. n.**

Figs 2m, n, 6

Euptychia sericeella Bates (1865: 202). **Type locality:** Vera Paz, Guatemala. **Lectotype (here designated)** ♀: Godman-Salvin Coll. 1904–1. B.C.A. Lep. Rhop. *Euptychia sericeella*, Bates. // B.M. TYPE No. Rh 3181 *Euptychia sericeella*, ♀ Bates. // Forests of N. Vera Paz. F.D.G. & O.S. // Type. Sp. Figured. // ♀ // (NHMUK) [examined].

Euptychia sericeella: Butler 1867: 489; Kirby 1871: 53; Butler 1877: 122; Godman and Salvin 1880–1881: 89–90, pl. 8, figs 20, 21; Weymer 1911: 219; Riley and Gabriel 1924: 53; Gaede 1931: 464; D'Abra 1988: 770–771.

Chloreuptychia sericella [sic]: Forster 1964: 120–121, fig. 132.

Chloreuptychia sericeella: R. de la Maza and J. de la Maza 1993: 182; Salinas-Gutiérrez et al. 2004: 136; Lamas 2004: 218.

Identification and taxonomy. Bates (1865) described *Euptychia sericeella* based on an unspecified number of “male” specimen(s) from Vera Paz, Guatemala. Nevertheless, the only syntype specimen that we have located, in the NHMUK, is a female, a fact also noted by Godman and Salvin (1880: 89–90), who had this specimen in their possession and referred to it as “our specimen, marked as the type”. This specimen (B.M. TYPE No. Rh 3181) was also referred to as a type by Riley and Gabriel (1924: 53) and D'Abra (1988: 770–771). Because of the complexity of euptychiine taxonomy, to provide an unambiguous reference for this name we here designate this specimen as the lectotype of *Euptychia sericeella* (**lectotype designation**). Bates explicitly stated that the taxon was closely allied to *Eu[ptychia]. ebusa* (= *Amiga arnaca arnaca* comb. n.), indicating that he clearly regarded *Euptychia sericeella* and *Amiga arnaca arnaca* as two different species. Despite the ambiguous diagnosis provided in the original description (“the fore-wing having a narrow costal border, the apex, and a broader outer border of a brown hue”), the lectotype, figured in Warren et al. (2018), exhibits several rather distinctive phenotypic differences compared to specimens from South America and Nicaragua to western Ecuador. Presumably due to these wing pattern differences, described further below, subsequent authors treated *E. sericeella* as a species-level taxon (e.g., Butler 1867, 1877; Weymer 1911; Gaede 1931; Forster 1964; Lamas 2004). Specimens from Zelaya department, Nicaragua (e.g., FLMNH-MGCL-263066, 263067, 263072) are phenotypically similar to specimens known from Costa Rica to western Ecuador, and *A. a. sericeella* thus seems to replace *A. a. adela* n. ssp. with little or no obvious gap or dispersal barrier separating these taxa, and conversely with no known area of sympatry. Furthermore, the presence of an iridescent bluish-lilac reflection between the postdiscal band and umbra in some specimens of the subspecies from Nicaragua, Costa Rica, and Panama might be a result of introgression with *A. a. sericeella*. Finally, divergence in the DNA barcode between a specimen from Honduras (LEP-16997) phenotypically similar to the lectotype of *sericeella* and



Figure 6. Distribution map of *Amiga arnaca* ssp.

other Central American *A. arnaca* from further south is no greater than between east and west Andean *A. arnaca* (Table 2). Based on these considerations, we downgrade *E. sericeella* to subspecific rank, proposing, for the first time, what we believe to be the most parsimonious hypothesis of a single species. This null hypothesis remains to be more strongly tested when new evidence, such as distributional, behavioral, or genetic data, becomes available.

Both sexes of *A. arnaca sericeella* comb. n. et stat. n. differ from the nominotypical subspecies in the following respects: DHW feeble pearly reflection restricted to posterior one-third of hindwing and not extending into discal cell; ventral ground color somewhat paler; discal band, postdiscal band, submarginal band on the ventral forewing and ventral hindwing narrower; ventral hindwing postdiscal band not bent inwards in cell Cu₂ and gently curving towards inner margin (but see also below); ventral ocelli smaller (but see also below); bluish-lilac reflection on ventral surface appearing purplish.

Variation. The ventral ocelli are variable in terms of size; while many specimens seem to possess ventral ocelli smaller than the nominotypical subspecies and *A. arnaca indianacristoi* ssp. n., some appear to have ocelli that are similar to the aforementioned two taxa in terms of size. The VHW postdiscal band is bent inwards in cell Cu₂ in some specimens, whereas it gradually curves towards the inner margin in other specimens.

Distribution (Fig. 6). This subspecies ranges from southern Mexico to Honduras, where it appears to be uncommon.

Examined specimens (46 ♂, 23 ♀). See Appendix for the data of these specimens.

***Amiga arnaca indianacristoi* Nakahara & Marín, subsp. n.**

<http://zoobank.org/E2CB94D6-ED44-498C-BD23-313D5139601F>

Figs 2o, p, 6, 7

Description and diagnosis. MALE: forewing length 18.5–21 mm ($n = 6$): Differs from the nominotypical subspecies in the following respects: dorsal hindwing bluish lilac reflection restricted to posterior one-thirds of hindwing and not extending into discal cell; ventral ground color appearing somewhat paler; discal band, postdiscal band, submarginal band on ventral forewing and ventral hindwing narrower; feeble pearly reflection on the ventral forewing (distal side of postdiscal band) absent or insignificant.

FEMALE: forewing length 20–22 mm ($n = 3$): Differs from the nominotypical subspecies by the characters provided for the male, except for the first DHW character.

Variation. The area of the dorsal hindwing bluish-lilac reflection is variable, restricted only to the distal side of cells Cu₁ and Cu₂ in some specimens, whereas extending up to the area around M₃ in some specimens. One female (FLMNH-MGCL 1036235) lacks the dorsal hindwing bluish-lilac reflection, while it is present in three other females (FLMNH-MGCL-264685, 1036240, 1036239).

Types. HOLOTYPE ♂: // VENEZUELA: CARABOBO Hda. María Teresa (IAN), W of Las Trincheras 400 m, moist forest 28.vii.1981 Lee D. Miller, sta. VE16 // Allyn Museum Acc. 1981-23 // FLMNH-MGCL Specimen 264660 // (FLMNH).

PARATYPES (15 ♂, 4♀): **Venezuela:** Aragua: Rancho Grande Biological Station, [10°20'58"N, 67°41'3"W], 1100 m, (Heppner, J. B.), Jul 1981, 1 ♀ [FLMNH-MGCL-1036240], (FLMNH); km 22 Maracay–Ocumare rd., Rancho Grande, 1100–1200 m, (Lichy, R.), 2 Aug 1943, 1 ♂ [FLMNH-MGCL-262940], (FLMNH); Maracay, Pozo del Diablo, [10°17'N, 67°37'W], 420–440 m, (Miller, L. D.), 22 Jul 1981, 1 ♂ [FLMNH-MGCL-264654], 1 ♂ [FLMNH-MGCL-264656], (FLMNH), 27 Jul 1981, 1 ♂ [FLMNH-MGCL-264655], (FLMNH); Maracay–Ocumare hwy., 1100–1200 m, (Lichy, R.), 4 Sept 1942, 1 ♀ [FLMNH-MGCL-1036235], (FLMNH); Carabobo: nr. Puerto Cabello, San Esteban, [10°26'N, 68°1'W], (Hahnel de Sagan), 1^{er} trimestre 1877, 1 ♀ [BMNH(E)#1420075], (NHMUK), Jun, Jul 1877, 1 ♂ [BMNH(E)#1420068], 1 ♂ [BMNH(E)#1420069], (NHMUK); Yuma, [10°6'N, 67°42'W], 550 m, (Miller, L. D.), 16 Dec 1981, 1 ♂ [FLMNH-MGCL-1036241], 1 ♀ [FLMNH-MGCL-1036239], (FLMNH); Cojedes: El Baul, Hato



Figure 7. *Amiga arnaca indianacristoi* ssp. n. in nature, Altos de Pipe, Miranda, Venezuela (photographed by Indiana Cristóbal Ríos-Málaver, on 11 September 2011).

Pinero, (Brenner, J.), Feb 1968, 1 ♂ [FLMNH-MGCL-1036242], (FLMNH); *Districto Federal*: Caracas, [10°30'N, 66°55'W], 1200 m, (Forster, W.), 29 Jun 1954, 1 ♂, (ZSM); *Miranda*: 10 miles S of Caracas, [10°23'46"N, 66°53'26"W], 1311 m, 30 Mar 1970, 1 ♂ [woods], (USNM); [Caracas], Macizo Naiguatá, 720–800 m, (Lichy, R.), 6 Dec 1942, 1 ♂ [FLMNH-MGCL-262941], (FLMNH); Massif du Naiguatá, (Lichy, R.), 5 Jul 1945, 1 ♂ [FLMNH-MGCL-264683], (FLMNH); mist forest 20 km SE Caracas, [10°21'24"N, 66°46'18"W], 500–750 m, (Miller, L. D. & J. Y., Dukes, D.), 1 Sep 1990, 1 ♂ [FLMNH-MGCL-264657], 1 ♂ [FLMNH-MGCL-264659], (FLMNH); Río Chacaito, [10°25'N, 66°55'W], 980–1080 m, (Lichy, R.), 12 Sep 1936, 1 ♂ [FLMNH-MGCL-264658], (FLMNH).

Etymology. This new species-group name is proposed in recognition of our friend and colleague, Indiana Cristóbal Ríos-Málaver, known as “Indiana Cristo”, who studied the butterflies of the area where this taxon occurs. Indiana Cristo has contributed to Neotropical lepidopterology in various ways, especially through social media, where he is bringing lepidopterology to the public. This species-group name is treated as a latinized masculine noun in the genitive case.

Distribution (Fig. 6). This taxon occurs in the Venezuelan Cordillera de la Costa and northwestern Cordillera de Mérida, and possibly also into the Serranía de Perijá.

Remarks. We have examined a single specimen from Monagas, Venezuela (FLM-NH-MGCL-264682), with a phenotype that corresponds to this subspecies. Thus, this taxon's range may extend further east than that indicated above. However, given that we have examined only a single specimen from the area, combined with the fact that specimens from the island of Trinidad, whose butterfly fauna has strong biogeographic affinities with Monagas (e.g., Neild 1996), clearly represent the nominotypical subspecies, there still remains the possibility of this specimen being mislabeled.

Acknowledgements

We thank the museum curators who allowed us to examine the Euptychiina collections under their care, and the numerous people who contributed to our knowledge of this genus by collecting, databasing, and rearing specimens. We are grateful to Bernard Hermier (Cayenne, French Guiana), Andrew Neild (London, UK), and Hajo Gernaat (Leiden, Netherlands) for their help with translating relevant original descriptions; to Fernando Dias (Curitiba, Brazil) for his help accessing materials at DZUP; André Freitas (Campinas, Brazil) for his help accessing materials at ZUEC; Indiana Crisóstomo Ríos-Málaver (Manizales, Colombia) for allowing us to use his photo in the present article; Sophie Ledger, Robyn Crowther (London, UK), Evelyn Gamboa (Lima, Peru), Alexandra Pagac, and Michelle Modena (Gainesville, USA) for databasing and photographing specimens; Lei Xiao (Gainesville, USA) for support in the molecular lab; André Freitas (Campinas, Brazil), Thamara Zacca (Campinas, Brazil), and Riley Gott (Gainesville, USA) for generously reviewing the manuscript; Karolyn Darrow (Washington DC, USA) for kindly photographing the neotype; SN and KRW thank Santiago Villamarín and Sofía Nogales (Quito, Ecuador), the Instituto Nacional de Biodiversidad (INABIO, Ecuador), and the Ecuadorian Ministerio del Ambiente for supporting field research in Ecuador. Funding for museum and fieldwork was provided in part from the National Geographic Society, the Leverhulme Trust, the Darwin Initiative, the National Science Foundation (# 0103746, 0639861, #1256742), the Florida Museum of Natural History, the FLMNH Museum Associates, and the University of Florida. SN acknowledges the University of Florida's Entomology and Nematology Department for support; MAM thanks the Brazilian Research Council – CNPq (fellowship 151077/2018-5). Brazilian specimens are registered in the SISGEN database (A4F1643). Finally, we thank University of Florida open-access publishing fund for financial support.

References

- Barcant M (1970) Butterflies of Trinidad and Tobago. Collins, London, 314 pp.
Bates H (1864–1865) New species of butterflies from Guatemala and Panama, collected by Osbert Salvin and F. du Cane Godman, Esqs. Entomologist's Monthly Magazine 1(1): 1–6

- (June 1864), (2): 31–35 (July 1864), (3): 55–59 (August 1864), (4): 81–85 (September 1864), (5): 113–116 (October 1864), (6): 126–131 (November 1864), (7): 161–164 (December 1864), (8): 178–180 (January 1865), (9): 202–205 (February 1865).
- Beccaloni GW, Viloria AL, Hall SK, Robinson GS (2008) Catalogue of the hostplants of the Neotropical butterflies. Catálogo de las plantas huésped de las mariposas neotropicales. Monografías del Tercer Milenio, Zaragoza, Sociedad Entomológica Aragonesa 8: 1–536.
- Benmesbah M, Zacca T, Casagrande MM, Mielke OHH, Lamas G, Willmott KR (2018) Taxonomic notes on *Papilio ocypete* Fabricius, 1776 and *Papilio helle* Cramer, 1779 with description of two new similar species from South America (Lepidoptera: Nymphalidae: Satyrinae). Zootaxa 4425(1): 115–145. <https://doi.org/10.11646/zootaxa.4425.1.7>
- Brévignon C (2008) Inventaire des Satyrinae de Guyane française (Lepidoptera : Nymphalidae). In : Lacomme D, Manil L (Eds) Lépidoptères de Guyane. Tome 3. Rhopalocères 2. Association des Lépidoptéristes de France, Paris, 62–94.
- Brévignon C, Benmesbah M (2012) Complément à l'inventaire des Satyrinae de Guyane (Lepidoptera: Nymphalidae). In: Lacomme D, Manil L (Eds) Lépidoptères de Guyane, Tome 7, Nymphalidae. Lépidopteristes de France, Paris, 36–52.
- Brown FM (1975) An annotated entomological bibliography of Romualdo Ferreira d'Almeida (1891–1969). Journal of the Lepidopterists' Society 29(1): 40–51.
- Brown KS, Freitas AVL (2000) Diversidade de Lepidoptera em Santa Teresa, Espírito Santo. Boletim do Museu de Biologia Mello Leitão 11/12: 71–118.
- Bryk VF (1953) Lepidoptera aus dem Amazonasgebiete und aus Peru gesammelt von Dr. Douglas Melin und Dr. Abraham Roman. Arkiv för Zoologi 5(1): 1–269.
- Butler AG (1867) A monograph of the genus *Euptychia*, a numerous race of butterflies belonging to the family Satyridae; with descriptions of sixty species new to science, and notes to their affinities, etc. Proceedings of the Zoological Society of London 1866: 458–504.
- Butler AG (1877) On new species of the genus *Euptychia*, with a tabular view of those hitherto recorded. Journal of the Linnean Society of London (Zoology) 13(67): 116–128. <https://doi.org/10.1111/j.1096-3642.1877.tb02375.x>
- Cock MJW (2014) An updated and annotated checklist of the larger butterflies (Papilio-noidea) of Trinidad, West Indies: Papilionidae, Pieridae and Nymphalidae. Insecta Mundi 0353: 1–14.
- Cong Q, Grishin NV (2014) A new *Hermeuptychia* (Lepidoptera, Nymphalidae, Satyrinae) is sympatric and synchronic with *H. sosybius* in southeast US coastal plains, while another new *Hermeuptychia* species—not *hermes*—inhabits south Texas and northeast Mexico. ZooKeys 379: 43–91. <https://doi.org/10.3897/zookeys.379.6394>
- Cramer P (1775–1780) De uitlandische Kapellen voorkomende in de drie Waereld-Deelen Asia, Africa en America. Papillons exotiques des trois parties du monde l'Asie, l'Afrique et l'Amérique. Amsteldam, S. J. Baalde; Utrecht, Barthelemy Wild and J. Van Schoonhoven & Comp. 1(1/7): i–xxx, 1–16, 1–132, pls 1–84 ([31 December] 1775), (8): 133–155, pls 85–96 (1776); 2 (9/16): 1–151, pls 97–192 (1777); 3 (17/22): 1–128, pls 193–264 (1779), (23/24): 129–176, pls 265–288 (1780); 4 (25/26): 1–28, pls 289–304 (1780).
- D'Abra BL (1988) Butterflies of the Neotropical Region. Part V. Nymphalidae (Conc.) and Satyridae. Hill House, Black Rock, Victoria, 679–877.

- D'Almeida R (1922) Mélanges lépidoptérologiques. Études sur les lépidoptères du Brésil. Berlin, R. Friedländer & Sohn, 226 pp.
- D'Almeida RF (1937) Excursão científica aos rios Cuminá e Trombetas. Memórias do Instituto Oswaldo Cruz 32 (2): 235–298. <https://doi.org/10.1590/S0074-02761937000200008>
- de la Maza RG, de la Maza J (1993) Mariposas de Chiapas. Gobierno del Estado de Chiapas, México, 224 pp.
- DeVries PJ (1987) The butterflies of Costa Rica and their natural history. Papilionidae, Pieridae, Nymphalidae. Princeton University Press, Princeton, 327 pp.
- Dyar HG (1914) Report on the Lepidoptera of the Smithsonian Biological Survey of the Panama Canal Zone. Proceedings of the United States National Museum 47(2050): 139–350. <https://doi.org/10.5479/si.00963801.47-2050.139>
- Emmel TC, Austin GT (1990) The tropical rain forest butterfly fauna of Rondonia, Brazil: species diversity and conservation. Tropical Lepidoptera 1(1): 1–12.
- Espeland M, Breinholt J, Willmott KR, Warren AD, Vila R, Toussaint EF, Maunsell SC, Aduse-Poku K, Talavera G, Eastwood R, Jarzyna MA, Guralnick R, Lohman DJ, Pierce NE, Kawahara AY (2018) A comprehensive and dated phylogenomic analysis of butterflies. Current Biology 28(5): 770–778. <https://doi.org/10.1016/j.cub.2018.01.061>
- Espeland M, Breinholt J, Barbosa EP, Casagrande M, Huertas B, Lamas G, Marín MA, Mielke OHH, Miller JY, Nakahara S, Tan D, Warren AD, Zacca T, Kawahara AY, Freitas AVL, Willmott KR (2019) Four hundred shades of brown: higher level phylogeny of the problematic Euptychiina (Lepidoptera, Nymphalidae, Satyrinae) based on hybrid enrichment data. Molecular Phylogenetics and Evolution 131: 116–124. <https://doi.org/10.1016/j.ympev.2018.10.039>
- Fabricius JC (1776) Genera insectorum eorumque characteres naturales secundum nomenclaturam, situm et proportionem omnium partium oris adiecta mantissa specierum non per detectarum. Chilonii, Mich. Friedr. Bartsch, 310 pp.
- Fabricius JC (1781) Species insectorum exhibentes eorum differentias specificas, synonyma auctorum, loca natalia, metamorphosis adiectis observationibus, *descriptionibus*. Carl Ernest Bohn, Hamburgii et Kilonii 2: 1–494.
- Fabricius JC (1787) Mantissa insectorum sistens species non per detectas adiectis synonymis, observationibus, descriptionibus, emendationibus. Christian Gottlieb Proft, Hafniae, 2, 382 pp.
- Fabricius JC (1793) Entomologia systematica emendata et aucta. Secundum classes, ordines, genera, species adiectis synonymis, locis, observationibus, descriptionibus. Christian Gottlieb Proft, Fil. et Soc., Hafniae, 3 (1), 488 pp.
- Forster W (1964) Beiträge zur Kenntnis der Insektenfauna Boliviens XIX Lepidoptera III. Satyridae. Veröffentlichungen der zoologischen, Staatssammlung München 8: 51–188.
- Francini RB, Duarte M, Mielke OHH, Caldas A, Freitas AVL (2011) Butterflies (Papilio-noidea and Hesperioidae) of the "Baixada Santista" region, coastal São Paulo, southeastern Brazil. Revista Brasileira de Entomologia 55(1): 55–68. <https://doi.org/10.1590/S0085-56262011000100010>
- Freitas AVL, Brown KS, Mielke, OHH, Santos JP, Vasconcellos-Neto J (2016) Borboletas da Reserva Natural Vale, Linhares/ES. In: Rolim SG, Menezes LFT, Srbek-Araujo AC (Eds)

- Floresta atlântica de tabuleiro: diversidade e endemismos na Reserva Natural Vale. Belo Horizonte, Editora Rupestre, 317–328.
- Fujisawa T, Barraclough TG (2013) Delimiting species using single-locus data and the Generalized Mixed Yule Coalescent approach: a revised method and evaluation on simulated data sets. *Systematic Biology* 62(5): 707–724. <https://doi.org/10.1093/sysbio/syt033>
- Gaede M (1931) Familia Satyridae. *Lepidopterorum Catalogus*, 1–320 [Vol. 43]; 321–544 [Vol. 46]; 545–759 [Vol. 48].
- Godart JB (1824) In: Latreille PA, Godart JB (Eds) *Encyclopédie Méthodique. Histoire naturelle. Entomologie, ou histoire naturelle des crustacés, des arachnides et des insectes*. Veuve Agasse (Paris) 9(2): 329–828.
- Godman FD, Salvin O (1880–1881) *Biologia Centrali-Americanana. Insecta. Lepidoptera Rhopalocera*. Dulau & Co., Bernard Quaritch (London) 1(1): 1–32, pls 1, 2 [September 1879], 1(2) [November 1879]: 33–56; 1(3)[February 1880]: 57–72; 1(6)[August 1880]: 73–88; 1(9)[February 1881]: 89–96.
- Hall A (1939) Catalogue of the Lepidoptera Rhopalocera (butterflies) of British Guiana. *Agricultural Journal of British Guiana* 10(1): 25–41.
- Hancock EG (2015) The shaping role of Johan Christian Fabricius (1745–1808): William Hunter's insect collection and entomology in eighteenth century London. In: Hancock EG, Pearce N, Campbell M (Eds) *William Hunter's World: the Art and Science of Eighteenth Century Collecting*. Routledge, Abingdon, 151–163.
- Hoang DT, Chernomor O, von Haeseler A, Minh BQ, Vinh LS (2017) UFBoot2: improving the ultrafast bootstrap approximation. *Molecular Biology and Evolution* 35 (2): 518–522. <https://doi.org/10.1093/molbev/msx281>
- ICZN (1999) International Code of Zoological Nomenclature. Fourth edition. International Trust for Zoological Nomenclature, London. <http://www.iczn.org/iczn/index.jsp>.
- Janzen DH, Hallwachs W (2015) Dynamic Database for an Inventory of the Macrocaterpillar Fauna, and its Food Plants and Parasitoids, of Área de Conservación Guanacaste (ACG), Northwestern Costa Rica. <http://janzen.sas.upenn.edu> [2018-4-1]
- Kaye WJ (1904) A catalogue of the Lepidoptera Rhopalocera of Trinidad. *Transactions of the Entomological Society of London* 1904(2): 159–224. <https://doi.org/10.1111/j.1365-2311.1904.tb02744.x>
- Kalyaanamoorthy S, Minh BQ, Wong TKF, Haeseler A von, Jermiin LS (2017) ModelFinder: Fast model selection for accurate phylogenetic estimates. *Nature Methods* 14: 587–589. <https://doi.org/10.1038/nmeth.4285>
- Kirby WF (1871) A Synonymic Catalogue of Diurnal Lepidoptera. John Van Voorst, London, 690 pp.
- Lamas G (2004) Nymphalidae. Satyrinae. Tribe Satyrini. Subtribe Euptychiina. In: Lamas G (Ed.) Checklist: part 4A. Hesperioidae – Papilionoidea. In: Heppner JB (Ed.) *Atlas of Neotropical Lepidoptera. Volume 5A*. Association for Tropical Lepidoptera/Scientific Publishers, Gainesville, 217–223.
- Lamas G, Grados J (1996) Mariposas de la Cordillera del Sira, Peru. *Revista Peruana de Entomología* 39: 55–61.

- Lamas G, Robbins RK, Harvey DJ (1991) A preliminary survey of the butterfly fauna of Pakitzá, Parque Nacional del Manu, Peru, with an estimate of its species richness. Publicaciones del Museo de Historia Natural UNMSM (Lima), (A) 40: 1–19.
- Lamas G, Robbins RK, Harvey DJ (1996) Mariposas del alto Río Napo, Loreto, Peru. Revista Peruana de Entomología 39: 63–74.
- Marín MA, Uribe SI (2009) Actualización sobre Euptychiina (Lepidoptera: Satyrinae) representadas en la colección del Museo Entomológico Francisco Luis Gallego. Boletín del Museo Entomológico Francisco Luis Gallego 1(2): 22–32.
- Mielke OHH, Casagrande, MM (1991) Lepidoptera: Papilionoidea e Hesperioidae coletados na Ilha de Maracá, Alto Alegre, Roraima, parte do projeto Maracá, com uma lista complementar de Hesperiidae de Roraima. Acta Amazonica 21: 175–210. <https://doi.org/10.1590/1809-43921991211210>
- Miller LD (1968) The higher classification, phylogeny and zoogeography of the Satyridae (Lepidoptera). Memoirs of the American Entomological Society, Vol. 24, 174 pp.
- Möschler HB (1877) Beiträge zur Schmetterlings-Fauna von Surinam. Verhandlungen der kaiserlich-königlichen zoologisch-botanischen Gesellschaft in Wien 26(1): 293–352.
- Nakahara S, Janzen DH, Hallwachs W, Espeland M (2015) Description of a new genus for *Euptychia hilara* (Lepidoptera, Nymphalidae, Satyrinae). Zootaxa 4012(3): 525–541. <http://dx.doi.org/10.11646/zootaxa.4012.3.7>
- Nakahara S, Willmott KR, Mielke OHH, Schwartz J, Zacca T, Espeland M, Lamas G (2018a) Seven new taxa from the butterfly subtribe Euptychiina (Lepidoptera: Nymphalidae: Satyrinae) with revisional notes on *Harjesia* Forster, 1964 and *Pseudeuptychia* Forster, 1964. Insecta Mundi 0639: 1–38.
- Nakahara S, Zacca T, Huertas B, Neild AFE, Hall JPW, Lamas G, Holian LA, Espeland M, Willmott KR (2018b) Remarkable sexual dimorphism, rarity and cryptic species: a revision of the ‘*aegrota* species group’ of the Neotropical genus *Caeruleuptychia* Forster, 1964 with the description of three new species (Lepidoptera, Nymphalidae, Satyrinae). Insect Systematics and Evolution 49(2): 130–182. <https://doi.org/10.1163/1876312X-00002167>
- Neild AFE (1996) The Butterflies of Venezuela. Part 1: Nymphalidae I (Limenitidinae, Apaturinae, Charaxinae). A Comprehensive Guide to the Identification of Adult Nymphalidae, Papilionidae, and Pieridae. Meridian Publications, London, 144 pp.
- Paluch M, Mielke OHH, Nobre CEB, Casagrande MM, Melo DHA, Freitas AVL (2011) Butterflies (Lepidoptera: Papilionoidea and Hesperioida) of the Parque Ecológico João Vasconcelos Sobrinho, Caruaru, Pernambuco, Brazil. Biota Neotropica 11(4): 230–238.
- Paradis E (2013) Molecular dating of phylogenies by likelihood methods: a comparison of models and a new information criterion. Molecular Phylogenetics and Evolution 67(2): 436–444. <https://doi.org/10.1016/j.ympev.2013.02.008>
- Paradis E, Claude J, Strimmer K (2004) APE: analyses of phylogenetics and evolution in R language. Bioinformatics 20: 289–290. <https://doi.org/10.1093/bioinformatics/btg412>
- Peña C, Nylin S, Freitas AVL, Wahlberg N (2010) Biogeographic history of the butterfly subtribe Euptychiina (Lepidoptera, Nymphalidae, Satyrinae). Zoologica Scripta 39(3): 243–258. <https://doi.org/10.1111/j.1463-6409.2010.00421.x>

- Pons J, Barraclough TG, Gomez-Zurita J, Cardoso A, Duran DP, Hazel S, Kamoun S, Sumlin WD, Vogler AP (2006) Sequence-based species delimitation for the DNA taxonomy of undescribed insects. *Systematic Biology* 55(4): 595–609. <https://doi.org/10.1080/10635150600852011>
- Popescu AA, Huber KT, Paradis E (2012) ape 3.0: new tools for distance based phylogenetics and evolutionary analysis in R. *Bioinformatics* 28: 1536–1537. <https://doi.org/10.1093/bioinformatics/bts184>
- Puillandre N, Lambert A, Brouillet S, Achaz G (2012) ABGD, Automatic Barcode Gap Discovery for primary species delimitation. *Molecular Ecology* 21(8): 1864–1877. <https://doi.org/10.1111/j.1365-294X.2011.05239.x>
- Ramos FA (1996) Nymphalid butterfly communities in an amazonian forest fragment. *Journal of Research on the Lepidoptera* 35: 29–41.
- Riley ND, Gabriel AG (1924) Catalogue of the Type Specimens of Lepidoptera Rhopalocera in the British Museum. Part I. Satyridae. Oxford University Press, London, 62 pp. <https://doi.org/10.5962/bhl.title.118835>
- Salinas JL, Luis MA, Llorente JE (2004) Papilionoidea of the evergreen tropical forests of Mexico. *Journal of the Lepidopterists' Society* 58(3): 125–142.
- Sharpe EMB (1890) On a collection of Lepidoptera made by Mr. Edmund Reynolds on the rivers Tocantins and Araguaya and in the province of Goyaz, Brazil. *Proceedings of the Zoological Society of London* 1890(3): 552–577.
- Singer MC, Ehrlich PR (1993) Host specialization of satyrine butterflies, and their responses to habitat fragmentation in Trinidad. *Journal of Research on the Lepidoptera* 30(3/4): 248–256.
- Tuxen SL (1967) The entomologist, J. C. Fabricius. *Annual Review of Entomology* 12: 1–15. <https://doi.org/10.1146/annurev.en.12.010167.0000245>
- Warren AD, Davis KJ, Stangeland EM, Pelham JP, Grishin NV (2018) Illustrated Lists of American Butterflies. <http://www.butterfliesofamerica.com> [2018-11-1]
- Weymer G (1911) 4. Familie: Satyridae. In: Seitz A (Ed.) *Die Gross-Schmetterlinge der Erde*. A. Kernen (Stuttgart) 5: 173–192.
- Whittaker PL (1983) Notes on the satyrid butterfly populations of Corcovado National Park, Costa Rica. *Journal of the Lepidopterists' Society* 37(2): 106–114.
- Zhang J, Kapli P, Pavlidis P, Stamatakis A (2013) A general species delimitation method with applications to phylogenetic placements. *Bioinformatics* 29(22): 2869–2876. <https://doi.org/10.1093/bioinformatics/btt499>

Appendix. Data of specimens examined in this study

Abbreviations: W&H = Willmott and Hall unpublished data; DABD = Darwin Andean Butterfly Database.

The locality of some specimens will appear the same as its state, province, department, etc., if no further information was available on the label.

Amiga arnaca arnaca

Specimens examined (718 ♂, 207 ♀): Argentina: Entre Ríos: Entre Ríos, (Smith, H. H.), Sep, 1 ♂ [BMNH(E)#1420202; Data unreliable. See B. M. 1915-3 K. J. Hayward MS'], (NHMUK). **Bolivia:** Cochabamba: Alto Palmar, [17°9'2"S,65°42'47"W], 1100 m, Nov 1960, 1 ♂, (ZSM); Valle del Sacta, [17°6"S,64°47"W], (Curso Mariposas Andinas), 12–16 Dec 2006, 1 ♂ [MHNNKM-15903], (MHNNKM); Yungas del Espíritu Santo, [17°6"S,65°40"W], (Germain, P.), 1888–1889, 1 ♂ [BMNH(E)#1420187], 1 ♂ [BMNH(E)#1420188], 1 ♀ [BMNH(E)#1420189], (NHMUK); La Paz: Madi-di, [13°37'94"S,68°44'45"W], (Gareca, Y.), 23 Aug 2004, 1 ♂ [MUSM-LEP-100524], (MUSM); Río Zongo, [16°3'40"S,68°1'2"W], 1200 m, (Garlepp), 1895–1896, 2 ♂, (MNHU); Río Zongo, [16°3'40"S,68°1'2"W], 1200–1600 m, (Garlepp), 2 ♀, (MNHU); Torewa, [14°43'14"S,67°36'16"W], 245 m, (Apaza, M., Lipa, T.), 11–12 May 2004, 1 ♂ [MHNNKM-15902], (MHNNKM); Yungas de La Paz, [16°20'S,66°45"W], 1000 m, (Rolle), 1 ♀, (ZSM); Pando: Rutina, [12°16'49"S,68°31'43"W], 237 m, (Condori, J., Saire, A., Rojas, N.), 25 May 1999, 1 ♂ [MHNNKM-15901], (MHNNKM); Santa Cruz: Buenavista, [17°27"S,64°40"W], 750 m, (Steinbach, F.), Aug 1906–Apr 1907, 1 ♀ [BMNH(E)#1498940], (NHMUK); Santa Cruz de la Sierra, [17°48"S,63°10'W], (Steinbach, F.), Apr to beginning May 1904, 1 ♀ [BMNH(E)#1498939], (NHMUK), Feb 1904, 1 ♂ [BMNH(E)#1498937], (NHMUK), Feb 1909, 1 ♂ [BMNH(E)#1498938], (NHMUK); Sivingal, [18°2'42"S,64°2'32"W], 2026 m, 8 Mar 1991, 1 ♂ [MHNNKM-15904], (MHNNKM); Not located: 'Bolivia', 1 ♂ [BMNH(E)#1420190], 1 ♀ [BMNH(E)#1420191], (NHMUK). **Brazil:** Acre: 50 km NW Bujari, [9°32'53"S,68°18'9"W], 200 m, (DZUP); Cruzeiro do Sul, Pentecostes-Japim, [7°38'10"S,72°48'17"W], (DZUP); Amapá: Rio Preto, [1°90'S,51°21'W], 100 m, (Büche, M.), Dec 1996, 1 ♂ [MUSM-LEP-100522], (MUSM); Amazonas: Benjamin Constant, [4°23"S,70°2'W], (DZUP); Coari, [4°5'1"S,63°8'36"W], 35 m, (Hahnel), 1 ♂, (MNHU); Ega, [3°22"S,64°42'W], (Bates, H. W.), 1 ♂ [BMNH(E)#1420135], (NHMUK); Igarapé Massauari, [2°54'17"S,57°8'23"W], (Michael), 1892, 1 ♂, (MNHU); Manaus, [3°7"S,60°2'W], 1 ♂ [FLMNH-MGCL-263301], 1 ♂ [FLMNH-MGCL-263305], 1 ♂ [FLMNH-MGCL-263312], 1 ♂ [FLMNH-MGCL-263363], (FLMNH), (Hahnel), 1 ♂, (MNHU); Manaus, km 72 BR-174, Fazenda Dimona, [2°19"S,60°5'W], (Rogers, H., Sullivan, J.), Dec 1993, 1 ♂ [FLMNH-MGCL-207922], (FLMNH); Manicoré, [5°49"S,61°17'W], 1 ♀, (ZSM), Jun, 1 ♂, (ZSM), (Callaghan, C. J.), 16 Aug 1976, 1 ♂ [FLMNH-MGCL-263317], (FLMNH), (Hahnel), 1887, 1 ♂, 1 ♀, (MNHU); Nova Olinda do Norte, [3°45'24"S,59°2'54"W], Aug 1998, 1 ♂ [FLMNH-MGCL-264662], (FLMNH); nr. Benjamin Constant, Rio Javari, [4°23"S,70°2'W], (DZUP); Rio Japurá, Maraá, [1°50'S,65°22'W], Feb 1994, 1 ♂ [FLMNH-MGCL-207955], (FLMNH); Rio Purus, Ypiranga, [4°14'52"S,61°39'52"W], 30 m, 1 ♂ [FLMNH-MGCL-263313], (FLMNH); Rio Roosevelt, Apr 2006, 1 ♀ [FLMNH-MGCL-264653], (FLMNH); São Paulo de Olivença, [3°28"S,68°57'W], 1 ♂ [FLMNH-MGCL-263308], (FLMNH), (Mathan, M. de), 1 ♂ [BMNH(E)#1420129], 1 ♀

[BMNH(E)#1420133], (NHMUK), Jun, Jul 1883, 1 ♂ [BMNH(E)#1420130], 1 ♂ [BMNH(E)#1420131], 1 ♀ [BMNH(E)#1420132], (NHMUK), (Michael), 1891, 1 ♂, (MNHU), (Waehner, S.), Jan 1933, 1 ♂ [BMNH(E)#1497565], 1 ♂ [BMNH(E)#1497596], 1 ♂ [BMNH(E)#1497627], 1 ♂ [BMNH(E)#1497658], (NHMUK); Tefé, [3°22'S,64°44'W], (Hoffmanns, W.), Jun 1906, 1 ♂ [BMNH(E)#1498893], (NHMUK), (Mathan, M. de), Apr 1878–Jan 1879, 1 ♂ [BMNH(E)#1420137], (NHMUK), 3^{er} trimestre 1878, 1 ♂ [BMNH(E)#1420136], 1 ♂ [BMNH(E)#1498906], (NHMUK), Jan 1905, 1 ♂ [BMNH(E)#1498891], (NHMUK), Nov 1907, 1 ♂ [BMNH(E)#1498892], (NHMUK); Tonantins, [2°52'S,67°48'W], Mar 1993, 1 ♀ [FLMNH-MGCL-207957], (FLMNH); Bahía: Bahía, [12°59'S,38°31'W], 1 ♂ [BMNH(E)#1420141], (NHMUK); Cachimbo, 1890, 1 ♂ [BMNH(E)#1420138], 1 ♂ [BMNH(E)#1420139], 1 ♂ [BMNH(E)#1420140], (NHMUK); Camacá, [15°24'S,39°29'W], (DZUP); Camaçá, Serra Bonita, (Freitas, A. V. L., Carreira, J. Y. O.), 18-20 Jul 2014, 1 ♂, (ZUEC); Ilhéus, [14°46'S,39°3'W], (DZUP); Itabuna, [14°47'S,39°17'W], (Becker, V.), 18 Jan 1967, 1 ♂ [FLMNH-MGCL-263302], 1 ♂ [FLMNH-MGCL-263303], 1 ♂ [FLMNH-MGCL-295863], (FLMNH); Rio das Contas, Jitaúna, [14°1'S,39°57'W], 150 m, (DZUP); Ubatá, 100 m, (Brown, K. S.), 21 Dec 1966, 1 ♂ [FLMNH-MGCL-263299], 1 ♀ [FLMNH-MGCL-263339], (FLMNH); Xerm, [22°33'S,43°17'W], (DZUP); Espírito Santo: Conceição da Barra, [18°34'S,39°45'W], (DZUP), 25 Sep 1969, 1 ♀, (ZSM); Espírito Santo, [20°20'S,40°17'W], 1 ♂ [BMNH(E)#1420142], 1 ♂ [BMNH(E)#1420143], 1 ♂ [BMNH(E)#1420144], 1 ♀ [BMNH(E)#1420160], 1 ♀ [BMNH(E)#1420166], (NHMUK); Linhares, [19°23'S,40°4'W], (DZUP), (Elias, P. C.), Aug 1972, 1 ♂ [FLMNH-MGCL-262993], 1 ♂ [FLMNH-MGCL-263008], 1 ♂ [FLMNH-MGCL-263019], 1 ♂ [FLMNH-MGCL-263024], (FLMNH), Feb 1972, 1 ♂ [FLMNH-MGCL-262991], 1 ♂ [FLMNH-MGCL-262992], 1 ♂ [FLMNH-MGCL-262998], 1 ♂ [FLMNH-MGCL-262999], 1 ♂ [FLMNH-MGCL-263000], 1 ♂ [FLMNH-MGCL-263001], 1 ♂ [FLMNH-MGCL-263002], 1 ♂ [FLMNH-MGCL-263005], 1 ♂ [FLMNH-MGCL-263006], 1 ♂ [FLMNH-MGCL-263009], 1 ♂ [FLMNH-MGCL-263010], 1 ♂ [FLMNH-MGCL-263017], 1 ♂ [FLMNH-MGCL-263018], 1 ♂ [FLMNH-MGCL-263023], 1 ♀ [FLMNH-MGCL-263034], 1 ♀ [FLMNH-MGCL-263035], (FLMNH), Jul 1972, 1 ♂ [FLMNH-MGCL-263013], 1 ♀ [FLMNH-MGCL-263043], (FLMNH), Mar 1972, 1 ♂ [FLMNH-MGCL-262986], 1 ♂ [FLMNH-MGCL-262988], 1 ♂ [FLMNH-MGCL-262989], 1 ♂ [FLMNH-MGCL-262990], 1 ♂ [FLMNH-MGCL-262995], 1 ♂ [FLMNH-MGCL-262996], 1 ♂ [FLMNH-MGCL-262997], 1 ♂ [FLMNH-MGCL-263003], 1 ♂ [FLMNH-MGCL-263004], 1 ♂ [FLMNH-MGCL-263007], 1 ♂ [FLMNH-MGCL-263011], 1 ♂ [FLMNH-MGCL-263012], 1 ♂ [FLMNH-MGCL-263014], 1 ♂ [FLMNH-MGCL-263015], 1 ♂ [FLMNH-MGCL-263020], 1 ♂ [FLMNH-MGCL-263022], 1 ♂ [FLMNH-MGCL-263025], 1 ♀ [FLMNH-MGCL-263036], 1 ♀ [FLMNH-MGCL-263037], 1 ♀ [FLMNH-MGCL-263038], 1 ♀ [FLMNH-MGCL-263040], 1 ♀ [FLMNH-MGCL-263041], 1 ♀ [FLMNH-MGCL-263042], 1 ♀ [FLMNH-MGCL-263044], 1 ♀ [FLMNH-MGCL-263045], 1 ♀

[FLMNH-MGCL-263046], (FLMNH), May 1972, 1 ♂ [FLMNH-MGCL-262982], 1 ♂ [FLMNH-MGCL-262983], 1 ♂ [FLMNH-MGCL-262984], 1 ♂ [FLMNH-MGCL-262985], 1 ♂ [FLMNH-MGCL-262987], 1 ♂ [FLMNH-MGCL-262994], 1 ♂ [FLMNH-MGCL-263016], 1 ♂ [FLMNH-MGCL-263021], 1 ♀ [FLMNH-MGCL-263047], (FLMNH), Sep 1972, 1 ♀ [FLMNH-MGCL-263039], (FLMNH), May 1972, 1 ♂ [FLMNH-MGCL-262981], (FLMNH); Reserva Ecológica de Sooretama, [19°3'25"S, 40°8'50"W], 100 m, (DZUP), (Mielke, O. H. H., Casagrande, M. M.), 21-25 Jan 2014, 1 ♀, (DZUP); Santa Cruz, [19°57"S, 40°9'W], (Callaghan, C. J.), 19 Jun 1976, 1 ♂/♀ [FLMNH-MGCL-207921], (FLMNH); Santa Leopoldina, [20°6'S, 40°32'W], (DZUP); Santa Teresa, [19°56"S, 40°36'W], (DZUP); Goiás: Goiás Velho, (DZUP); Ilha do Bananal, [8°35"S, 49°28'W], (DZUP); N. Anápolis, Belo Horizonte-Brasília, km 47, (Callaghan, C. J.), 10 Apr 1973, 1 ♂ [FLMNH-MGCL-263029], (FLMNH); Maranhão: 26 km E Feira Nova do Maranhão, Fazenda Forquilha dos Brejos, [7°0'29"S, 46°26'30"W], (DZUP), (Mielke, O. H. H.), 15-25 Feb 2012, 1 ♀, (DZUP); 30 km W Fortaleza dos Nogueiras, Retiro, 470 m, (DZUP); Imperatriz, (DZUP); km 108 Açaílandia-Sta. Luzia, Fazenda Terrasse, (DZUP); Mato Grosso: 10 mi. S. Diamantino, Melguira, [14°32"S, 56°19'W], 610 m, (Collenette, C. L.), 23 May-3 Jun 1927, 1 ♂ [BMNH(E)#1420156], (NHMUK); Barra do Garça, (DZUP); Cáceres, Coronel Rio Branco, Rio Vermelho, [15°9"S, 58°15'W], 400 m, (DZUP); Diamantino, Alto Rio Arinos, Faz. [enda] S. [ão] João, [14°21'18"S, 56°9'2"W], (DZUP); nr. Melguira, Alto Rio Paraguai, Barra do Bugres, [15°4'4"S, 57°10'W], 150 m, (DZUP); no specific locality, (Germain, P.), 1886, 1 ♂ [BMNH(E)#1420155], (NHMUK); Minas Gerais: Belo-Brasilia, woods along river, 47 km N Anápolis, (Callaghan, C. J.), 10 Apr 1973, 1 ♂ [FLMNH-MGCL-263311], 1 ♂ [FLMNH-MGCL-263319], 1 ♂ [FLMNH-MGCL-263323], 1 ♂ [FLMNH-MGCL-263327], 1 ♂ [FLMNH-MGCL-263328], 1 ♂ [FLMNH-MGCL-263335], (FLMNH), 10 Apr 1973, 1 ♀ [FLMNH-MGCL-1036236], (FLMNH); Caratinga, Estação Biológica Caratinga, [19°47"S, 42°8'W], 400 m, (DZUP); Conceição dos Ouros, Serra Grande, [22°25"S, 45°47'W], 1365 m, (Melo, D.), 19 Nov 2012, 1 ♂, (ZUEC); nr. Col. Fabriciano, Parque Estadual do Rio Doce, (Callaghan, C. J.), 25 Jul 1972, 1 ♂ [FLMNH-MGCL-263031], 1 ♂ [FLMNH-MGCL-263032], (FLMNH), 25-28 Jul 1972, 1 ♂ [FLMNH-MGCL-263030; in recently burned forest area], (FLMNH); Parque Estadual do Rio Doce, [20°15"S, 42°54'W], 200 m, (DZUP), (Callaghan, C. J.), 26 Jul 1972, 1 ♂ [FLMNH-MGCL-263310], (FLMNH); Teófilo Otoni, San Jacinto Valley, Apr 1908, 1 ♀ [BMNH(E)#1498895], 1 ♀ [BMNH(E)#1498898], (NHMUK), Feb 1908, 1 ♂ [BMNH(E)#1498889], 1 ♀ [BMNH(E)#1498897], (NHMUK), Jul 1908, 1 ♂ [BMNH(E)#1498890], (NHMUK), Mar 1908, 1 ♀ [BMNH(E)#1498894], (NHMUK), May 1908, 1 ♂ [BMNH(E)#1498887], 1 ♂ [BMNH(E)#1498888], (NHMUK), Nov 1907, 1 ♀ [BMNH(E)#1498896], (NHMUK); no specific locality, 1 ♂ [BMNH(E)#1420157], 1 ♀ [BMNH(E)#1420164], (NHMUK), (Callaghan, C. J.), 10 Apr 1973, 1 ♂ [FLMNH-MGCL-1036218], (FLMNH); Pará: [Rio] Tapajós, [4°16'8"S, 55°59'10"W], 25 m, 3 Dec 2012, 1 ♂, (ZUEC); Pará, (Bates, H. W.), 1 ♂ [BMNH(E)#1420119], 1 ♂ [BMNH(E)#1420120], 1 ♀ [BMNH(E)#1420123], 1

♀ [BMNH(E)#1420124], (NHMUK), (Smith, H. H.), Aug, 1 ♂ [BMNH(E)#1420122], (NHMUK), (Wallace, A. R.), 1 ♂ [BMNH(E)#1420121], (NHMUK); 15 km S Itaituba, [4°17'S, 56°5'W], (Callaghan, C. J.), 23 Jul 1978, 1 ♂ [FLMNH-MGCL-263027], 1 ♂ [FLMNH-MGCL-263028], (FLMNH); Água Azul, (DZUP); Belém, [1°27'S, 48°29'W], (Forster, W.), 15 Jun 1954, 1 ♀, (ZSM), 16 Jun 1954, 2 ♂, (ZSM), (Kesselring, J.), 4 Feb 1971, 1 ♂ [FLMNH-MGCL-263333], (FLMNH); Belém, Utinga, [1°27'S, 48°25'W], (DZUP); Benevides, Neopolis, [1°22'S, 48°15'W], (DZUP), (Carneiro, E., Dolibaina, D., Dias, F., Moreira), 2 Feb 2010, 1 ♀, (DZUP); Bragança, [1°3'S, 46°47'W], (Mathan, M. de), 1 ♂ [BMNH(E)#1420127], (NHMUK); Ilha da Maracá, Alto Alegre, (DZUP); Itaituba on Río Tapajós, [4°16'8"S, 55°59'10"W], Aug, 1 ♂ [FLMNH-MGCL-263306], 1 ♂ [FLMNH-MGCL-263307], (FLMNH); Itaituba, [4°17'S, 55°59'W], (Michael), 1 ♂, (MNHU), 1890, 1 ♀, (MNHU); Maçauari-Belém, (DZUP); nr. Belém, Fazenda Velha, [1°20'S, 48°14'W], (Callaghan, C. J.), 18 Nov 1973, 1 ♂ [FLMNH-MGCL-263304], 1 ♂ [FLMNH-MGCL-263326], 1 ♂ [FLMNH-MGCL-263329], 1 ♀ [FLMNH-MGCL-263338], (FLMNH), 19 Nov 1973, 1 ♂ [FLMNH-MGCL-263314], 1 ♂ [FLMNH-MGCL-263315], 1 ♂ [FLMNH-MGCL-263316], 1 ♂ [FLMNH-MGCL-263318], (FLMNH); Óbidos, [1°54'S, 55°31'W], (DZUP); Pará, [1°0'S, 51°11'W], 2 ♂, (MNHU), (Goeldi), 1 ♂ [BMNH(E)#1420114], 1 ♂ [BMNH(E)#1420115], (NHMUK), (Hahnel), 1 ♂, (MNHU), (Mathan, M. de), 1 ♂ [BMNH(E)#1420116], 1 ♂ [BMNH(E)#1420117], 1 ♂ [BMNH(E)#1420118], (NHMUK), (Moss, A. M.), 1 ♂ [BMNH(E)#1498899], 1 ♂ [BMNH(E)#1498900], 1 ♀ [BMNH(E)#1498901], (NHMUK), (Stevens, M.), 1 ♂ [BMNH(E)#1420113], (NHMUK); Pará, [1°0'S, 51°11'W], 229 m, (Majerus, M.), 1 Mar 2007, 1 ♂ [BMNH(E)#1267133], (NHMUK); 'Raisao', 1 ♂ [FLMNH-MGCL-263298], (FLMNH); Rio Cuminá, [1°22'S, 56°3'W], (DZUP); Rio Cuminá, Cachoeira Breu, [0°27'S, 56°5'W], (DZUP); Santarém, [2°26'S, 54°43'W], 1 ♂ [FLMNH-MGCL-263300], (FLMNH), (Smith, H. H.), 1 ♂ [BMNH(E)#1420134], (NHMUK); Santo Antônio do Tauá, Reserva Sonho Azul, [1°15'S, 48°3'W], (DZUP); Taperinha, [0°52'S, 47°49'W], (Boy, H. C.), Aug 1920, 1 ♂, (ZSM), Sep 1920, 4 ♂, (ZSM); Urumanza, 22/07/59, 1 ♂ [BMNH(E)#1670216], (NHMUK); Paraná: Alto da Serra, Morretes, [25°28'S, 48°49'W], 850 m, (DZUP); Pernambuco: Jaqueira, RPPN Frei Caneca, [8°43'16"S, 35°50'W], 650 m, (DZUP); Pernambuco, [8°47'S, 37°42'W], 1 ♂ [BMNH(E)#1420128], (NHMUK); Rio de Janeiro: Duque de Caxias, Villa Equitativa, 100 m, (Callaghan, C. J.), 1 ♂ [FLMNH-MGCL-1036210], 1 ♂ [FLMNH-MGCL-1036211], 1 ♂ [FLMNH-MGCL-1036212], 1 ♂ [FLMNH-MGCL-1036213], (FLMNH); Guapimirim, [22°32'S, 42°59'W], 400 m, (Callaghan, C. J.), 27 May 1972, 1 ♂ [FLMNH-MGCL-262974], (FLMNH); Guapimirim, [22°32'S, 42°59'W], 50 m, (DZUP), (Callaghan, C. J.), 3 Sep 1971, 1 ♂ [FLMNH-MGCL-262972], 1 ♂ [FLMNH-MGCL-262973], (FLMNH); Imbariê, [22°38'S, 43°13'W], 25 m, (DZUP), (Callaghan, C. J.), Jun 1976, 1 ♂ [FLMNH-MGCL-207914], 1 ♂ [FLMNH-MGCL-207915], 1 ♂ [FLMNH-MGCL-207916], (FLMNH); km 16 Rio Teresópolis, (Callaghan, C. J.), 10 May 1971, 1 ♂ [FLMNH-MGCL-262975], (FLMNH), 10

Oct 1971, 1 ♂ [FLMNH-MGCL-262977], (FLMNH), 5 Jun 1972, 1 ♂ [FLMNH-MGCL-263026], (FLMNH), 6 May 1972, 1 ♀ [FLMNH-MGCL-263048], (FLMNH); km 27 Rio Teresópolis, (Callaghan, C. J.), 24 Jun 1971, 1 ♂ [FLMNH-MGCL-262968], (FLMNH), 6 Sep 1971, 1 ♂ [FLMNH-MGCL-262976], (FLMNH); km 42 Rio de Janeiro-Teresópolis rd., Mt. Olivetti, [22°31'31"S, 42°59'54"W], (Callaghan, C. J.), 2 Jul 1972, 1 ♀ [FLMNH-MGCL-263049], (FLMNH); Laguna de Sacuarema, [22°56'S, 42°28'W], (Germain, P.), Sep 1884, 1 ♂ [BMNH(E)#1420145], 1 ♂ [BMNH(E)#1420146], 1 ♂ [BMNH(E)#1420147], 1 ♂ [BMNH(E)#1420148], 1 ♂ [BMNH(E)#1420149], 1 ♂ [BMNH(E)#1420150], 1 ♂ [BMNH(E)#1420151], 1 ♂ [BMNH(E)#1420152], 1 ♂ [BMNH(E)#1420153], 1 ♀ [BMNH(E)#1420161], 1 ♀ [BMNH(E)#1420162], 1 ♀ [BMNH(E)#1420163], (NHMUK); Petrópolis to Rio de Janeiro old rd., 300 m, (Callaghan, C. J.), 13 May 1972, 1 ♂ [FLMNH-MGCL-262967], 1 ♂ [FLMNH-MGCL-262978], 1 ♂ [FLMNH-MGCL-262979], 1 ♂ [FLMNH-MGCL-262980], (FLMNH); 'Rio de Janeiro Zubeaida', 25 m, (Ebert, H.), 10 Feb 1975, 1 ♂ [FLMNH-MGCL-207917], 1 ♂ [FLMNH-MGCL-207918], 1 ♂ [FLMNH-MGCL-207919], 1 ♂ [FLMNH-MGCL-207920], (FLMNH); Rio de Janeiro, [22°55'S, 43°14'W], 1 ♂ [BMNH(E)#1420154], (NHMUK); Rio-Petrópolis Hwy. km 20, Magé, (Callaghan, C. J.), 2 May 1971, 1 ♂ [FLMNH-MGCL-262969], (FLMNH); Serra de Tingua, Xerém, [22°32'S, 43°18'W], (Brown, K. S.), 21 Mar 1967, 1 ♂ [FLMNH-MGCL-262970], 1 ♂ [FLMNH-MGCL-262971], (FLMNH); Silvia Jardim, (Callaghan, C. J.), 8 Jul 1975, 1 ♂ [FLMNH-MGCL-263033], (FLMNH); Três Rios, Jacarepaguá, 1 ♂ [HT priamis: 'No 5630'//Euptychia ar-naea priamis d' Alm 1992 Almeida det. ♂'//Coll. D' Almeida'//HOLOTIPO'//Jacarepaguá Três-Rios. Rio, 19.. ♂']; Vila Inhomirim, [22°34'5"S, 43°10'35"W], 180 m, (DZUP); *Rondônia*: C-20 5 km N, 3 km W Cacaulândia, Fazenda Rancho Grande, Lot 25 forest trail, (Eiler, D. L.), 13 Nov 1992, 1 ♂ [FLMNH-MGCL-264636], (FLMNH), 20 Nov 1992, 1 ♂ [FLMNH-MGCL-264642], (FLMNH), 21 Nov 1992, 1 ♂ [FLMNH-MGCL-264635], (FLMNH), (Emmel, T. C.), 6 Nov 1989, 1 ♂ [FLMNH-MGCL-207970], 1 ♂ [FLMNH-MGCL-207971], (FLMNH), (Groce, L. L.), 22 Mar 1991, 1 ♂ [FLMNH-MGCL-207972], (FLMNH); 1 km N Cacaulândia, [10°31'30"S, 62°48'W], (Austin, G. T.), 13 Nov 1992, 1 ♀ [FLMNH-MGCL-207956], (FLMNH); 1 km N Cacaulândia, Fernandes Trail (linea C-14) off B-65, [10°19'33"S, 62°54'W], (Austin, G. T.), 10 Nov 1990, 1 ♂ [FLMNH-MGCL-1036222], (FLMNH), 8 Dec 1990, 1 ♂ [FLMNH-MGCL-207952], 1 ♂ [FLMNH-MGCL-207953], (FLMNH); 10 km S Cacaulândia, [10°37'24"S, 62°48'W], (Austin, G. T.), 9 Dec 1990, 1 ♀ [FLMNH-MGCL-207948], (FLMNH); 12.5 km S Cacaulândia, [10°39"S, 62°48'W], (Austin, G. T.), 12 Dec 1990, 1 ♂ [FLMNH-MGCL-207945], (FLMNH), 21 Mar 1991, 1 ♀ [FLMNH-MGCL-207950], (FLMNH), 3 Nov 1990, 1 ♂ [FLMNH-MGCL-207944], (FLMNH), 9 Dec 1990, 1 ♂ [FLMNH-MGCL-207946], 1 ♂ [FLMNH-MGCL-207947], (FLMNH); 15 km S Cacaulândia, [10°40"S, 62°48'W], (Austin, G. T.), 22 Apr 1991, 1 ♀ [FLMNH-MGCL-207949], (FLMNH); 62 km S Ariquemes, Fazenda Rancho Grande, linea C-20, 7 km E B-65, [10°17'58"S, 62°52'14"W], 170 m, (Austin, G. T.), 16 Sep 1992, 1 ♂

[FLMNH-MGCL-207958], (FLMNH), 20 Apr 1991, 1 ♂ [FLMNH-MGCL-1036223], (FLMNH), 22 Nov 1991, 1 ♂ [FLMNH-MGCL-207959], (FLMNH), 30 Oct 1990, 1 ♂ [FLMNH-MGCL-207962], (FLMNH), 5 Nov 1991, 1 ♂ [FLMNH-MGCL-207960], (FLMNH), 9 Nov 1990, 1 ♂ [FLMNH-MGCL-207961], (FLMNH), (Bongiolo, G.), 24 Mar 1991, 1 ♂ [FLMNH-MGCL-207963], (FLMNH); 67 km S Ariquemes, 5 km S of Cacaulândia on linha C-10 at Rio Pardo off B-65, [10°23'15"S, 62°54'53"W], (Gomes, O.), 5 Sep 1993, 1 ♂ [FLMNH-MGCL-207951], (FLMNH), 7 Dec 1995, 1 ♂ [FLMNH-MGCL-264644], (FLMNH); Ariquemes 70 km S, B-80 between lineas C-10 and 15, [10°24'36"S, 62°53'59"W], (Austin, G. T.), 8 Nov 1991, 1 ♂/♀ [FLMNH-MGCL-207943], (FLMNH); Ariquemes, [9°56'S, 63°3'W], (DZUP); Fazenda Rancho Grande (Ariquemes 62 km S linha C-20, 7 km E B-65), [10°32'S, 62°48'W], (Austin, G. T.), 11 Jun 1993, 1 ♀ [FLMNH-MGCL-207932], (FLMNH), 13 Nov 1992, 1 ♂ [FLMNH-MGCL-207930], (FLMNH), 14 Apr 1992, 1 ♂ [FLMNH-MGCL-207924], (FLMNH), 17 Sep 1992, 1 ♀ [FLMNH-MGCL-207933], (FLMNH), 19 Sep 1992, 1 ♀ [FLMNH-MGCL-207931], (FLMNH), 20 Apr 1991, 1 ♂ [FLMNH-MGCL-207926; station #2 (forest)], (FLMNH), 20 Nov 1991, 1 ♂ [FLMNH-MGCL-207928], (FLMNH), 20 Sep 1992, 1 ♂ [FLMNH-MGCL-207929], (FLMNH), 25 Oct 1992, 1 ♂ [FLMNH-MGCL-207927], (FLMNH), 30 Oct 1990, 1 ♂ [FLMNH-MGCL-207925], (FLMNH), 31 Oct 1992, 1 ♀ [FLMNH-MGCL-207934; station #6 forest], (FLMNH), 7 Dec 1990, 1 ♀ [FLMNH-MGCL-207935], (FLMNH), 8 Apr 1995, 1 ♂ [FLMNH-MGCL-264639; Trap #3], (FLMNH), (Bongiolo, G.), 24 Mar 1991, 1 ♂ [FLMNH-MGCL-207923], (FLMNH); Fazenda Rancho Grande (Ariquemes 62 km S C-20), [10°32'S, 62°48'W], 165 m, (Harris, L. & H.), 17 April 1992 1 ♀ [FLMNH-MGCL-207984], (FLMNH); Fazenda Rancho Grande (Ariquemes 62 km S linha C-20, 7 km E B-65), [10°32'S, 62°48'W], 143 m, (Harris, L. & H.), 20 Apr 1997, 1 ♂ [FLMNH-MGCL-264640], 1 ♂ [FLMNH-MGCL-264641], 1 ♂ [FLMNH-MGCL-264651], (FLMNH); Fazenda Rancho Grande (Ariquemes 62 km S linha C-20, 7 km E B-65), [10°32'S, 62°48'W], 180 m, (Austin, G. T.), 21 Mar 1989, 1 ♂ [FLMNH-MGCL-263334], (FLMNH); Fazenda Rancho Grande (Ariquemes 65 km S linha C-20, 10 km E B-65, 3 km E Fazenda RG lot 18), (Harris, L. & C.), 12 Apr 1992, 1 ♂ [FLMNH-MGCL-207936], (FLMNH), 17 Apr 1992, 1 ♂ [FLMNH-MGCL-207937], (FLMNH), 21 Apr 1992, 1 ♂ [FLMNH-MGCL-207938], (FLMNH); Jaru, [10°27'S, 62°30'W], (DZUP); Linea C-20 off B-65 at Rio Pardo, Fernandes Trail, (Austin, G. T.), 10 Dec 1990, 1 ♂ [FLMNH-MGCL-207954], (FLMNH); nr. Cacaulândia, 62 km. S. Ariquemes, Fazenda Rancho Grande, Linea C-20, 7 km E B-65, 20 Apr 1997, 1 ♂ [FLMNH-MGCL-207939], (FLMNH), 20 Apr 1997, 1 ♂ [FLMNH-MGCL-207940], 1 ♂ [FLMNH-MGCL-207941], 1 ♂ [FLMNH-MGCL-207942], (FLMNH), (Harris, L.), 20 Apr 1997, 1 ♂ [FLMNH-MGCL-1036229], (FLMNH); nr. Cacaulândia, 62 km. S. Ariquemes, Fazenda Rancho Grande, Linea C-20, 7 km E B-65, (Ross, G.), 13 Jan 1991, 1 ♂ [FLMNH-MGCL-207969], (FLMNH), 24 Jan 1991, 1 ♂ [FLMNH-MGCL-207968], (FLMNH), 29 Dec 1990, 1 ♀

[FLMNH-MGCL-207967], (FLMNH), 31 Dec 1991, 1 ♂ [FLMNH-MGCL-207965], (FLMNH), 4 Feb 1991, 1 ♂ [FLMNH-MGCL-207964], (FLMNH), 5 Feb 1991, 1 ♀ [FLMNH-MGCL-207966], (FLMNH), (Smith, J. A.), 18-26 Apr 1991, 1 ♂, (BME); nr. Cacaúlândia, 62 km. S. Ariquemes, Fazendo Rancho Grande, [10°32'S,62°48'W], 180-200 m, (Heydon, S. L.), 4 Dec 1991, 1 ♂ [vapor headlamp], (BME); nr. Cacaúlândia, 62 km. S. Ariquemes, linea C10, Fazenda Rancho Grande, [10°32'S,62°48'W], 180-200 m, (Austin, G. T.), 31 Oct 1989, 1 ♂ [FLMNH-MGCL-207973], 1 ♂ [FLMNH-MGCL-207974], (FLMNH); vicinity of Fazenda Rancho Grande, 62 km S Ariquemes off B-65, [10°17'58"S,62°52'14"W], 165 m, (Harris, L. & C.), 14 Apr 1992, 1 ♂ [FLMNH-MGCL-264646], (FLMNH); vicinity of Fazenda Rancho Grande, 62 km S Ariquemes off B-65, [10°17'58"S,62°52'14"W], 180 m, (Austin, G. T.), 24 Oct 1989, 1 ♂ [FLMNH-MGCL-263309], (FLMNH); *Roraima*: Amajari, Tepequén, 620 m, (DZUP); Maloca da Serra do Sul, (DZUP); Pacaraima, [4°27'57"S,61°8'32"W], 800 m, (DZUP); Surucucu, (DZUP); *São Paulo*: Ariri, (DZUP); *Not located: Brazil*, 1 ♂ [BMNH(E)#1420158], 1 ♂ [BMNH(E)#1420159], 1 ♀ [BMNH(E)#1420167], (NHMUK), (Camalte, B.D.), 1 ♀ [BMNH(E)#1420165], (NHMUK); Rio Tapajos, Barreiras, Oct, 2 ♂, (ZSM). **Colombia: Amazonas**: Río Caquetá, La Pedrera, [1°18'S,69°42'W], 170 m, May 1992, 1 ♂ [FLMNH-MGCL-257060], (FLMNH), Apr 1992, 1 ♂ [FLMNH-MGCL-257061], (FLMNH), (Simon, M. J.), 18 May 1992, 1 ♂ [FLMNH-MGCL-257064], 1 ♂ [FLMNH-MGCL-257068], (FLMNH), 25 May 1992, 1 ♂ [FLMNH-MGCL-257063], (FLMNH), 29 May 1992, 1 ♂ [FLMNH-MGCL-257062], (FLMNH), 7 May 1992, 1 ♂ [FLMNH-MGCL-257067], 1 ♂ [FLMNH-MGCL-257069], (FLMNH); Río San Miguel, Santa Rosa de Sucumbíos, (Simon, M. J.), 9 Sep 1971, 1 ♂ [FLMNH-MGCL-263103], (FLMNH); *Caquetá*: Montaña, [1°25'N,75°28'W], 366 m, (Nicolay, S. S.), 24 Jan 1971, 1 ♀ [FLMNH-MGCL-263133], (FLMNH), 25 Jan 1971, 1 ♂ [FLMNH-MGCL-263101], (FLMNH); *Meta*: Bosque Bavaria, w Villavicencio-Restrepo, [4°11'N,73°39'46"W], 600 m, (Lamas, G.), 12-13 Oct 2006, 1 ♂ [MUSM-LEP-100439], (MUSM); Cuchilla, 7 Sep 1943, 1 ♂ [FLMNH-MGCL-263106], (FLMNH); Río Guayabero, [2°15'N,73°45'W], 300 m, (Trapp, D.), 15 Jan 1959, 1 ♀ ['Macarena Sur'], (ZSM); Río Negro, [4°12'N,73°42'23"W], 732 m, (Nicolay, S. S.), 16 Jan 1971, 1 ♀ [FLMNH-MGCL-263128], (FLMNH); Villavicencio, [4°9'N,73°38'W], 500 m, (Robbins, R. K.), 9 Jul 1972, 1 ♂ [FLMNH-MGCL-263100], (FLMNH); *Putumayo*: Mocoa, [1°9'N,76°37'W], 650 m, (Sullivan, J. B.), 2 Jul 1981, 1 ♂ [FLMNH-MGCL-264643], (FLMNH); Orito, [0°17'N,76°53'W], 400 m, (Sullivan, J. B.), 3 Jul 1981, 1 ♂ [FLMNH-MGCL-264637], 1 ♂ [FLMNH-MGCL-264638], (FLMNH); Río Caqueta, Curillo, [1°0'N,76°0'w], 200 m, (Mallet, J., Jackson, D., Garcia C., P.), 1-7 Aug 1977, 1 ♂ [FLMNH-MGCL-264650], (FLMNH); Villa Garzón, [1°0'N,76°30'w], 300 m, (Mallet, J.), 18 Jun 1977, 1 ♂ [BMNH(E)#1498967], (NHMUK), (Mallet, J., Jackson, D., Garcia C., P.), 2 Feb 1977, 1 ♀ [FLMNH-MGCL-264652], (FLMNH), 2 Jul 1977, 1 ♂ [FLMNH-MGCL-264649], (FLMNH); *Valle del Cauca*: Anchicayá, [3°34'27"N,76°46'W], 305 m, (Sullivan, J. B.), 24 Jan 1988, 1 ♂ [FLMNH-MGCL-257054], (FLMNH); *Not loca-*

ted: 'Colombia', (Ovalle, E), 1 ♂ [FLMNH-MGCL-263102], (FLMNH). Ecuador: Azuay: 'Sigsig' – (error), (Lafebre, R. de), Jul 1970, 1 ♂ [FLMNH-MGCL-263349], 1 ♂ [FLMNH-MGCL-263355], 1 ♀ [FLMNH-MGCL-263370], (FLMNH), Jul 1970, 1 ♂ [FLMNH-MGCL-263343], (FLMNH); Loja: 'environs of Loja' – (error), 1886, 1 ♀ [BMNH(E)#1420066], (NHMUK); 'Loja' – (error), 1800 m, 1893, 1 ♂ [BMNH(E)#1498859], (NHMUK), (Gaujon), 1886, 1 ♂ [BMNH(E)#1498856], 1 ♂ [BMNH(E)#1498857], (NHMUK); 'Vilcabamba' – (error), (Lafebre, R. de), Jul 1970, 1 ♂ [FLMNH-MGCL-263350], 1 ♀ [FLMNH-MGCL-263374], (FLMNH); Morona-Santiago: 2 km N San Isidro, [2°11'54"S, 78°9'24"W], 1250–1450 m, (Busby, R. C.), 10 Jan 2015, 1 ♂ [FLMNH-MGCL-195469], 1 ♂ [FLMNH-MGCL-195476], (FLMNH); E of Misión de Bomboiza, [3°26'6"S, 78°30'18"W], 950–1300 m, (Busby, R. C.), 18 Sep 2014, 1 ♂ [FLMNH-MGCL-195374], (FLMNH); forest ridge nr. Yaupi, [2°51'15"S, 77°56'48"W], 400 m, (Gallice, G.), 13 Jun 2009, 1 ♂ [FLMNH-MGCL-152428], (FLMNH), 16 Jun 2009, 1 ♂ [FLMNH-MGCL-152426], (FLMNH), 21 Jun 2009, 1 ♂ [FLMNH-MGCL-152429], (FLMNH), 4 Jul 2009, 1 ♂ [FLMNH-MGCL-152430], (FLMNH); Gualaquiza, Río Bomboiza, [3°26'S, 78°32'W], 850 m, (Hall, J. P. W., Willmott, K. R.), 26–29 Jul 1993, 1 ♀ [FLMNH-MGCL-257138], (FLMNH); hill N of Santiago, [3°2'32"S, 78°0'20"W], 350 m, (Busby, R. C.), 15 Sep 2014, 1 ♂ [FLMNH-MGCL-195371], (FLMNH); hill N of Santiago, [3°2'32"S, 78°0'20"W], 380 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 29 Jul, 2 Aug 2016, (INABIO); km 14 Chigüinda–Gualaquiza rd., [3°15'45"S, 78°39'4"W], 1300 m, (Willmott, K. R., J. I. R., J. C. R.), 15 Jun 2013, (INABIO); km 14 Chigüinda–Gualaquiza rd., [3°15'45"S, 78°39'4"W], 1300–1600 m, (Busby, R. C.), 17 Sep 2014, 1 ♂ [FLMNH-MGCL-195373], (FLMNH); km 2 Santiago–Puerto Morona rd., [3°2'8"S, 78°0'W], 350–500 m, (Ahrenholz, D. H., Busby, R. C.), 15 Sep 2014, 1 ♂ [FLMNH-MGCL-195372], (FLMNH), (Busby, R. C., Ahrenholz, D. H.), 8 Jan 2015, 1 ♂ [FLMNH-MGCL-195464], 1 ♂ [FLMNH-MGCL-195465], (FLMNH); km 47.6 Santiago–Puerto Morona rd., [2°56'12"S, 77°44'48"W], 245 m, (Busby, R. C.), 7 Jan 2015, 1 ♂ [FLMNH-MGCL-195445], (FLMNH); Río Waiwaim, Taisha, [2°22'36"S, 77°30'W], 600 m, (Hall, J. P. W.), 1,4 Jun 1994, 1 ♂, (FLMNH); Napo: Aguano, [1°4'S, 77°33'W], 350 m, (Simpson, A.), 1 ♂ [BMNH(E)#1420056], (NHMUK); Archidona, [0°55'S, 77°48'W], 24 May 1900, 1 ♂, (ZSM); Cordillera Galeras, [0°49'24"S, 77°34'6"W], 1187 m, (Ranford, J.), 11 Aug 2010, 1 ♂ [GAN26], (FLMNH) (CULEPEX Expedition, 2010); km 14 Tena–Puyo rd., Apuya, [1°6'18"S, 77°46'42"W], 600 m, (Busby, R. C.), 10 Sep 2014, 1 ♂ [FLMNH-MGCL-195370], (FLMNH); Río Anzu, [1°10'30"S, 77°52'22"W], 700 m, (Velástegui, D.), 9 Jan 1969, 1 ♂ [MUSM-LEP-100441], (MUSM); Río Arajuno, [1°14'S, 77°42'W], 900 m, (Brown, F. M.), 26 Apr 1941, 1 ♂ [FLMNH-MGCL-263325], (FLMNH); Río Misahualli 10 min by boat above the junction with Río Napo, [1°0'2"S, 77°40'23"W], 488 m, (Harris, L. N.), 14 Nov 1997, 1 ♂ [FLMNH-MGCL-257127], 1 ♂ [FLMNH-MGCL-264666], (FLMNH); Río Misahualli, [1°1'36"S, 77°40'W], 518 m, (Bowe, J. J.), 14 Sep 1998, 1 ♂ [FLMNH-MGCL-257123], (FLMNH), 16 Sep 1998, 1 ♂ [FLMNH-MGCL-257122], (FLMNH),

8 Sep 1998, 1 ♂ [FLMNH-MGCL-257124], (FLMNH), 9 Sep 1998, 1 ♂ [FLMNH-MGCL-257121], (FLMNH); Río Misahualli, Misahualli, [1°1'36"S, 77°40'W], 350–400 m, (Nakamura, I.), 21 Jun 2006, (ICNA), 22 Jun 2006, (ICNA), 23 Jun 2006, (ICNA); Río Misahualli, Misahualli, [1°1'36"S, 77°40'W], 400 m, (Smith, J. A.), 7–15 Sep 1997, 1 ♂, (BME), 8–14 Sep 1996, 1 ♂, (BME), (Taylor, T.), 26 Apr 1971, 1 ♂ [FLMNH-MGCL-263340], (FLMNH), 28 Apr 1971, 1 ♂ [FLMNH-MGCL-263348], (FLMNH); Río Misahualli, Tena, [0°59'28"S, 77°49'6"W], 500 m, (Jenkins, D. W. & J.), 23 Jan 1985, 1 ♂ [FLMNH-MGCL-257128], 1 ♂ [FLMNH-MGCL-257129], 1 ♂ [FLMNH-MGCL-263053], (FLMNH); Río Napo, 600 m, (Lafébre, R. de), 11 Sep 1968, 1 ♂ [FLMNH-MGCL-263354], (FLMNH); Río Napo, Misahualli, [1°1'36"S, 77°40'W], 518 m, (Bowe, J. J.), 16 Sep 1998, 1 ♂ [FLMNH-MGCL-263050], (FLMNH); Río Napo, Puerto Napo-Ahuano rd., Chichicorumi, [1°4'11"S, 77°37'45"W], 450 m, (Hall, J. P. W., Willmott, K. R.), 7 Sep 1993, 1 ♂ [FLMNH-MGCL-257126], (FLMNH); Tena-Baeza rd., Cotundo, [0°50'42"S, 77°47'44"W], 750 m, (Lafébre, R. de), Oct 1975, 1 ♀ [FLMNH-MGCL-257131], (FLMNH); Tena-Baeza rd., Cotundo, [0°50'42"S, 77°47'44"W], 800 m, (Nicolay, S. S.), 18 Dec 1976, 1 ♂ [FLMNH-MGCL-263358], (FLMNH); Tres Cruces, 1960 m, 28 Feb 1958, 1 ♂ [FLMNH-MGCL-263055], (FLMNH); Orellana: 48.5 km S Pompeya, Bogi 2 W stream, [0°42'44"S, 76°28'29"W], 230 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 28 Jul 2015, 3 ♂, (INABIO); Lago Agrio, [0°5'N, 76°53'W], 300 m, 26 Jul 1978, 1 ♂ [FLMNH-MGCL-257130; J. J. Anderson collection], (FLMNH); lower Río Yasuní, 'Baradero' trail, [1°5'S, 75°29'8"W], 170–220 m, (Willmott, K. R., J. I. R., J. C. R.), 18 Jul 2015, 1 ♂, 1 ♀, (INABIO); lower Río Yasuní, 'Pichincha' trail, [1°3'11"S, 75°27'53"W], 170 m, (Willmott, K. R., J. I. R., J. C. R.), 22 Jul 2015, 1 ♂, (INABIO); Parque Nacional Yasuní, 10 km E Guardiaña Pindo, [0°43'6"S, 76°39'8"W], 330 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 21,22 Jul 2016, (INABIO); Puerto Francisco de Orellana, [0°19'15"S, 78°56'6"W], 1421 m, (Majerus, M.), 6 Mar 2007, 1 ♀ [BMNH(E) #1420052], (NHMUK); Reserva Biológica del Río Bigal, [0°31'41"S, 77°25'7"W], 976 m, (Radford, J.), 21 Jul 2010, 1 ♀ [N15], (INABIO) (CULEPEX Expedition, 2010); Reserva Biológica del Río Bigal, [0°31'42"S, 77°25'20"W], 917 m, (Radford, J.), 21 Jul 2010, 1 ♂ [N20], (FLMNH) (CULEPEX Expedition, 2010); Reserva Biológica del Río Bigal, main campsite, [0°31'30"S, 77°25'4"W], 950 m, (Segebarth, C.), 1 Nov 2011, 1 ♂, (collection unknown) (Segebarth, C., pers. comm.), (Turner, J. D.), 30 Oct 2011, 1 ♂, (INABIO); Reserva Biológica del Río Bigal, main campsite, [0°31'30"S, 77°25'4"W], 955 m, (Radford, J.), 21 Jul 2010, 1 ♂ [N13], (INABIO) (CULEPEX Expedition, 2010); Río Aguarico, Zancudococha, [0°34'23"S, 75°26'13"W], 240 m, (Willmott, K. R., J. C. R., J. I. R., Aldaz, R.), 3, 5–8 Jul 2017, 1 ♂ [FLMNH-MGCL-288704], (FLMNH), (Willmott, K.R., J.C.R., J.I.R., Aldaz, R.), 3, 5–8 Jul 2017, (INABIO); Río Coca, [0°28'S, 76°58'W], 300 m, (Lafébre, R. de), Jul 1971, 1 ♂ [FLMNH-MGCL-263341], 1 ♀ [FLMNH-MGCL-263378], (FLMNH), Jul 1971, 1 ♀ [FLMNH-MGCL-263337], (FLMNH), Jun 1971, 1 ♀ [FLMNH-MGCL-263372], (FLMNH); Río Napo, Sacha Lodge, [0°28'14"S, 76°27'33"W], 240 m, (Gallice, G.), 21 Oct 2010, 1

♂, (INABIO); Río Tiputini, Estación Científica Yasuní, parcela 50 Ha, [0°40'55"S, 76°24'1"W], 250–270 m, (Willmott, K. R., J. I. R., J. C. R., Páez, E.), 7 Jul 2014, 1 ♀, (INABIO); Río Tiputini, Tiputini Biodiversity Station, [0°42'12"S, 76°0'30"W], 300 m, (Melo, P.), May–Aug 2002, 1 ♀, (FLMNH); Río Tiputini, vía Auca, Estación Científica Yasuní, [0°40'27"S, 76°23'49"W], 220–250 m, (Gallice, G.), 14 Jul 2009, 1 ♂ [FLMNH-MGCL-152425], (FLMNH), 4 Aug 2009, 1 ♂ [FLMNH-MGCL-152427], (FLMNH), (Harris, L. N.), 4 Oct 1998, 1 ♂ [FLMNH-MGCL-257135], (FLMNH), (Robinson Willmott, J. I., J. C.), 5 Jul 2014, 1 ♂, (INABIO); Río Tiputini, vía Auca, Estación Científica Yasuní, [0°40'27"S, 76°23'49"W], 250 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 26 Jul 2015, 1 ♂ [FLMNH-MGCL-209454], (FLMNH), 2 ♂, (INABIO); Yasuní, Estación Científica, [0°40'17"S, 77°24'2"W], 229 m, (Majerus, M.), 1 Mar 2007, 1 ♂ [BMNH(E)#1420050], 1 ♂ [BMNH(E)#1420051], (NHMUK); Yasuní, Estación Científica, [0°40'17"S, 77°24'2"W], 250 m, (Lamas, G.), 6 Dec 2004, 1 ♂ [MUSM-LEP-100523], (MUSM); Yasuní, Estación Científica, [0°40'17"S, 77°24'2"W], 300 m, (Harris, L.), 8 Sept 2002, 1 ♂ [FLMNH-MGCL-1036227], (FLMNH); Pastaza: 10.5 km SW Palora, [1°45'20"S, 78°1'49"W], 1000 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 2 Aug 2015, 1 ♂, (INABIO); 25 km E of Puyo, 762 m, (Stevens, C. M.), 28 Jun 1980, 1 ♂ [FLMNH-MGCL-257133], 1 ♂ [FLMNH-MGCL-257134], (FLMNH); km 11 Mera-Río Anzu rd., [1°25'15"S, 78°3'8"W], 1200 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 31 Jul 2015, 1 ♂, (INABIO); nr. Mera, Río Puyo, [1°28'S, 77°59'W], 1000 m, (McIntyre, W.), 24 Feb 1950, 1 ♂, (CMNH); Nushiño, [1°14'S, 77°34'30"W], (Simpson, A.), 1 ♂ [BMNH(E)#1420055], (NHMUK); Pastaza, [1°34'36"S, 77°45'W], 1 ♂ [BMNH(E)#1498855; 'forest on edge'], (NHMUK); Puyo, [1°28'S, 77°59'W], 1000 m, 1 ♀, (CMNH), (McIntyre, W.), 17 Mar 1950, 1 ♀, (CMNH), 23 Mar 1950, 1 ♀, (CMNH), 24 Feb 1950, 1 ♀, (CMNH), 24 Mar 1950, 1 ♂, (CMNH), 29 Apr 1950, 1 ♀, (CMNH), 30 May 1950, 1 ♀, (CMNH), Apr 1950, 1 ♀, (CMNH), Feb 1950, 1 ♀, (CMNH), Jul 1950, 2 ♂, 1 ♀, (CMNH); Puyo, [1°28'S, 77°59'W], 1067 m, (Nicolay, S. S.), 6 Dec 1972, 1 ♂ [FLMNH-MGCL-263324], (FLMNH), 7 Dec 1972, 1 ♂ [FLMNH-MGCL-263320], (FLMNH), 8 Dec 1972, 1 ♂ [FLMNH-MGCL-263336], (FLMNH), 9 Dec 1972, 1 ♂ [FLMNH-MGCL-263330], 1 ♀ [FLMNH-MGCL-263380], (FLMNH); Puyo-Macas rd., Pitirishca, [1°48'18"S, 77°49'15"W], 800 m, (Godefroi, R., Busby, R. C.), Sep 2001, 1 ♂ [FLMNH-MGCL-257132], (FLMNH); Río Bobonaza, Canelos, [1°35'S, 77°45'W], 640 m, (Palmer, M. G.), 1 ♂ [BMNH(E)#1420057], (NHMUK); Río Bobonaza, Sarayacu, [1°44'S, 77°29'W], 700 m, (Lafabre, R. de), 15 Sep 1968, 1 ♂ [FLMNH-MGCL-263342], (FLMNH); Río Capahuari, Kapawi Lodge, [2°32'30"S, 76°51'32"W], 250 m, (Willmott, K. R., Hall, J. P. W.), 21,22,27 Jul 2009, 1 ♂ [FLMNH-MGCL-149529], (FLMNH); Río Pastaza, (Lafabre, R. de), Dec 1968, 1 ♀ [FLMNH-MGCL-263373], (FLMNH); Río Pastaza, Kapawi village, [2°32'16"S, 76°50'10"W], 260 m, (Willmott, K. R., Hall, J. P. W.), 23 Jul 2009, 1 ♂ [FLMNH-MGCL-149525], 1 ♀ [FLMNH-MGCL-149526], (FLMNH); Río Pindo Grande, Shell, [1°29'40"S, 78°3'40"W], 1050 m, (Willmott, K. R., Hall, J. P. W.), 7,8

Feb 1995, (FLMNH); Shell-Mera Rd., (Taylor, T.), 28 Feb 1971, 1 ♂ [FLMNH-MGCL-263321], 1 ♂ [FLMNH-MGCL-263347], (FLMNH); Yutsuntsa, [2°21'4"S, 76°27'14"W], 250 m, (Nakahara, S.), 9 Jul 2014, 1 ♂/♀, (FLMNH); *Pichincha*: 12 km E Santo Domingo de los Colorados, Hotel Tinalandia, [0°18'S, 79°4'W], 650–750 m, (Nakamura, I.), 27 Jun 2006, (ICNA), 28 Jun 2006, (ICNA), 29 Jun 2006, (ICNA); *Sucumbíos*: Cerro Lumbaqui Norte, [0°1'42"N, 77°19'W], 800–950 m, (Hall, J. P. W., Willmott, K. R., J. C. R., J. I. R.), 15–19 Jul 2016, 1 ♂ [FLMNH-MGCL-209995], (FLMNH), (INABIO); Cuyabeno, Reserva de Producción Faunística, [0°0'4"S, 76°10'50"W], 230 m, (Kareofelas, G., Witham, C. W.), 20 Nov–12 Dec 1993, 4 ♂, 2 ♀, (BME); km 10.5 Lumbaqui-Baeza rd., [0°0'15"S, 77°25'W], 850 m, (Hall, J. P. W.), 17 Aug 2002, 1 ♂, (FLMNH); Río Napo, Limoncocha, [0°24'S, 76°37'W], 300 m, 6 Apr 1977, 1 ♂ [BMNH(E) #1498854], (NHMUK), (Nicolay, S. S.), 10 Feb 1971, 1 ♂ [FLMNH-MGCL-263332], (FLMNH), 9 Feb 1971, 1 ♂ [FLMNH-MGCL-263331], (FLMNH); *Tungurahua*: Santa Inés, [1°24'44"S, 78°13'43"W], 1250 m, (Simpson, A.), 1 ♀ [BMNH(E) #1420067], (NHMUK); *Zamora-Chinchipe*: 7 km SW Guayzimi, San José, [4°4'29"S, 78°43'36"W], 1400 m, (Willmott, K. R., Hall, J. P. W.), 2 Aug 2009, 1 ♂ [FLMNH-MGCL-149522], (FLMNH); above Río Sabanilla, Sofáaderos, [4°3'6"S, 79°1'4"W], 1450 m, (Willmott, K. R.), 13 Nov 2010, 1 ♂, (INABIO); Cabañas Ecológicas Copalinga, Río Bombuscaro, [4°5'26"S, 78°57'31"W], 1000 m, (Whelan, C.), 6 Dec 2008, 1 ♂ [FLMNH-MGCL-115951], (FLMNH), 8 Dec 2008, 1 ♂ [FLMNH-MGCL-115801], (FLMNH); E of Zumba, km 2.6 El Pite-Río Mayo rd., [4°51'58"S, 79°5'40"W], 1000 m, (Willmott, K. R., J. I. R., J. C. R.), 26 Jun 2014, 1 ♀, (INABIO); E. of Chito, Tres Aguas, [4°53'31"S, 78°59'34"W], 1850 m, (Willmott, K. R., J. I. R., J. C. R.), 5,6 Jun 2013, 1 ♂ [FLMNH-MGCL-157409], (FLMNH); km 11.5 Los Encuentros-Zarza, La Libertad, [3°47'54"S, 78°36'26"W], (Nakahara, S.), 28 Jun 2014, 1 ♀, (FLMNH); km 11.5 Los Encuentros-Zarza, La Libertad, [3°47'54"S, 78°36'26"W], 1250 m, (Willmott, K. R., Hall, J. P. W.), 6,8 Aug 2009, 1 ♂ [FLMNH-MGCL-149521], (FLMNH); km 18 Zumba-Los Sungas rd., Quebrada Huanchunangui, [4°55'11"S, 79°9'54"W], 1100 m, (Willmott, K. R.), 11 Oct 2010, 1 ♂, (INABIO), (Willmott, K. R., J. I. R., J. C. R.), 2,3 Jun 2013, 1 ♂, (INABIO); km 2.5 Zumba-San Andrés rd., [4°51'18"S, 79°3'47"W], 1370 m, (Willmott, K. R.), 12 Oct 2010, 1 ♂, (INABIO); km 22 Zumba-Loja rd., [4°46'10"S, 79°7'6"W], 1180 m, (Padrón, S., Aldaz, R.), 13 May 2008, 1 ♂ [FLMNH-MGCL-118493], (FLMNH); km 29 Zumba-Los Sungas rd., [4°57'4"S, 79°12'40"W], 1400 m, (Willmott, K. R., J. I. R., J. C. R.), 18 Jun 2014, 1 ♀ [FLMNH-MGCL-195105], (FLMNH); km 5 Zumba-Chito rd., [4°53'18"S, 79°7'26"W], 950 m, (Willmott, K. R., J. I. R., J. C. R.), 1 Jun 2013, 1 ♂ [FLMNH-MGCL-157408], (FLMNH), 1 ♂, (INABIO); lower Río Numpatakaime, c. 3 km S Shaime, [4°21'S, 78°39'28"W], 900 m, (Willmott, K. R., Hall, J. P. W.), 31 Jul 2009, 1 ♂ [FLMNH-MGCL-149523], 1 ♂ [FLMNH-MGCL-149524], (FLMNH); nr. Zamora, Río Bombuscaro, [4°6'48"S, 78°57'54"W], (Nakahara, S.), 23 Jun 2014, 1 ♂/♀, (FLMNH); Progreso, c. km 10 Zumba-Valladolid rd., [4°50'2"S, 79°6'6"W], 1400 m, (Padrón, S., Aldaz, R.), 15 May 2008, 1 ♂ [FLMNH-

MGCL-118490], 1 ♂ [FLMNH-MGCL-118491], (FLMNH); rd. Zumbi-Yankuam, Quebrada Numbame, [4°9'5"S, 78°38'40"W], 900 m, (Willmott, K. R., Hall, J. P. W.), 29 Jul 2009, 1 ♂ [FLMNH-MGCL-149527], 1 ♂ [FLMNH-MGCL-149528], (FLMNH); Río Mariposa, Nangaritza, 900 m, (Parker, T. A.), 28 Jul 1993, 1 ♂ [MUSM-LEP-100442], (MUSM); Río Nangaritza, 4 km S Zurmi, Reserva Maycú, [4°12'45"S, 78°38'36"W], 850 m, (Willmott, K. R., J. I. R., J. C. R.), 28 Jun 2014, 1 ♀ [FLMNH-MGCL-195110], (FLMNH), 2 ♂, 2 ♀, (INABIO); Río Zamora, Zamora, [4°4'6"S, 78°57'W], 1050 m, 1885, 1 ♂ [BMNH(E)#1498840], (NHMUK); Río Zamora, Zamora, [4°4'6"S, 78°57'W], 920-1220 m, (Baron, O. T.), 1 ♂ [BMNH(E)#1498829], 1 ♂ [BMNH(E)#1498830], 1 ♂ [BMNH(E)#1498831], 1 ♂ [BMNH(E)#1498833], 1 ♂ [BMNH(E)#1498834], 1 ♂ [BMNH(E)#1498835], 1 ♂ [BMNH(E)#1498836], 1 ♂ [BMNH(E)#1498837], 1 ♂ [BMNH(E)#1498838], 1 ♀ [BMNH(E)#1498832], 1 ♀ [BMNH(E)#1498841], 1 ♀ [BMNH(E)#1498842], 1 ♀ [BMNH(E)#1498843], (NHMUK); Yacuambí, [3°38'10"S, 78°55'34"W], 1250 m, (Aldaz, R.), 26, 29 Sep 2007, 1 ♂ [FLMNH-MGCL-113705], (FLMNH); Yacuambí-Tutupali rd., Cascada Tres Chorros, [3°32'43"S, 78°57'54"W], 1525 m, (Willmott, K. R., J. I. R., J. C. R.), 18 Jun 2013, 1 ♂ [FLMNH-MGCL-157410], (FLMNH), (INABIO); 'Zamora Podocarpus' [=Río Bombuscaro], [4°6'48"S, 78°57'54"W], 1000 m, (Kareofelas, G., Witham, C. W.), 7 Feb 1998, 2 ♂, (BME); Zamora, ridge to west, [4°4'30"S, 78°58'7"W], 1450 m, (Godefroi, R., Busby, R. C.), 18 Sep 2000, 1 ♂ [FLMNH-MGCL-257136], (FLMNH); Zumba-Loja rd., Palanda, [4°40'S, 79°8'W], 1150 m, 1986, 1 ♂ [BMNH(E)#1420061], (NHMUK), 7 Aug 1886, 1 ♂ [BMNH(E)#1498858], (NHMUK); *Not located: 'Ecuador'*, 1 ♂, (MNHU). **French Guiana:** *Cayenne*: 13 km SE Sinnamary on Rte. N1, CIRAD Forest reserve, (Edwards, G. B.), 5-7 Apr 1999, 1 ♀ [FLMNH-MGCL-262965], (FLMNH); Cayenne, [4°56'N, 52°20'W], 1 ♂ [BMNH(E)#1420099], 1 ♂ [BMNH(E)#1420100], 1 ♂ [BMNH(E)#1420101], 1 ♂ [BMNH(E)#1420196], 1 ♂ [BMNH(E)#1420197], 1 ♂ [BMNH(E)#1420201], 1 ♀ [BMNH(E)#1420195], (NHMUK), 1 ♂, (MNHU); Kaw Mountains, Relais de Patawa Lodge, (Emmel, T. C., Sourakov, A.), 3-5 Mar 1995, 1 ♂ [FLMNH-MGCL-262962], (FLMNH); SW of Regina on Approuage River, Saut Anthanase Camp, [4°10'33"N, 52°21'24"W], (Emmel, T. C., Sourakov, A.), 6-9 Mar 1995, 1 ♀ [FLMNH-MGCL-262963], (FLMNH), (Smith, J. A.), 14-17 Oct 1999, 1 ♀, (BME); vic. Saül airport, [4°33'33"N, 52°12'25"W], 228 m, (Smith, N. J., Gilbert, A.), 8-14 Aug 2012, 1 ♂, (BME); vicinity of Cayenne, Airport/mountain reservoir, (Harris, L. N.), 4 May 1998, 1 ♂ [FLMNH-MGCL-262961], (FLMNH); *St-Laurent du Maroni*: Maroni River, (DZUP), 1 ♂ [FLMNH-MGCL-263114], 1 ♂ [FLMNH-MGCL-263115], 1 ♂ [FLMNH-MGCL-263117], 1 ♂ [FLMNH-MGCL-263118], 1 ♂ [FLMNH-MGCL-263119], 1 ♂ [FLMNH-MGCL-263120], 1 ♂ [FLMNH-MGCL-263121], 1 ♂ [FLMNH-MGCL-263122], 1 ♀ [FLMNH-MGCL-263132], (FLMNH); Maroni river, Maripasoula, [3°41'N, 54°2'W], (Kassarov, L.), 20 Jan 1991, 1 ♀ [FLMNH-MGCL-262964], (FLMNH), Jan 1992, 1 ♀ [FLMNH-MGCL-1036237], (FLMNH); Saint-Georges-de-l'Oyapock, [3°53'33"N, 51°48'27"W], (Brévignon, C.), 8 Feb 1985, 1 ♂ [MUSM-LEP-100519],

(MUSM); Saül, [3°51'30"N, 53°18'14"W], 200–450 m, 1991, (LBCB), (Nakahara, S.), 5 Aug 2014, 1 ♂ [FLMNH-MGCL-209434; 'hill'], (FLMNH); St. Laurent du Maroni, [5°30'N, 54°2'W], 1 ♂ [BMNH(E)#1420102], 1 ♂ [BMNH(E)#1420103], 1 ♂ [BMNH(E)#1420104], 1 ♂ [BMNH(E)#1420105], (NHMUK); *Not located: 'French Guiana'*, 1 ♂ [BMNH(E)#1420106], 1 ♂ [BMNH(E)#1420107], 1 ♂ [BMNH(E)#1420108], 1 ♂ [BMNH(E)#1498905], 1 ♀ [BMNH(E)#1420109], 1 ♀ [BMNH(E)#1420110], 1 ♀ [BMNH(E)#1420111], 1 ♀ [BMNH(E)#1420112], (NHMUK). **Guyana:** *Cuyuni-Mazaruni*: Bartica, [6°24'N, 58°37'W], 1 ♂ [BMNH(E)#1498870], (NHMUK), (Parish, H. S.), 1 ♂ [BMNH(E)#1420082], (NHMUK), (Parish, H. S., Hoffmanns, W.), 1 ♀ [BMNH(E)#1420089], 1 ♀ [BMNH(E)#1420090], (NHMUK); Cariamang River, [5°42'N, 59°38'W], (Whitely, H.), 1 ♂ [BMNH(E)#1420085], (NHMUK); Kamarang, [5°53'N, 60°40'W], (Jenkins, D. W.), 10–14 Oct 1977, 1 ♂ [FLMNH-MGCL-257170], 1 ♂ [FLMNH-MGCL-264684], (FLMNH); 'Mazaruni Potaro', (Steiner, W. E.), 24 Dec 1983, 1 ♂ [FLMNH-MGCL-1036219], 1 ♂ [FLMNH-MGCL-1036221], (FLMNH); Paruima, [5°48'N, 61°1'W], 610 m, (Pinhas, A. S.), 1938, 1 ♀ [FLMNH-MGCL-263130], (FLMNH); Roraima, [5°12'N, 60°44'W], 1 ♂ [BMNH(E)#1420084], (NHMUK); *East Berbice-Corentyne*: New River Triangle, Camp Jaguar, 152 m, (Steinhauser, S. R.), 17 Nov 1980, 1 ♀ [FLMNH-MGCL-263371], (FLMNH), 18 Nov 1980, 1 ♂ [FLMNH-MGCL-263112], (FLMNH); *Upper Demerara-Berbice*: Essequibo River, Shankslands Resort, 36 mi SW of Georgetown, [6°28'44"N, 58°34'54"W], 20 m, (Douglas, M. G.), 20–28 Sep 2006, 1 ♂ [FLMNH-MGCL-257159], 1 ♂ [FLMNH-MGCL-257160], 1 ♂ [FLMNH-MGCL-257161], 1 ♂ [FLMNH-MGCL-257162], 1 ♂ [FLMNH-MGCL-257163], 1 ♂ [FLMNH-MGCL-257164], 1 ♂ [FLMNH-MGCL-257165], 1 ♀ [FLMNH-MGCL-257166], 1 ♀ [FLMNH-MGCL-257167], 1 ♀ [FLMNH-MGCL-257168], (FLMNH); Omai, [5°26'N, 58°45'W], (Schaus, W. M.), 1 ♂ [BMNH(E)#1420086], (NHMUK); *Not located: 'Guyana'*, 1 ♂ [BMNH(E)#1420088], 1 ♂ [BMNH(E)#1498871], 1 ♂ [BMNH(E)#1498872], (NHMUK), (Bartlett, A. W.), 1 ♂ [BMNH(E)#1498904], 1 ♀ [BMNH(E)#1498965], (NHMUK), (Parish, H. S.), 1 ♂ [BMNH(E)#1498903], (NHMUK); Demerara river, 1 ♀ [BMNH(E)#1498873], (NHMUK); Demerara, [6°47'N, 58°10'W], (Holmes, W.), 1 ♂ [BMNH(E)#1420083], (NHMUK); Parish, [4°46'N, 58°15'W], 1 ♂ [BMNH(E)#1420087], (NHMUK); Rio Essequibo, Makouria, Feb 1999, 1 ♂ [FLMNH-MGCL-264645], (FLMNH), Feb 1999, 1 ♂ [FLMNH-MGCL-264648], (FLMNH); Suruwabarú CK, Mt. Wokamung, 686 m, (Fratello, S.), Nov, 1 ♂ [FLMNH-MGCL-257169], (FLMNH). **Peru:** *Amazonas*: 0–5 km E La Peca, [5°37'S, 78°26'W], 1100–1400 m, (Lamas, G.), 23 Sep 1999, 1 ♂ [MUSM-LEP-100527], (MUSM); 4 km W Abra Wawajin, [5°18'S, 78°24'W], 750 m, (Lamas, G.), 24 Sep 1999, 1 ♀ [MUSM-LEP-100536], (MUSM); Alfonso Ugarte, [3°55'S, 78°26'W], 1000–1200 m, (Lamas, G.), 15 Jul 1994, 1 ♂ [MUSM-LEP-100452], 1 ♂ [MUSM-LEP-100453], (MUSM), 16 Jul 1994, 1 ♂ [MUSM-LEP-100450], 1 ♂ [MUSM-LEP-100451], (MUSM); Cordillera del Cóndor, P.V. 12 de Enero (P.V. 32), [3°39'30"S, 78°18'552"W], 700 m, (Grados, J., Asenjo, A.), 23

Nov 2003, 1 ♂ [MUSM-LEP-100456], (MUSM); Cordillera del Cóndor, Qda. Chinganasa (Qda. Ponce) c.a. P.V., [3°46'47"S, 78°20'W], 680 m, (Grados, J., Asenjo, A.), 10 Nov 2003, 1 ♂ [MUSM-LEP-100459], (MUSM); Cordillera del Cóndor, Qda. Chinganasa (Qda. Ponce) c.a. P.V., [3°46'47"S, 78°20'W], 700–850 m, (Grados, J., Asenjo, A.), 13 Nov 2003, 1 ♂ [MUSM-LEP-100457], 1 ♂ [MUSM-LEP-100461], (MUSM); Cordillera del Cóndor, Qda. Chinganasa (Qda. Ponce) c.a. P.V., [3°46'47"S, 78°20'W], 850–1160 m, (Grados, J., Asenjo, A.), 15 Nov 2003, 1 ♂ [MUSM-LEP-100454], 1 ♂ [MUSM-LEP-100455], 1 ♂ [MUSM-LEP-100458], 1 ♂ [MUSM-LEP-100460], (MUSM); Cordillera del Cóndor, Quebrada Kegkem, [3°38'S, 78°18'W], 700 m, (Grados, J., Asenjo, A.), 20 Nov 2003, 1 ♀ [MUSM-LEP-100534], (MUSM); Falso Paquisha, [3°58'S, 78°25'W], 800 m, (Lamas, G.), 22 Oct 1987, 1 ♂ [MUSM-LEP-100445; in copula], 1 ♂ [MUSM-LEP-100446; in copula], 1 ♂ [MUSM-LEP-100448; in copula], (MUSM), 23 Oct 1987, 1 ♂ [MUSM-LEP-100447; in copula], (MUSM), 25 Oct 1987, 1 ♀ [MUSM-LEP-100533; in copula], (MUSM), 26 Oct 1987, 1 ♂ [MUSM-LEP-100449; in copula], (MUSM), 30 Oct 1987, 1 ♂ [MUSM-LEP-100444; in copula], 1 ♀ [MUSM-LEP-100532; in copula], (MUSM); Mendoza, Quebrada Yanahuayco, [6°24'S, 77°26'W], 1600–1800 m, (Calderón, B.), Aug 1998, 1 ♀ [MUSM-LEP-100538], (MUSM); near La Iguana, [5°41'S, 78°24'W], 850 m, (Lamas, G.), 26 Jun 1995, 1 ♀ [MUSM-LEP-100535], (MUSM); Nueva Esperanza, 3 km N, 1700 m, (Calderón, B.), 11 Mar 1986, 1 ♂ [MUSM-LEP-100462], (MUSM); Pongo de Retema, Rentema Falls, [5°29'S, 78°33'W], 305 m, (Pratt, A. & E.), 1 ♂ [BMNH(E)#1420181], (NHMUK); Quebrada Gebil, [6°28'S, 77°24'W], 1300 m, (Lamas, G.), 20 Sep 1999, 1 ♀ [MUSM-LEP-100537], (MUSM); Cajamarca: 5 km W Jaén, [5°42'S, 78°50'W], 800 m, (Lamas, G.), 10–11 Nov 1975, 1 ♀ [MUSM-LEP-100531], (MUSM); Charape, [5°25'S, 78°59'W], 1220 m, (Pratt, A. & E.), Sep–Oct 1912, 1 ♀ [BMNH(E)#1420184], (NHMUK); W de Tamborapa, 600 m, (Lamas, G.), 17 Mar 1985, 1 ♂ [MUSM-LEP-100443], (MUSM); Cuzco: Cosnípata, Quebrada Quitacalzón, [13°1'S, 71°30'W], 1100 m, (Harris, B.), 7 Feb 2011, 1 ♂ [MUSM-LEP-100520], (MUSM), (Lamas, G.), 10 May 2012, 1 ♀ [MUSM-LEP-100562], (MUSM), 26 Apr 2015, 1 ♀ [MUSM-LEP-100902], (MUSM), 27 Jan 2013, 1 ♂ [MUSM-LEP-100528], (MUSM); Pilcopata, [12°55'S, 71°24'W], 550 m, (Lamas, G.), 5 Feb 2010, 1 ♂ [MUSM-LEP-100479], (MUSM); Quincemil, [13°14'S, 70°46'W], 600–800 m, (Steiner, W. E.), 30 Jan 1979, 1 ♀ [FLMNH-MGCL-262960], (FLMNH); Quincemil, Quebrada Yanaorcco, [13°16'S, 70°47'W], 720 m, (Rodríguez, M.), 16 Oct 2009, 1 ♂ [MUSM-LEP-100521], 1 ♂ [MUSM-LEP-100525], (MUSM), 9 Dec 2009, 1 ♀ [MUSM-LEP-100560], (MUSM); Río Urubamba, Kitaparay, [12°11'8"S, 72°49'14"W], 459 m, (Cerdeña, J., Farfán, J., Gutiérrez, R.), 4 Sep 2007, 1 ♂ [MUSM-LEP-100477], (MUSM); Río Urubamba, Timpia, [12°5'31"S, 72°49'12"W], 408 m, (Cerdeña, J., Farfán, J., Gutiérrez, R.), 25 Aug 2007, 1 ♂ [MUSM-LEP-100478], (MUSM); Huánuco: ‘Huánaco’ [= Huánuco], 1900–1980 m, (Kassarov, L.), Apr 1992, 1 ♂ [FLMNH-MGCL-1036224], (FLMNH); 13 km S Tingo María, Tambillo Chico Canyon, [9°8'S, 75°57'W], (Weisner, K. J.), 24 Jun 1982, 1 ♂ [FLMNH-MGCL-262959], (FLMNH); 15 km N Tingo

María on Río Huallaga, (Rojas, M.), 15–22 Aug 1981, 1 ♂ [FLMNH-MGCL-262956], 1 ♂ [FLMNH-MGCL-262957], (FLMNH); 8 km S Tingo María, Cueva de Las Pavas, [9°24'S, 75°58'W], 900 m, (DZUP), (Harris, L. & H.), 21 Jun 1985, 1 ♂ [FLMNH-MGCL-262950], (FLMNH); Cordillera del Sira, [9°25'S, 74°45'W], 750 m, (Exp. Universidad Viena), Sep 1987–Aug 1988, 1 ♂ [MUSM-LEP-100465], 1 ♂ [MUSM-LEP-100466], 1 ♂ [MUSM-LEP-100467], 1 ♂ [MUSM-LEP-100468], (MUSM); Lower Ucayali, Río Pachitea, [8°46'S, 74°32'W], 150 m, (Tessmann), 3 ♂, (MNHU); Tingo María, [9°18'S, 76°0'W], 800 m, May 1987, 1 ♀ [FLMNH-MGCL-262955], (FLMNH), (Kassarov, L.), Sept 1992, 1 ♀ [FLMNH-MGCL-1036234], (FLMNH), (Rosier, P.), Jun 1979, 1 ♂ [FLMNH-MGCL-262958], (FLMNH); vicinity of Tingo María, (Rosier, P.), May 1979, 1 ♂ [FLMNH-MGCL-263365], (FLMNH); *Junín*: Cerro Conchapen, [10°49'S, 75°11'W], 1000 m, (Hocking, P.), 5 May 1969, 1 ♂ [MUSM-LEP-100474], (MUSM); Cerro Conchapen, [10°49'S, 75°11'W], 1200 m, (Hocking, P.), 5 May 1969, 1 ♂ [MUSM-LEP-100475], (MUSM); Chanchamayo, [11°4'S, 75°19'W], 1000–1400 m, Oct 1960, 1 ♀, (ZSM), (König, F.), May 1959, 1 ♀, (ZSM), (Schunke, O.), 1892, 1 ♂ [BMNH(E)#1420172], 1 ♂ [BMNH(E)#1420173], 1 ♂ [BMNH(E)#1420174], (NHMUK), 1912, 1 ♂ [BMNH(E)#1420168], 1 ♂ [BMNH(E)#1420169], 1 ♂ [BMNH(E)#1420170], 1 ♂ [BMNH(E)#1420171], 1 ♂ [BMNH(E)#1498932], 1 ♂ [BMNH(E)#1498933], 1 ♂ [BMNH(E)#1498934], 1 ♂ [BMNH(E)#1498935], (NHMUK), (Tessmann), 1 ♀, (MNHU); Chanchamayo, [11°4'S, 75°19'W], 750 m, Mar 1962, 1 ♂, (ZSM); Chanchamayo, Río Ulcumayo valley NW San Ramón, trail up river, [10°59'1"S, 75°26'28"W], 1250–1370 m, (Nakamura, I.), 12 Dec 2008, (ICNA), 4 Dec 2008, (ICNA), 5 Dec 2008, (ICNA), Dec 2008, (ICNA); Chanchamayo, Río Ulcumayo, Pampa Hermosa, [11°25'S, 74°46'W], 1300–1400 m, (Medina, M.), 10 Jun 2008, 1 ♂ [MUSM-LEP-100476], (MUSM); La Merced, [11°3'S, 75°19'W], 762 m, (Watkins, Tomlinson), May, Jun 1903, 1 ♀ [BMNH(E)#1420185], (NHMUK); Pampa Hermosa Lodge, [10°59'15"S, 75°25'25"W], 1560 m, (Smith, J. A.), 2–12 Dec 2008, 2 ♂, (BME); Provincia de Satipo, Alto Cheni, 800 m, 1–15 May 1975, 1 ♂ [FLMNH-MGCL-262947], (FLMNH); Río Perené, [11°9'S, 74°18'W], 610–1220 m, 1 ♂ [BMNH(E)#1498931], (NHMUK), (Martin, P.), 1 ♂, 2 ♀, (CMNH); Río Perené, [11°9'S, 74°18'W], 700 m, (Schunke, J. M.), 20 Sep 1979, 1 ♀ [FLMNH-MGCL-262952], (FLMNH); San Ramón, [11°8'S, 75°21'W], 915 m, (Watkins, Tomlinson), Aug 1903, 1 ♂ [BMNH(E)#1420176], (NHMUK); Satipo, [11°15'S, 74°38'W], 800 m, (Schunke, J. M.), 5 May 1981, 1 ♂ [FLMNH-MGCL-262946], (FLMNH), 6 May 1981, 1 ♀ [FLMNH-MGCL-262951], (FLMNH); upper Río Toro, [11°3'S, 75°19'W], 3000 m, (Simmons), Aug, Sep 1901, 1 ♀ [BMNH(E)#1498928], (NHMUK); *Loreto*: ‘Ampyam’ [= Río Ampiyacu], [3°19'S, 71°51'W], 120 m, Jun–Aug 1918, 1 ♂ [BMNH(E)#1498936], (NHMUK); ‘Cachiacu’ [= Río Cachiyacu], [5°50'S, 76°33'W], 200 m, (Stuart), 1 ♂ [BMNH(E)#1498920], 1 ♂ [BMNH(E)#1498921], (NHMUK); 80 km E Iquitos, Yanamono, [3°27'S, 72°51'W], 120 m, (Lamas, G., Mallet, J.), 27 Jul 1984, 1 ♀ [MUSM-LEP-100542], (MUSM); 9 km S La Vista, [4°40'52"S, 77°26'7"W], 250 m, (Lamas, G.), 11 Feb 1978, 1 ♂

[MUSM-LEP-100481], (MUSM); Castaña, [0°48'S, 75°14'W], 150 m, (Lamas, G.), 19 Oct 1993, 1 ♂ [MUSM-LEP-100488], (MUSM), 24 Oct 1993, 1 ♂ [MUSM-LEP-100485], 1 ♀ [MUSM-LEP-100546], (MUSM), 26 Oct 1993, 1 ♂ [MUSM-LEP-100484], (MUSM), (Robbins, R. K.), 20 Oct 1993, 1 ♂ [MUSM-LEP-100486], 1 ♂ [MUSM-LEP-100487], 1 ♂ [MUSM-LEP-100489], (MUSM), 29 Oct 1993, 1 ♀ [MUSM-LEP-100545], (MUSM); Explornapo-ACEER, [3°14'S, 72°55'W], 140 m, (Caldas, A.), 5 Sep 1995, 1 ♀ [MUSM-LEP-100547], (MUSM), 6 Sep 1995, 1 ♂ [MUSM-LEP-100495], (MUSM), 7 Sep 1995, 1 ♂ [MUSM-LEP-100492], 1 ♂ [MUSM-LEP-100497], (MUSM), (Grados, J.), 11 Sep 1995, 1 ♂ [MUSM-LEP-100491], (MUSM), 5 Sep 1995, 1 ♂ [MUSM-LEP-100493], (MUSM), (Harvey, D. J.), 10 Sep 1995, 1 ♀ [MUSM-LEP-100549], (MUSM), 22 Sep 1995, 1 ♂ [MUSM-LEP-100496], (MUSM), 5 Sep 1995, 1 ♀ [MUSM-LEP-100550], (MUSM), (Lamas, G.), 21 Sep 1995, 1 ♂ [MUSM-LEP-100490], (MUSM), 5 Sep 1995, 1 ♂ [MUSM-LEP-100494], (MUSM), 6 Sep 1995, 1 ♂ [MUSM-LEP-100498], (MUSM), (Robbins, R. K.), 16 Sep 1995, 1 ♂ [MUSM-LEP-100499], (MUSM), 9 Sep 1995, 1 ♀ [MUSM-LEP-100548], (MUSM); Iquitos, [3°45'S, 73°15'W], 100 m, Feb 1989, 1 ♂ [FLMNH-MGCL-262949], (FLMNH), Jul 1988, 1 ♀ [FLMNH-MGCL-262953], (FLMNH), (Callegari, M.), Feb 2004, 1 ♀ [MUSM-LEP-100565], (MUSM); Iquitos, San Roque, [3°48'S, 73°20'W], 1 ♂ [FLMNH-MGCL-263361], (FLMNH); Jenaro Herrera, [4°55'S, 73°40'W], 125 m, (Lamas, G.), 12 Aug 2013, 1 ♂ [MUSM-LEP-100530], (MUSM), 16 Aug 2013, 1 ♂ [MUSM-LEP-100529], 1 ♀ [MUSM-LEP-100563], (MUSM), 6 Aug 2013, 1 ♀ [MUSM-LEP-100564], (MUSM); Lower Río Ucayali, Río Pacaya, Aug-Sep 1912, 1 ♂ [BMNH(E)#1420177], 1 ♂ [BMNH(E)#1420178], (NHMUK); Nauta, [4°30'S, 73°35'W], 120 m, (Lequerica, H.), 25 Sep 1990, 1 ♂ [MUSM-LEP-100482], (MUSM); near Yanayacu River mouth, Ayzana Village, (Eiler, D. L.), 27 Jul 1989, 1 ♀ [FLMNH-MGCL-262954], (FLMNH); nr. Iquitos, Explornapo Camp, [3°15'S, 72°55'W], 120 m, (Brown, H. B.), 9 Feb 1982, 1 ♂ [FLMNH-MGCL-1036215], (FLMNH); Pebas, [3°19'S, 71°51'W], 120 m, 1 ♂ [BMNH(E)#1420126], 1 ♂ [BMNH(E)#1420180], (NHMUK), Jun 1992, 1 ♂ [FLMNH-MGCL-262948], (FLMNH), (Hahnel), 1 ♂, (MNHU), (Mathan, M. de), 1880, 1 ♂ [BMNH(E)#1420125], (NHMUK), Dec 1906, 1 ♂ [BMNH(E)#1498917], 1 ♀ [BMNH(E)#1498918], (NHMUK), Jan 1907, 1 ♂ [BMNH(E)#1498919], (NHMUK), Nov 1906, 1 ♂ [BMNH(E)#1498912], 1 ♂ [BMNH(E)#1498913], 1 ♂ [BMNH(E)#1498914], 1 ♂ [BMNH(E)#1498915], 1 ♀ [BMNH(E)#1498916], (NHMUK); Río Aguas Negras, [0°31'24"S, 75°15'24"W], 150 m, (Lamas, G.), 6 Mar 1994, 1 ♀ [MUSM-LEP-100544], (MUSM), (Robbins, R. K.), 2 Mar 1994, 1 ♂ [MUSM-LEP-100483], (MUSM); Río Maquía, Arica, [6°26'S, 74°46'W], 110 m, (Peña, C.), 17 Jul 2009, 1 ♀ [MUSM-LEP-100555], (MUSM); Río Nanay, Mishana, Estación Biológica Callicebus, [3°54'S, 73°29'W], 150 m, (Lamas, G.), 16 Jan 1980, 1 ♂ [MUSM-LEP-100480], (MUSM); Río Tigre, San Jacinto, [2°19'S, 75°52'W], 200 m, (Debinski, D.), 18 Apr 1993, 1 ♀ [MUSM-LEP-100543], (MUSM); Yurimaguas, [5°54'S, 76°6'W], 120 m, (Hahnel), 1 ♀, (MNHU), (Mathan, M. de), Jun-Aug 1885, 1 ♂ [BMNH(E)#1420175], (NHMUK);

Zona Reservada Allpahuayo-Mishana, [3°57'30"S, 73°25'30"W], 170 m, (Campos, L.), 27 Nov 2001, 1 ♂ [MUSM-LEP-100504; varillal seco], (MUSM), 28 Feb 2002, 1 ♀ [MUSM-LEP-100551; Yarinal], (MUSM), (Ramírez, J. J.), 18 Feb 2002, 1 ♀ [MUSM-LEP-100552; Yarinal], (MUSM), 19 Nov 2001, 1 ♂ [MUSM-LEP-100502; varillal seco], (MUSM), 20 Nov 2001, 1 ♂ [MUSM-LEP-100501; varillal seco], (MUSM), 21 Feb 2002, 1 ♂ [MUSM-LEP-100503; Yarinal], (MUSM), 21 Nov 2001, 1 ♀ [MUSM-LEP-100553; varillal seco], (MUSM), 23 Feb 2002, 1 ♀ [MUSM-LEP-100554; Yarinal], (MUSM), 25 Jul 2001, 1 ♂ [MUSM-LEP-100500; varillal seco], (MUSM); *Madre de Dios*: 0–2 km W Puerto Maldonado, [12°36'12"S, 69°12'32"W], 250 m, (Miller, L. D.), 14 Aug 1981, 1 ♂ [FLMNH-MGCL-263367], (FLMNH); 12 km N Tambopata, Comunidad Infierno, [12°43'56"S, 69°13'44"W], 200 m, (Harris, L. & H.), 18 Jun 1985, 1 ♂ [FLMNH-MGCL-264647], (FLMNH); 15 km NE Puerto Maldonado, [12°29'52"S, 69°8'41"W], 200 m, (Lamas, G.), 19 Jun 1989, 1 ♂ [MUSM-LEP-100511], (MUSM), 9 Jun 1989, 1 ♂ [MUSM-LEP-100510], (MUSM), (Medina, M.), 11 Feb 1990, 1 ♂ [MUSM-LEP-100512], (MUSM); Boca Río La Torre, [12°50'S, 69°17'W], 300 m, (Lamas, G.), 20 Feb 1982, 1 ♂ [MUSM-LEP-100508], (MUSM), 22 Oct 1982, 1 ♂ [MUSM-LEP-100509], (MUSM), 24 Oct 1983, 1 ♂ [MUSM-LEP-100506], (MUSM), 26 Jul 1980, 1 ♀ [MUSM-LEP-100557], (MUSM), 4 Mar 1983, 1 ♂ [MUSM-LEP-100507], (MUSM), 7 Oct 1983, 1 ♀ [MUSM-LEP-100556], (MUSM); Cerro Pantiacolla, E slope, 4–5 km ENE Shintuya, [12°38'S, 71°16'W], 1000 m, (Douglass, J. F.), 19 Jul 1980, 1 ♂ [FLMNH-MGCL-263346; 1159], (FLMNH); Cerro Pantiacolla, E slope, 4–5 km ENE Shintuya, [12°38'S, 71°16'W], 960–1120 m, (Douglass, J. F.), 23 Jul 1980, 1 ♂ [FLMNH-MGCL-263366; 1244], (FLMNH); Madre de Dios, [12°16'S, 70°55'W], 491 m, (Brock, J. P.), 15 May 2012, 1 ♂ [FLMNH-MGCL-1036216], (FLMNH); Parque Manu, Pakitzá, [11°55'48"S, 71°15'18"W], 340 m, (Clarke, N. L.), 21 Apr 1991, 1 ♂ [MUSM-LEP-100518], (MUSM); Parque Manu, Pakitzá, [11°55'48"S, 71°15'18"W], 340–400 m, (DZUP); Parque Manu, Pakitzá, [11°55'48"S, 71°15'18"W], 400 m, (Lamas, G.), 11 Oct 1990, 1 ♂ [MUSM-LEP-100515], (MUSM), 8–14 Sep 1989, 1 ♂ [MUSM-LEP-100513], (MUSM), (Lozada, P.), 14 Feb 1992, 1 ♂ [MUSM-LEP-100514], (MUSM), (Rowe, W.), 13 Nov 1990, 1 ♂ [MUSM-LEP-100516], (MUSM), 3 Nov 1990, 1 ♂ [MUSM-LEP-100517], (MUSM); Parque Nacional Manu, Cocha Cashu, [11°53'S, 71°25'W], 350 m, (Lilleengen, P.), (collection unknown) (Lilleengen, P., pers. comm. (email to KRW 29 Sep 2016)); Refugio Juliaca, [12°57'S, 68°53'W], 220 m, (Lamas, G.), 18 Jun 1992, 1 ♀ [MUSM-LEP-100559; bosque], (MUSM); Reserva de Tambopata, [12°50'S, 69°17'W], 250 m, (DZUP); Río Madre de Dios, Albergue Amazonia, [12°52'S, 71°23'W], 500 m, (Brock, J.), 29 Sep 2011, 1 ♂ [MUSM-LEP-100526], (MUSM), (Lamas, G.), 27 Sep 2011, 1 ♀ [MUSM-LEP-100561], (MUSM); 'Sheringayoc bis Pto. Maldonado', (Koepcke, H.W.), 16–18 May 1949, 1 ♂, (ZSM); *Pasco*: Chuchurras, [10°9'S, 75°14'W], 300 m, (Martin, P.), 3 ♂, 1 ♀, (CMNH); near Eneñas, 1400 m, (Hocking, P.), 9 Oct 1967, 1 ♂ [MUSM-LEP-100469], 1 ♂ [MUSM-LEP-100470], (MUSM); P. N. Yanachaga Chemillén, Pampa Pescado, [10°22'33"S, 75°14'36"W], 400–450 m, (Car-

bonel, S.), 18 Sep 2007, 1 ♀ [MUSM-LEP-100539], (MUSM); (Grados, J., Carbonel, S.), 18 Sep 2007, 1 ♀ [MUSM-LEP-100541], (MUSM); P.N. Yanachaga-Che-millén, Huampal, [10°11'S, 75°34'W], 1050 m, (Peña, C.), 9 Feb 2003, 1 ♂ [MUSM-LEP-100473], (MUSM); Parque Nacional Yanachaga – Chemillén, Paujil, [10°20'S, 75°16'W], 375 m, (Carbonel, S., Calderón C.), 22 May 2008, 1 ♂ [MUSM-LEP-100471], (MUSM); (Grados, J., Calderón, C., Carbonel S.), 22 May 2008, 1 ♀ [MUSM-LEP-100540], (MUSM); Pozuzo, [10°7'S, 75°32'W], 800 m, 1 ♂ [FLMNH-MGCL-263362], (FLMNH); Río Palcazu, Río Chuchurras, [10°7'S, 75°10'W], 320 m, 1 ♂ [FLMNH-MGCL-263353], 1 ♂ [FLMNH-MGCL-263360], 1 ♂ [FLMNH-MGCL-263368], 1 ♀ [FLMNH-MGCL-263376], (FLMNH); Río Palcazu, Río Chuchurras, [10°9'S, 75°14'W], 320 m, (Hoffmanns, W.), 1 ♂ [BMNH(E)#1498907], 1 ♂ [BMNH(E)#1498908], 1 ♂ [BMNH(E)#1498909], 1 ♂ [BMNH(E)#1498910], 1 ♂ [BMNH(E)#1498911], (NHMUK); San Juan de Cacazú, [10°40'S, 75°7'W], 1600 m, (Peña, C.), 21 Oct 2002, 1 ♂ [MUSM-LEP-100472], (MUSM); *Puno*: Río Tambopata, Z. R. Tambopata-Candamo, [13°22'S, 69°34'W], 270 m, (Cambridge University Amazon Expedition), 28 Jul 1995, 1 ♀ [BMNH(E)#1420186], (NHMUK), 8 Aug 1995, 1 ♂ [BMNH(E)#1420179], (NHMUK); Río Tambopata, Z. R. Tambopata-Candamo, [13°22'S, 69°34'W], 300 m, (Lamas, G.), 25 Oct 1990, 1 ♀ [MUSM-LEP-100558], (MUSM); Yahuarmayo, 366 m, (Watkins, H. & C.), Feb–Mar 1912, 1 ♂ [BMNH(E)#1498929], 1 ♂ [BMNH(E)#1498930], (NHMUK); *San Martín*: 5 km S Moyobamba, nr. Baños Termales, [6°4'31"S, 76°58'6"W], 970 m, (Nakamura, I.), 17 Oct 2012, (ICNA); 5 km S Moyobamba, nr. Baños Termales, [6°4'31"S, 76°58'6"W], 970–1120 m, (Nakamura, I.), 14 Oct 2012, 1 ♀, (ICNA); Moyobamba rd. nr. km 487, N side of Calzada, 830 m, (Nakamura, I.), 16 Oct 2012, (ICNA); Moyobamba, Rumipata, (Elias, M.), 26 Oct 2015, 1 ♂ [FLMNH-MGCL-209944], (FLMNH); Río Serranoyacu, [5°40'S, 77°40'W], 1200 m, (Lamas, G.), 13 Mar 1985, 1 ♂ [MUSM-LEP-100463], 1 ♂ [MUSM-LEP-100464], (MUSM); Rumi Jepelacio, Ruta del Agua, (Elias, M.), 26 Oct 2015, 1 ♂ [FLMNH-MGCL-209949], (FLMNH), 27 Oct 2015, 1 ♀ [FLMNH-MGCL-209937], (FLMNH); *Ucayali*: Pucallpa, [8°23'S, 74°37'W], 150 m, (Schunke, J. M.), 4 Dec 1974, 1 ♂ [MUSM-LEP-100505], (MUSM); Pucallpa, [8°23'S, 74°37'W], 180–182 m, (Jae, R.), 22 Jul 1964, 1 ♂ [FLMNH-MGCL-263364], (FLMNH), 26 May 1962, 1 ♂ [FLMNH-MGCL-263352], (FLMNH); Río Aguaytí, Previsto, [9°3'S, 75°38'W], 420–500 m, (Knudson, E. C.), Oct 2006, 1 ♂ [FLMNH-MGCL-1036225], (FLMNH); *Not located*: ‘Río Huallaga’, [5°7'S, 75°37'W], 300 m, (Heppner, J. B., Lamas, G.), 16 Oct 2012, 1 ♂ [FLMNH-MGCL-1036214], (FLMNH); ‘N Peru’, (Krause), 1 ♂ [BMNH(E)#1420182], (NHMUK); no data, 1 ♂ [BMNH(E)#1420183], (NHMUK); Siberia, (DZUP). **Suriname**: *Brokopondo*: Bergen-Dal, [5°9'N, 55°4'W], (Ellacombe, G. W.), Apr 1892, 1 ♂ [BMNH(E)#1498875], 1 ♂ [BMNH(E)#1498876], (NHMUK); Brownsberg, rainforest km 6–12, [4°56'36"N, 55°10'15"W], (Pellmyr, O.), 30 Jan 1982, 1 ♂ [*NT arnaca*], (USNM); Saramacca River, [5°31'N, 54°2'W], May 1893, 1 ♂ [BMNH(E)#1498874], (NHMUK); *Marowijne*: Cottica River, Moengo, [5°37'33"N, 54°24'29"W], May

1927, 2 ♂, (CMNH); *Para*: Bersaba, [5°32'N, 55°3'W], (Michael), 1898–1899, 1 ♂, (MNHU); *Paramaribo*: No specific locality, (Ellacombe, G. W.), Feb 1892, 1 ♂ [BMNH(E)#1420091], (NHMUK); *Sipaliwini*: Alalapadu, 300 m, (Simon, M. J.), Mar 2002, 1 ♂ [FLMNH-MGCL-262966], (FLMNH); *Not located*: ‘Surinam’, 1 ♂ [BMNH(E)#1420092], 1 ♂ [BMNH(E)#1420093], 1 ♂ [BMNH(E)#1420094], 1 ♂ [BMNH(E)#1420095], 1 ♀ [BMNH(E)#1420096], 1 ♀ [BMNH(E)#1420097], 1 ♀ [BMNH(E)#1420098], (NHMUK), 2 ♂, 2 ♀, (MNHU). **Trinidad & Tobago**: *Diego Martin*: Fort George, [10°42'N, 61°32'W], Sep 1891, 1 ♂ [BMNH(E)#1498885], 1 ♂ [BMNH(E)#1498886], (NHMUK); Mt. Catherine upper trail, (Preston, J. & F.), 29 Apr 1982, 1 ♀ [FLMNH-MGCL-257158], (FLMNH); *Port of Spain*: Port of Spain, [10°40'N, 61°31'W], 17–23 Aug 1965, 1 ♀ [FLMNH-MGCL-263057], (FLMNH); *San Juan-Laventille*: Fondes Amandes, 91 m, 16 Apr 1922, 1 ♂ [FLMNH-MGCL-263109], (FLMNH), 16 Apr 1922, 1 ♀ [FLMNH-MGCL-263129], (FLMNH); *Maraval*, [10°43'N, 61°31'W], Jul 1891, 1 ♂ [BMNH(E)#1498860], 1 ♂ [BMNH(E)#1498861], (NHMUK); *Siparia*: Parrylands, [10°11'N, 61°37'W], 19 Aug 1974, 1 ♂ [FLMNH-MGCL-257157], (FLMNH); *Tunapuna-Piarco*: 6 mi. N Arima, [10°42'12"N, 61°17'28"W], 300 m, (Pliske, T. E.), 30 Jul 1962, 1 ♂ [FLMNH-MGCL-263116], (FLMNH), 5 Jul 1962, 1 ♂ [FLMNH-MGCL-263111], (FLMNH), 6 Aug 1962, 1 ♂ [FLMNH-MGCL-263110], (FLMNH); 7.5 mi N Arima, Asa Wright Nature Center, [10°43'3"N, 61°17'55"W], 488 m, (Klein, T. W.), 3 Sep 2000, 1 ♂ [FLMNH-MGCL-257155], (FLMNH); Arima rd., [10°42'36"N, 61°17'32"W], (S. K.), 1 ♀ [FLMNH-MGCL-263134], (FLMNH); Maracas Valley, [10°42'37"N, 61°24'54"W], 100 m, (Birch, F.), Aug 1905, 1 ♂ [BMNH(E)#1498869], (NHMUK); *Not located*: ‘Trinidad’, 1 ♂ [BMNH(E)#1420079], 1 ♂ [BMNH(E)#1420080], 1 ♂ [BMNH(E)#1498866], 1 ♂ [BMNH(E)#1498867], 1 ♂ [BMNH(E)#1498868], (NHMUK), 1 ♂ [FLMNH-MGCL-263113], (FLMNH), (Fountaine, M.), Dec 1911, 1 ♂ [BMNH(E)#1420081], (NHMUK), (Kaye, W.J.), 1898, 1 ♂ [FLMNH-MGCL-295862], (FLMNH), (Simon, M. J.), 16 Apr 1922, 1 ♂ [FLMNH-MGCL-263104], (FLMNH); Port of Spain, (Birch, F.), 1 ♂ [BMNH(E)#1498865], (NHMUK); Sangre Grande, Sans Souci Estate, (Church, C.), 1 ♂ [FLMNH-MGCL-257154], (FLMNH); St. George, Sep 1891, 1 ♂ [BMNH(E)#1498884], (NHMUK), (Ellacombe, G. W.), Dec 1891, 1 ♂ [BMNH(E)#1498877], 1 ♂ [BMNH(E)#1498878], 1 ♂ [BMNH(E)#1498879], 1 ♂ [BMNH(E)#1498880], 1 ♂ [BMNH(E)#1498881], 1 ♂ [BMNH(E)#1498882], 1 ♂ [BMNH(E)#1498883], (NHMUK); ‘St. George’, (Ellacombe, G. W.), 1 ♂ [BMNH(E)#1420076], 1 ♂ [BMNH(E)#1420077], 1 ♀ [BMNH(E)#1420078], (NHMUK); Stanway Parris River, Feb 1921, 1 ♂ [BMNH(E)#1498862], 1 ♂ [BMNH(E)#1498863], 1 ♂ [BMNH(E)#1498864], (NHMUK). **Venezuela**: *Amazonas*: Caño Wiraki, 400 m, (Lichy, R.), 30 Apr 1950, 1 ♂ [FLMNH-MGCL-263108], (FLMNH); *Bolívar*: 80 km S El Dorado, [6°11'8"N, 61°24'36"W], 900 m, (O'Shea, G.), 28 Jun 1984, 1 ♂ [FLMNH-MGCL-264663; Sta.102], 1 ♂ [FLMNH-MGCL-264664; Sta.102], 1 ♂ [FLMNH-MGCL-264665; Sta.102], 1 ♀ [FLMNH-MGCL-264668; Sta.102], (FLMNH); 85 km S El Dorado on mining road near Las Clar-

itas Hotel, (Denno, R. F.), 3 Nov 1982, 1 ♂ [FLMNH-MGCL-262944], (FLMNH), 5 Nov 1982, 1 ♂ [FLMNH-MGCL-262942], 1 ♂ [FLMNH-MGCL-262943], (FLMNH); El Dorado, km 82, [6°10'54"N, 61°25'6"W], (Harris, L. & H.), 27 Jun 1984, 1 ♂ [FLMNH-MGCL-262945], (FLMNH); Mérida: Azulita to Mirabal, 1460 m, (Huber, H.), 10 Apr 1971, 1 ♂, 1 ♀, (ZSM); between Masa Bolívar and La Victoria, 800 m, (Huber, H.), 23 May 1971, 1 ♀, (ZSM); 'La Victoria to Estanquas', [8°26'29"N, 71°33'56"W], 560 m, (Huber, H.), 19 Apr 1971, 3 ♂, (ZSM); Santa Cruz de Mora, 620 m, (Huber, H.), 30 Jan 1971, 1 ♀, (ZSM); Monagas: near San Francisco stream, 2 km E of Rt. 1 on Caripe rd., 1000 m, (Hedbor, J. D. & E. R.), 2 Feb 1994, 1 ♂ [FLMNH-MGCL-264682; daytime bait fruit trap], (FLMNH); Táchira: Chimborazo, 10 May 1937, 1 ♂ [FLMNH-MGCL-263107], (FLMNH); La Fría, [8°13'N, 72°15'W], 130 m, (Jenkins, D. W. & J.), 25 Apr 1982, 1 ♀ [FLMNH-MGCL-264685], (FLMNH); Palmira, San Cristobal, [7°46'N, 72°14'W], 1000 m, (Hocking, P.), 27 Dec 1979, 1 ♂ [MUSM-LEP-100437], (MUSM); Palmira, San Cristobal, [7°46'N, 72°14'W], 1300 m, (Hocking, P.), 27 Dec 1979, 1 ♂ [MUSM-LEP-100438], (MUSM). **Country unknown:** Not located: 'Amaz[on]', 1 ♂ [BMNH(E)#1498941], (NHMUK), (Mathan, M. de), Apr 1905, 1 ♂ [BMNH(E)#1498942], (NHMUK); 'Amazon', 1 ♂ [BMNH(E)#1420199], (NHMUK), 1 ♂, (CMNH); 'Amazonas', (Fassl, A. H.), 21 ♂, 2 ♀, (ZSM); no data, 1 ♂ [BMNH(E)#1420192], 1 ♂ [BMNH(E)#1420193], 1 ♂ [BMNH(E)#1420200], 1 ♂ [BMNH(E)#1420203], 1 ♂ [BMNH(E)#1498943], 1 ♂ [BMNH(E)#1498944], 1 ♂ [BMNH(E)#1498945], 1 ♂ [BMNH(E)#1498946], 1 ♂ [BMNH(E)#1498947], 1 ♂ [BMNH(E)#1498948], 1 ♂ [BMNH(E)#1498949], 1 ♂ [BMNH(E)#1498950], 1 ♂ [BMNH(E)#1498954], 1 ♂ [BMNH(E)#1498958], 1 ♂ [BMNH(E)#1498959], 1 ♂ [BMNH(E)#1498960], 1 ♂ [BMNH(E)#1498964], 1 ♂ [BMNH(E)#1670215], 1 ♀ [BMNH(E)#1498952], 1 ♀ [BMNH(E)#1498953], (NHMUK), 1 ♀ [FLMNH-MGCL-263135], 1 ♀ [FLMNH-MGCL-263379], (FLMNH), 1 ♀, (MNHU), 2 ♂, (ZSM), 1 Jul, 1 ♂ [BMNH(E)#1498963], (NHMUK), 13 Aug 1993, 1 ♂ [FLMNH-MGCL-263052], (FLMNH), 23 Jun, 1 ♂ [BMNH(E)#1498957], (NHMUK), 5 Sep, 1 ♂ [BMNH(E)#1498956], (NHMUK), 7 Aug, 1 ♂ [BMNH(E)#1498955], (NHMUK), 1 ♀ [Pap. arnaca, Fabr. pag 75 No 331'], 21 Mar 1991, 1 ♀ [FLMNH-MGCL-263056], (FLMNH), (McKenzie), 29 Jul 1969, 1 ♂ [BMNH(E)#1498961], (NHMUK), 30 Jul 1969, 1 ♂ [BMNH(E)#1498962], (NHMUK); 'South America', 1 ♀ [BMNH(E)#1420198], (NHMUK); 'upper Amazon', 1 ♀, (CMNH).

Other records: **Bolivia:** El Bení: Bosque Chimanes, Jamanchi, [15°23'42"S, 67°15'20"W], (Guerra, F., Gironda, W.), 7-15 Nov 1993, 1 ♂ [CBF-927], (CBF) (DABD of CBF). **Colombia:** Caquetá: Belén de los Andaquies, La Cerinda, [1°37'3"N, 75°51'57"W], 680 m, (Sañudo, C.), 4 Oct 07, 1 ♂/♀ [ME-FLG-14974; jama], (MEFLG); Belén de los Andaquies, Reserva Páez-La Esperanza, [1°32'16"N, 75°57'11"W], 1048 m, (Sañudo, C.), 3 Dec 2007, 1 ♂/♀ [ME-FLG-15095; jama], (MEFLG); El Quince, Parcela La Simbra, [0°48'11"N, 75°11'58"W], 204 m, (Sañudo, C., Muñoz, F.), 4 Sep 2007, 1 ♂/♀, (MEFLG) (Claudia Sañudo, pers. comm.); La Cerinda, camino Casa Ramiro Tascon, [1°37'3"N, 75°51'57"W],

680 m, (Sañudo, C., Muñoz, F.), 6 Oct 2007, 1 ♂/♀ (HERENCIA) (Claudia Sañudo, pers. comm.); La Cerinda, Laguna camino Andaqui, [1°37'18"N, 75°50'4"W], 894 m, (Sañudo, C., Muñoz, F.), 3 Oct 2007, 1 ♂/♀ (MUA) (Claudia Sañudo, pers. comm.); La Esperanza-PNNAFIW, camino Casa Celio Usme, [1°32'15"N, 75°57'11"W], 1036 m, (Sañudo, C.), 3 Dec 2007, 1 ♂/♀ (HERENCIA) (Claudia Sañudo, pers. comm.); *Meta*: Villavicencio, Bavaria, [4°10'44"N, 73°38'58"W], 570 m, (Marín, M. A.), 13-Oct-06, 1 ♂/♀ [MEFLG-15498; jama], 1 ♂/♀ [MEFLG-15499; jama], 1 ♂/♀ [MEFLG-15500; jama], 1 ♂/♀ [MEFLG-15501; jama], 1 ♂/♀ [MEFLG-15502; jama], (MEFLG). **Ecuador:** *Morona-Santiago*: Gualaquiza, [3°25'S, 78°36'W], 1500 m, (Piñas, F.), 25 Jul 1995, 1 ♂/♀ [FDPR-18183], 1 ♂/♀ [FDPR-18190], (FRPI) (DABD of FRPI); Indanza, [3°3'30"S, 78°28'40"W], 1500 m, (Piñas, F.), 29 Apr 1995, 1 ♂/♀ [FDPR-16682], 1 ♂/♀ [FDPR-18184], 1 ♂/♀ [FDPR-18214], (FRPI) (DABD of FRPI); km 40 Méndez-Santiago rd., [2°54'38"S, 78°14'51"W], 750 m, (Willmott, K. R.), 2 Nov 1996, (W&H); Macas, Loma Kilamo, [2°18'18"S, 78°8'42"W], 1470 m, (Willmott, K. R.), 7 Dec 2003, (W&H); nr. Gualaquiza, Bomboiza, [3°25'36"S, 78°31'W], 800-850 m, (Hall, J. P. W., Willmott, K. R.), 26-29 Jul 1993, (W&H), 26-29 May 1994, (W&H), 5,6 Nov 1996, (W&H); San Juan Bosco, [3°5'55"S, 78°33'9"W], 1500 m, (Estévez, G.), 1 Aug 1992, 1 ♂/♀ [MECN-TABDP-19014], (INABIO) (DABD of INABIO); Tayuza-Yakunk trail, [2°44'26"S, 78°12'14"W], 850 m, (Willmott, K. R.), 1 Dec 2003, (W&H); Yakunk-Cutucú trail, lower ridge, [2°45'40"S, 78°9'40"W], 1340 m, (Willmott, K. R.), 3 Dec 2003, (W&H); Yakunk-Cutucú trail, river camp, [2°45'7"S, 78°10'55"W], 1000 m, (Willmott, K. R.), 2 Dec 2003, (W&H); *Napo*: km 14 Tena-Puyo rd., Apuya, [1°6'18"S, 77°46'42"W], 600 m, (Piñas, F.), 12 Oct 2006, 1 ♂/♀ [FDPR-16708], 1 ♂/♀ [FDPR-18145], (FRPI), 13 Dec 2006, 1 ♂/♀ [FDPR-16676], (FRPI), 13 Jul 2005, 1 ♂/♀ [FDPR-16667], 1 ♂/♀ [FDPR-18178], (FRPI), 19 Jul 2006, 1 ♂/♀ [FDPR-16669], 1 ♂/♀ [FDPR-16670], 1 ♂/♀ [FDPR-16671], 1 ♂/♀ [FDPR-16675], (FRPI), 20 Oct 2006, 1 ♂/♀ [FDPR-16697], 1 ♂/♀ [FDPR-18117], (FRPI), 21 Nov 2006, 1 ♂/♀ [FDPR-18195], 1 ♂/♀ [FDPR-18205], (FRPI), 25 Jan 2002, 1 ♂/♀ [FDPR-16704], 1 ♂/♀ [FDPR-18106], 1 ♂/♀ [FDPR-18109], (FRPI), 26 Dec 2006, 1 ♂/♀ [FDPR-16649], 1 ♂/♀ [FDPR-16685], (FRPI), 27 Sep 2006, 1 ♂/♀ [FDPR-16694], 1 ♂/♀ [FDPR-16696], 1 ♂/♀ [FDPR-16698], (FRPI), 29 Sep 2006, 1 ♂/♀ [FDPR-16699], (FRPI), 7 Nov 2006, 1 ♂/♀ [FDPR-18156], 1 ♂/♀ [FDPR-18166], 1 ♂/♀ [FDPR-18175], 1 ♂/♀ [FDPR-18185], (FRPI), 9 Jan 2007, 1 ♂/♀ [FDPR-18101], 1 ♂/♀ [FDPR-18102], (FRPI), (Willmott, K. R., Hall, J. P. W.), 04 May 1994, (W&H), 10 Sep 1996, (W&H), 12-14,24 Feb 1995, (W&H), 28 Aug 1997, (W&H), 6,10,13,19,21,28 Oct 1996, (W&H), Dec, (W&H); km 49 Tena-Loreto rd., [0°42'51"S, 77°44'26"W], 1300 m, (Willmott, K. R., Hall, J. P. W.), Mar, (W&H), Oct, (W&H); Puyo-Tena rd., Santa Clara, [1°15'30"S, 77°53'W], 700 m, (Piñas, F.), 11 Jan 2002, 1 ♂/♀ [FDPR-18103], 1 ♂/♀ [FDPR-18199], (FRPI), 7 Dec 2001, 1 ♂/♀ [FDPR-16690], (FRPI) (DABD of FRPI); Río Jatunyacu, Pimpilala, [1°4'31"S, 77°56'13"W], 600-650 m, (Willmott, K. R., Hall, J. P. W.), 15,16 Feb 1995, (W&H), Sep, (W&H); Río Misahualli, Misa-

huallí, [1°1'36"S, 77°40'W], 500 m, (Piñas, F.), 2 Feb 2002, 1 ♂/♀ [FDPR-16641], 1 ♂/♀ [FDPR-18197], (FRPI), 4 Feb 2003, 1 ♂/♀ [FDPR-16637], 1 ♂/♀ [FDPR-18115], 1 ♂/♀ [FDPR-18160], 1 ♂/♀ [FDPR-18165], (FRPI) (DABD of FRPI); Río Napo, Puerto Napo, [1°3'S, 77°47'W], 500 m, (Piñas, F.), 14 Jul 2005, 1 ♂/♀ [FDPR-18182], 1 ♂/♀ [FDPR-18187], 1 ♂/♀ [FDPR-18188], (FRPI), 17 May 2006, 1 ♂/♀ [FDPR-18146], (FRPI), 18 Jul 2006, 1 ♂/♀ [FDPR-16674], (FRPI), 28 May 2004, 1 ♂/♀ [FDPR-16652], 1 ♂/♀ [FDPR-16653], 1 ♂/♀ [FDPR-16654], 1 ♂/♀ [FDPR-16655], 1 ♂/♀ [FDPR-16656], 1 ♂/♀ [FDPR-16663], 1 ♂/♀ [FDPR-16664], 1 ♂/♀ [FDPR-16665], 1 ♂/♀ [FDPR-16666], (FRPI), 29 Aug 2003, 1 ♂/♀ [FDPR-16657], (FRPI), 4 Jul 2003, 1 ♂/♀ [FDPR-18167], (FRPI), 4 Nov 2003, 1 ♂/♀ [FDPR-18111], 1 ♂/♀ [FDPR-18116], 1 ♂/♀ [FDPR-18126], 1 ♂/♀ [FDPR-18131], (FRPI) (DABD of FRPI); Río Napo, Puerto Napo, [1°3'S, 77°47'W], 600 m, (Piñas, F.), 15 Sep 2005, 1 ♂/♀ [FDPR-16650], 1 ♂/♀ [FDPR-16659], 1 ♂/♀ [FDPR-16660], 1 ♂/♀ [FDPR-16661], 1 ♂/♀ [FDPR-16662], (FRPI) (DABD of FRPI); Río Napo, Puerto Napo-Ahuano rd., Chichicorumi, [1°4'11"S, 77°37'45"W], 450 m, (Willmott, K. R., Hall, J. P. W.), 4 Dec 1997, Aug, Jul, Sep, (W&H); Río Napo, Puerto Napo-Ahuano rd., Jatun Sacha, [1°3'S, 77°35'9"W], 450 m, (Murray, D.), 8 Aug 1990, 1 ♂/♀ [MECN-TAB-DP-19015], (INABIO) (DABD of INABIO); Río Pano, [1°0'48"S, 77°51'45"W], 600 m, (Piñas, F.), 13 Jun 2006, 1 ♂/♀ [FDPR-16672], 1 ♂/♀ [FDPR-16673], (FRPI) (DABD of FRPI); Río Sinde, km 12 Tena-Puyo rd., Finca San Carlo, [1°5'18"S, 77°47'24"W], 600 m, (Willmott, K. R., Hall, J. P. W.), 19 Aug 1997, (W&H), 20-22 Feb 1995, (W&H), 5 Dec 1997, (W&H), Sep, (W&H); Río Urcusiqui, Baeza-Tena rd., Sarayacu, [0°40'30"S, 77°49'12"W], 1300-1400 m, (Willmott, K. R., Hall, J. P. W.), 3 Mar 1995, (W&H); San Rafael, [0°6'15"S, 77°35'12"W], 1150 m, (Piñas, F.), 17 Apr 2000, 1 ♂/♀ [FDPR-16668], (FRPI) (DABD of FRPI); San Rafael, [0°6'15"S, 77°35'12"W], 1550 m, (Oña, P.), 27 May 2000, 1 ♂/♀ [FDPR-18209], (FRPI), (Piñas, F.), 18 Jun 1998, 1 ♂/♀ [FDPR-16643], 1 ♂/♀ [FDPR-18173], 1 ♂/♀ [FDPR-18193], (FRPI), 7 Sep 1999, 1 ♂/♀ [FDPR-18138], 1 ♂/♀ [FDPR-18139], 1 ♂/♀ [FDPR-18198], (FRPI) (DABD of FRPI); Serena, [1°5'25"S, 77°55'33"W], 600 m, (Piñas, F.), 11 Oct 2006, 1 ♂/♀ [FDPR-16709], (FRPI) (DABD of FRPI); Tena-Loreto rd., Río Hollín, [0°41'48"S, 77°43'39"W], 800 m, (Piñas, F.), 1 Sep 2000, 1 ♂/♀ [FDPR-18158], 1 ♂/♀ [FDPR-18211], (FRPI) (DABD of FRPI); Tena-Puyo rd., El Capricho, [1°11'14"S, 77°49'53"W], 800 m, (Willmott, K. R.), 26 Oct 1996, (W&H); Orellana: Coca-Tiguino rd., Río Tiputini, [0°44'3"S, 76°53'31"W], 300 m, (Willmott, K. R., Hall, J. P. W.), 20 Sep 1996, (W&H), 30 Jun 1994, (W&H); km 21 Coca-Loretord., [0°29'31"S, 77°8'19"W], 300 m, (Willmott, K. R., Hall, J. P. W.), 08 Mar 1995, (W&H); Lagunas de Cuyabeno, La Ormiga, [0°1'S, 76°11'W], 250 m, (Willmott, K. R.), 18 Sep 1996, (W&H); Reserva Biológica del Río Bigal, [0°31'17"S, 77°25'10"W], 851 m, (Violette), 23 Jul 2010, 1 ♂/♀ [N82], (FLMNH) (CULEPEX Expedition, 2010); Reserva Biológica del Río Bigal, [0°31'24"S, 77°25'9"W], 891 m, (Violette), 22 Jul 2010, 1 ♂/♀ [N28], (FLMNH) (CULEPEX Expedition, 2010); Reserva Biológica del Río

Bigal, [0°31'28"S,77°25'4"W], 922 m, (Violette), 22 Jul 2010, 1 ♂/♀ [N24], (FLM-NH) (CULEPEX Expedition, 2010); Reserva Biológica del Río Bigal, [0°31'32"S,77°25'3"W], 922 m, (Radford, J.), 22 Jul 2010, 1 ♂/♀ [N46], (FLM-NH) (CULEPEX Expedition, 2010); Reserva Biológica del Río Bigal, 'the Hooch', [0°31'25"S,77°25'7"W], 892 m, (Hartley, E.), 22 Jul 2010, 1 ♂/♀ [N31], (FLMNH) (CULEPEX Expedition, 2010); Río Manduro, Río Napo, Yarina, [0°28'14"S,76°50'W], 300 m, (Willmott, K. R.), 17 Nov 2003, (W&H), 23-24 Jul 1998, (W&H); Río Napo, Boca del Río Añangu, [0°31'43"S,76°23'41"W], 220–300 m, 26 Oct 2005, (W&H); Río Napo, Pañacocha, [0°26'11"S,76°4'W], 250 m, 15,16,20 Oct 1997, (W&H); Río Napo, Río Yuturi, lodge trail, [0°32'53"S,76°2'W], 250 m, (Willmott, K. R.), 18 Nov 2003, (W&H), 19 Nov 2003, (W&H); Río Napo, Río Yuturi, Río Manduro trail, [0°33'29"S,76°2'39"W], 250 m, (Willmott, K. R.), 20 Nov 2003, (W&H); Río Napo, Sacha Lodge, [0°28'14"S,76°27'33"W], 200 m, (Hall, J. P. W.), 17,18 Feb 2001, (W&H); Río Tiguino, Tiguino, [1°6'35"S,76°56'45"W], 350 m, (Willmott, K. R.), 23, 24 Oct 1997, (W&H); Río Tiputini, Estación Científica Yasuní, parcela 50 Ha, [0°40'55"S,76°24'1"W], 250–300 m, (Mena, S.), 2017, 3 ♂, (PUCE) (Checa, M. (pers. comm. Oct 2017, email to KRW with photograph)); Río Tiputini, Tiputini Biodiversity Station, [0°42'12"S,76°0'30"W], 200 m, (Hall, J. P. W.), 10-15 Aug 2002, (FLMNH) (W&H); Río Tiputini, vía Auca, Estación Científica Yasuní, [0°40'27"S,76°23'49"W], 220–250 m, (Willmott, K. R., Hall, J. P. W.), 16–18 Aug 1999, (W&H); Yasuní, Estación Científica, [0°40'17"S,77°24'2"W], 250 m, (Piñas, F.), 29 Sep 1995, 1 ♂/♀ [FDPR-18133], (FRPI) (DABD of FRPI); Pastaza: ENE of Mera, Río Puyo, [1°25'42"S,78°2'48"W], 1300 m, (Willmott, K. R., Hall, J. P. W.), 3 Oct 1996, (W&H); km 25 Puyo-Tena rd., [1°19'42"S,77°56'W], 900–1000 m, (Willmott, K. R., Hall, J. P. W.), 7 Dec 1996, (W&H); km 35 Puyo-Tena rd., [1°16'48"S,77°51'48"W], 1000 m, (Willmott, K. R.), 4 Oct 1996, (W&H); Mera, [1°28'S,78°6'W], 1100 m, (Piñas, F.), 20 Oct 2001, 1 ♂/♀ [FDPR-18141], (FRPI), 31 Aug 2001, 1 ♂/♀ [FDPR-16691], (FRPI) (DABD of FRPI); Puyo, [1°28'S,77°59'W], 1000 m, (Piñas, F.), 12 Oct 2001, 1 ♂/♀ [FDPR-18122], 1 ♂/♀ [FDPR-18135], (FRPI), 21 Sep 2001, 1 ♂/♀ [FDPR-16644], (FRPI), 29 Dec 2001, 1 ♂/♀ [FDPR-18123], 1 ♂/♀ [FDPR-18124], 1 ♂/♀ [FDPR-18125], (FRPI), 31 Aug 2001, 1 ♂/♀ [FDPR-18142], 1 ♂/♀ [FDPR-18143], (FRPI), 8 Mar 2002, 1 ♂/♀ [FDPR-16681], 1 ♂/♀ [FDPR-16688], 1 ♂/♀ [FDPR-18104], 1 ♂/♀ [FDPR-18134], 1 ♂/♀ [FDPR-18210], (FRPI), 9 Aug 2001, 1 ♂/♀ [FDPR-16677], 1 ♂/♀ [FDPR-16684], 1 ♂/♀ [FDPR-18128], 1 ♂/♀ [FDPR-18132], 1 ♂/♀ [FDPR-18136], 1 ♂/♀ [FDPR-18147], 1 ♂/♀ [FDPR-18177], 1 ♂/♀ [FDPR-18194], 1 ♂/♀ [FDPR-18196], (FRPI) (DABD of FRPI); Puyo-Macas rd., Pitirishca, [1°48'18"S,77°49'15"W], 1000 m, (Willmott, K. R., Hall, J. P. W.), 26 Jul 1998, (W&H); Río Pastaza, Kapawi village, [2°32'16"S,76°50'10"W], (Willmott, K. R., Hall, J. P. W.), 23 Jul 2009, (W&H); Río Pindo Grande, Shell, [1°29'40"S,78°3'40"W], 1050 m, (Piñas, F.), 25 Aug 2001, 1 ♂/♀ [FDPR-16705], 1 ♂/♀ [FDPR-18180], (FRPI) (DABD of FRPI); Río Pindo Grande, Shell, [1°29'40"S,78°3'40"W], 1150 m, (Piñas, F.), 25 Aug 2001, 1 ♂/♀ [FDPR-18171], (FRPI) (DABD of FRPI); San

Ramón, 900 m, (Piñas, F.), 16 Nov 2001, 1 ♂/♀ [FDPR-16658], 1 ♂/♀ [FDPR-16700], 1 ♂/♀ [FDPR-16702], 1 ♂/♀ [FDPR-18113], 1 ♂/♀ [FDPR-18114], 1 ♂/♀ [FDPR-18118], 1 ♂/♀ [FDPR-18121], 1 ♂/♀ [FDPR-18204], (FRPI), 30 Nov 2001, 1 ♂/♀ [FDPR-16647], 1 ♂/♀ [FDPR-16648], 1 ♂/♀ [FDPR-16679], 1 ♂/♀ [FDPR-16703], 1 ♂/♀ [FDPR-18105], 1 ♂/♀ [FDPR-18107], 1 ♂/♀ [FDPR-18108], 1 ♂/♀ [FDPR-18110], 1 ♂/♀ [FDPR-18112], 1 ♂/♀ [FDPR-18119], 1 ♂/♀ [FDPR-18120], 1 ♂/♀ [FDPR-18127], 1 ♂/♀ [FDPR-18129], (FRPI) (DABD of FRPI); Villano, [1°30'S, 77°29'W], 450 m, (Naranjo, J.), 10 Jul 1996, 1 ♂/♀ [FDPR-18140], (FRPI) (DABD of FRPI); *Sucumbíos*: Baeza-Lago Agrio rd., Cascada de San Rafael, [0°5'48"S, 77°34'54"W], 1150 m, (Oña, P.), 17 Apr 2000, 1 ♂/♀ [FDPR-18161], 1 ♂/♀ [FDPR-18162], (FRPI) (DABD of FRPI); Baeza-Lago Agrio rd., Cascada de San Rafael, [0°5'48"S, 77°34'54"W], 1200 m, (Willmott, K. R., Hall, J. P. W.), 24 Aug 1999, (W&H); Cerro Lumbaqui Norte, [0°1'42"N, 77°19'W], 800-950 m, (Willmott, K. R., Hall, J. P. W.), 24, 26, 27 Feb 2001, (W&H), Aug, (W&H); Cerro Lumbaqui Sur, [0°0'18"N, 77°19'24"W], 1050 m, (Willmott, K. R., Hall, J. P. W.), 26 Feb 2001, (W&H); km 10.5 Lumbaqui-Baeza rd., [0°0'15"S, 77°25'W], 700-850 m, (Willmott, K. R., Hall, J. P. W.), 22 Feb 2001, (W&H); km 15 Lumbaqui-Pto. Libre rd., La Amarilla, [0°5'38"N, 77°22'55"W], 600 m, (Willmott, K. R., Hall, J. P. W.), 27 Feb 2001, (W&H); km 7 Lumbaqui-Baeza rd., [0°1'48"N, 77°22'41"W], 650 m, (Willmott, K. R., Hall, J. P. W.), 23 Feb 2001, (W&H); *Zamora-Chinchipe*: c. 3 km W Guayaguyme Alto, ridge above San Luís, [3°55'14"S, 78°54'49"W], 1470 m, (Willmott, K. R., J. I. R., J. C. R.), 23 Jun 2013, (W&H); km 13 Los Encuentros-Zarza, [3°48'33"S, 78°36'20"W], (Willmott, K. R., Hall, J. P. W.), 8 Aug 2009, (W&H); km 18 Zumba-Los Sungas rd., Quebrada Huanchunangui, [4°55'11"S, 79°9'54"W], 1100 m, (Willmott, K. R.), 11 Oct 2010, 1 ♂/♀, (W&H); Loma El Cuello, Zamora, [4°4'5"S, 78°56'23"W], 1210 m, (Willmott, K. R., Hall, J. P. W.), 8 May 2008, (W&H); nr. Zamora, Río Bombuscaro, [4°6'48"S, 78°57'54"W], 1146-1200 m, (Hooley, T. A.), Nov 1994, 1 ♂/♀ [MECN-TABDP-18792], 1 ♂/♀ [MECN-TABDP-18793], 1 ♂/♀ [MECN-TABDP-18797], (INABIO) (DABD of INABIO); P. N. Podocarpus, Higuerones, [4°6'S, 78°57'W], 1146-1200 m, (Hernando, R.), 6 May 1998, 1 ♂/♀ [MECN-TABDP-18790], 1 ♂/♀ [MECN-TABDP-18794], (INABIO) (DABD of INABIO); ridge to west of Romerillos, [4°13'17"S, 78°56'45"W], 1146-1600 m, (Hooley, T. A.), Nov 1994, 1 ♂/♀ [MECN-TABDP-18795], 1 ♂/♀ [MECN-TABDP-18796], (INABIO) (DABD of INABIO); Río Nangaritza, Shaime, [4°20'S, 78°40'W], 1146-1000 m, (Hooley, T. A.), Nov 1994, 1 ♂/♀ [MECN-TABDP-18791], (INABIO) (DABD of INABIO); Río Palanda, km 55 Zumba-Loja rd., [4°37'53"S, 79°8'16"W], 1100 m, (Willmott, K. R., Hall, J. P. W.), 20 Jul 1993, (W&H); Zamora, ridge to west, [4°4'30"S, 78°58'7"W], 1400-1450 m, (Willmott, K. R.), 18, 20 May 2000, (W&H); Zamora-Yantzaza rd., Namírez Bajo, [3°58'6"S, 78°49'48"W], 1050 m, (Willmott, K. R., Hall, J. P. W.), 21 May 2000, (W&H); *Not located*: 'Limón', (Piñas, F.), 26 Jul 1995, 1 ♂/♀ [FDPR-16646], (FRPI). **Peru: Ucayali:** Pucallpa, [8°23'S, 74°37'W],

150 m, (Schunke, J. M.), 4 Dec 1974, 1 ♂ [MUSM-ENT-1206], (MUSM) (Darwin Butterfly Database of MUSM).

Amiga arnaca indianacristoi

Specimens examined (16 ♂, 4 ♀): Venezuela: *Aragua*: Rancho Grande Biological Station, [10°20'58"N, 67°41'3"W], 1100 m, (Heppner, J. B.), Jul 1981, 1 ♀ [FLMNH-MGCL-1036240], (FLMNH); km 22 Maracay–Ocumaré rd., Rancho Grande, 1100–1200 m, (Lichy, R.), 2 Aug 1943, 1 ♂ [FLMNH-MGCL-262940], (FLMNH); Maracay, Pozo del Diablo, [10°17'N, 67°37'W], 420–440 m, (Miller, L. D.), 22 Jul 1981, 1 ♂ [FLMNH-MGCL-264654], 1 ♂ [FLMNH-MGCL-264656], (FLMNH), 27 Jul 1981, 1 ♂ [FLMNH-MGCL-264655], (FLMNH); Maracay–Ocumare hwy., 1100–1200 m, (Lichy, R.), 4 Sept 1942, 1 ♀ [FLMNH-MGCL-1036235], (FLMNH); *Carabobo*: nr. Puerto Cabello, San Esteban, [10°26'N, 68°1'W], (Hahnel de Sagan), 1^{er} trimestre 1877, 1 ♀ [BMNH(E)#1420075], (NHMUK), Jun, Jul 1877, 1 ♂ [BMNH(E)#1420068], 1 ♂ [BMNH(E)#1420069], (NHMUK); W of Las Trincheras, moist forest, Hacienda María Teresa, 400 m, (Miller, L. D.), 28 Jul 1981, 1 ♂ [FLMNH-MGCL-264660], (FLMNH); Yuma, [10°6'N, 67°42'W], 550 m, (Miller, L. D.), 16 Dec 1981, 1 ♂ [FLMNH-MGCL-1036241], 1 ♀ [FLMNH-MGCL-1036239], (FLMNH); *Cojedes*: El Baul, Hato Pinero, (Brenner, J.), Feb 1968, 1 ♂ [FLMNH-MGCL-1036242], (FLMNH); *Distrito Federal*: Caracas, [10°30'N, 66°55'W], 1200 m, (Forster, W.), 29 Jun 1954, 1 ♂, (ZSM); *Miranda*: 10 miles S of Caracas, [10°23'46"N, 66°53'26"W], 1311 m, 30 Mar 1970, 1 ♂ [woods], (USNM); [Caracas], Macizo Naiguatá, 720–800 m, (Lichy, R.), 6 Dec 1942, 1 ♂ [FLMNH-MGCL-262941], (FLMNH); Massif du Naiguatá, (Lichy, R.), 5 Jul 1945, 1 ♂ [FLMNH-MGCL-264683], (FLMNH); mist forest 20 km SE Caracas, [10°21'24"N, 66°46'18"W], 500–750 m, (Miller, L. D. & J. Y. Dukes, D.), 1 Sep 1990, 1 ♂ [FLMNH-MGCL-264657], 1 ♂ [FLMNH-MGCL-264659], (FLMNH); Río Chacaito, [10°25'N, 66°55'W], 980–1080 m, (Lichy, R.), 12 Sep 1936, 1 ♂ [FLMNH-MGCL-264658], (FLMNH).

Amiga arnaca adela

Specimens examined (244 ♂, 104 ♀): Colombia: *Antioquia*: Cerca 13, (Marín, M. A.), 18 Sep 2011, 1 ♂, (ZUEC); Helechal Puerto Berrio, Fazenda Berlin, [6°31'N, 74°26'29"W], 115 m, (Marín, M. A.), 10 Jan 2008, 1 ♂, (ZUEC); Valdivia, [7°9'N, 75°27'W], (Pratt), Apr–Jun 1921, 1 ♂ [BMNH(E)#1420039], 1 ♂ [BMNH(E)#1420040], (NHMUK); *Boyacá*: Muzo, [5°32'N, 74°6'W], 400–800 m, 1 ♂, (ZSM); *Chocó*: Acandi, Playa Aguacate, (Marín, M. A.), 5 Feb 2012, 1 ♂, (ZUEC), 8 Feb 2011, 1 ♂, (ZUEC); Condoto, [5°5'48"N, 76°39'1"W], 46 m, (Palmer, M. G.), 1 ♀ [BMNH(E)#1420043], 1 ♀ [BMNH(E)#1420044], (NHMUK); Río San Juan, [5°13'N, 76°39'W], (Trötsch), 1 ♂, 1 ♀, (MNHU); Río Tamaná, Río San Juan, Juntas, [4°59'N, 76°24'W], 122 m, (Palmer, M. G.), Feb 1909, 1 ♂ [BMNH(E)#1420036],

(NHMUK); *El César*: Manaure, (Simmons), 1 ♂ [BMNH(E)#1420041], (NHMUK); *Huila*: Río Hacha, [3°27'19"N, 74°45'31"W], 2744 m, (Brown), Mar 1898, 1 ♂ [BMNH(E)#1498828], (NHMUK); *Meta*: San Juan, Acacias, (Trötsch), 1 ♂ [BMNH(E)#1420031], 1 ♂ [BMNH(E)#1420032], 1 ♀ [BMNH(E)#1420033], (NHMUK); *Nariño*: [Río] Yaculá, [1°29'N, 78°5'W], (Hopp, W.), Jul 1921, 1 ♀, (ZSM); *Tolima*: Río Chili, [4°7'11"N, 75°15'34"W], 700-800 m, 1 ♂ [BMNH(E)#1420038], (NHMUK); *Valle del Cauca*: alto Río Calima, Jan 1986, 1 ♀ [FLMNH-MGCL-257066], (FLMNH); Anchicayá, [3°34'27"N, 76°46'W], 305 m, (Sullivan, J. B.), 23 Jan 1988, 1 ♂ [FLMNH-MGCL-257053], 1 ♂ [FLMNH-MGCL-257055], (FLMNH), 24 Jan 1988, 1 ♂ [FLMNH-MGCL-257051], 1 ♂ [FLMNH-MGCL-257052], 1 ♀ [FLMNH-MGCL-257058], (FLMNH); Anchicayá, [3°34'27"N, 76°46'W], 600 m, (Sullivan, J. B.), 20-24 Jan 1992, 1 ♂ [FLMNH-MGCL-257056], (FLMNH); Cauca, Juntas, [3°46'27"N, 76°44'41"W], (Mathan, M. de), 1897-1898, 1 ♂ [BMNH(E)#1420034], 1 ♂ [BMNH(E)#1420035], (NHMUK); Dagua, [3°40'N, 76°42'W], 300 m, (Steinhausser, S. & L.), 29 Sept 1973, 1 ♂ [FLMNH-MGCL-1036217], (FLMNH); Estación Agroforestal Bajo Calima, (Sullivan, J. B.), 21 Jan 1988, 1 ♂ [FLMNH-MGCL-257057], (FLMNH); Jct of Buenaventura Old Rd and La Virgen, (Sullivan, J. B.), 3 Feb 1987, 1 ♂ [FLMNH-MGCL-257059], 1 ♀ [FLMNH-MGCL-257065], (FLMNH); Río Calima nr Tambo, Quebrada La Brea, 30 m, (Steinhausser, S. R. & L. M.), 12 Feb 1974, 1 ♀ [FLMNH-MGCL-263131], (FLMNH); Río Dagua, [3°37'N, 76°40'W], 450-1600 m, (Rosenberg, W. F. H.), 1 ♂ [BMNH(E)#1498824], 1 ♂ [BMNH(E)#1498825], 1 ♂ [BMNH(E)#1498826], 1 ♂ [BMNH(E)#1498827], (NHMUK); *Not located*: Seville Island, (Batty, J. H.), 20-23 Jan 1902, 1 ♀ [BMNH(E)#1498821], 1 ♀ [BMNH(E)#1498822], (NHMUK). **Costa Rica**: *Alajuela*: 6-8 km W Atenas, [9°57'49"N, 84°26'8"W], (Austin, G. T.), 22 Sep 1986, 1 ♂, (BME); Esperanza, [10°21'53"N, 84°32'40"W], 200 m, Feb, 1 ♀ [BMNH(E)#1498791], (NHMUK); San Mateo, [9°57'N, 84°32'W], 315-635 m, Apr, 1 ♂ [BMNH(E)#1498784], (NHMUK); *Cartago*: Turrialba, [9°53'N, 83°38'W], (DZUP); rt 10, 21.8 km E Catie, (Olson, E. C.), 26 Jan 1982, 1 ♂ [FLMNH-MGCL-257046], (FLMNH); Volcán Irazú, [9°57'28"N, 83°57'14"W], 1829-2134 m, (Rogers, H.), 1 ♂ [BMNH(E)#1420005], (NHMUK); *Guanacaste*: Cañas, [10°25'N, 85°7'W], 137 m, (O'Shea, G.), 10 Aug 1986, 1 ♀ [FLMNH-MGCL-264667]; Sta. 133 'dark part for[est]', (FLMNH); *Heredia*: 3 km S Puerto Viejo de Sarapiquí, OTS La Selva Station, [10°25'52"N, 84°0'22"W], 20-120 m, (Denno, R. F.), 23 Jun 1979, 1 ♀ [FLMNH-MGCL-1036231], 1 ♀ [FLMNH-MGCL-1036232], (FLMNH); 3.8 km N Santa Clara, (Austin, G. & A.), 3 Sep 1987, 1 ♀ [FLMNH-MGCL-257026], (FLMNH); near Chilamate, [10°26'N, 84°4'W], 37 m, (Majerus, M.), 6 Jan 2005, 1 ♀ [BMNH(E)#1420012], 1 ♀ [BMNH(E)#1420030], (NHMUK); Chilamate, 10 km W Pto Viejo de Sarapiquí, Finca Selva Verde, [10°27'2"N, 84°4'8"W], 37 m, (Majerus, M.), 6 Jan 2005, 1 ♂ [BMNH(E)#1420006], (NHMUK); Chilamate, W. Puerto Viejo de Sarapiquí, ruta 9, Finca Selva Verde, [10°27'2"N, 84°4'8"W], 37 m, (Harris, L. & C.), 15 Feb 1993, 1 ♂ [FLMNH-MGCL-257023], 1 ♀ [FLMNH-MGCL-257025], (FLMNH); Río Peje, Magsasay, 150 m, (Hesterberg, R.), 13

Aug 1981, 1 ♂ [FLMNH-MGCL-257024], (FLMNH); Selva Verde Lodge, [10°27'2"N, 84°4'8"W], 80 m, (Flaspohler), 12 Nov 1997, 1 ♀ [FLMNH-MGCL-1036238], (FLMNH); *Limón*: Guápiles, [10°13'N, 83°46'W], May, 1 ♂ [BMNH(E)#1498786], (NHMUK); hill SE of Puerto Viejo, [9°38'46"N, 82°44'47"W], 100 m, (Nakamura, I.), 16 Sep 2004, (ICNA); Río Estrella, [9°47'15"N, 82°54'52"W], 1 ♂ [BMNH(E)#1670213], 1 ♂ [BMNH(E)#1670214], (NHMUK); *Puntarenas*: 5 km S San Vito de Java, Finca Las Cruces, [8°47'7"N, 82°58'1"W], 1150 m, (Austin, G. & A.), 10 Sep 1987, 1 ♂ [FLMNH-MGCL-257029], 1 ♂ [FLMNH-MGCL-257031], (FLMNH), 29 Sep 1986, 1 ♂ [FLMNH-MGCL-257032], (FLMNH), 30 Sep 1986, 1 ♂ [FLMNH-MGCL-257027], 1 ♂ [FLMNH-MGCL-257028], 1 ♂ [FLMNH-MGCL-257030], 1 ♀ [FLMNH-MGCL-257034], 1 ♀ [FLMNH-MGCL-257035], (FLMNH), (Smith, J. A.), 29 Sep–2 Oct 1986, 6 ♂, (BME); Brujo de Buenos Aires, (Austin, G. & A.), 27 Sep 1986, 1 ♂ [FLMNH-MGCL-257038], 1 ♂ [FLMNH-MGCL-257039], 1 ♀ [FLMNH-MGCL-257041], 1 ♀ [FLMNH-MGCL-257042], 1 ♀ [FLMNH-MGCL-257043], (FLMNH); Corcovado, [8°32'N, 83°35'W], (Kare-ofelas, G., Witham, C. W.), Aug 1983, 1 ♂, (BME); Las Alturas [Field Station], [8°57'N, 82°50'W], 1500 m, (Hesterberg, R.), 15 Jun 1979, 1 ♂ [FLMNH-MGCL-257037], (FLMNH); Llorona, (DeVries, P. J.), 29 Jan 1977, 1 ♂ [FLMNH-MGCL-263073], (FLMNH); Osa Peninsula, 2.5 mi SW Rincón, [8°42'26"N, 83°29'13"W], 15 m, (OTS Adv. Zoo. Course), 21–28 Feb 1967, 1 ♂ [FLMNH-MGCL-264661], (FLMNH); Osa Peninsula, Rincón, ridge N of airport, (Valerio, C. E.), 5 Aug 1970, 1 ♀ [FLMNH-MGCL-257049; primary forest], (FLMNH); Osa Peninsula, Sirena, [8°28'N, 83°34'W], 110 m, (Denno, R. F.), 13 Aug 1979, 1 ♂ [FLMNH-MGCL-1036220], (FLMNH), (DeVries, P. J.), 3 Feb 1977, 1 ♂ [FLMNH-MGCL-263060], (FLMNH); Refugio Golfito, Las Torres road, 300–450 m, (Nakamura, I. & M.), 4 Sep 2004, (ICNA), (Nakamura, I.), 5 Sep 2004, (ICNA); Rincón, Península de Osa, (Fratello, S.), Feb 2000, 1 ♂ [FLMNH-MGCL-257040], (FLMNH), (Valerio, C. E.), 14 Aug 1970, 1 ♂ [FLMNH-MGCL-257044], 1 ♂ [FLMNH-MGCL-257045], 1 ♀ [FLMNH-MGCL-257048], (FLMNH); San Vito [de Java], [8°49'N, 82°58'W], 1150 m, (Gard, O.), 28 Dec 1974, 1 ♀ [FLMNH-MGCL-257050], (FLMNH), (May, M. L.), 28 Jul 1970, 1 ♂ [FLMNH-MGCL-257033], (FLMNH), (Taylor, T.), 14 Jun 1971, 1 ♂ [FLMNH-MGCL-257036], (FLMNH); *San José*: Carillo, [10°9'35"N, 83°57'42"W], Oct, 1 ♀ [BMNH(E)#1498792], (NHMUK); El Rodeo, University for Peace Reserve, [9°54'42"N, 84°16'54"W], 1000 m, (Nakamura, I., Posla, M.), 5 Sep 2008, (ICNA); mountain 2 mi S Piedades, (Flaspohler), 3 Dec 1996, 1 ♀ [FLMNH-MGCL-1036233], (FLMNH); *Not located*: ‘Costa Rica’, 1 ♂ [BMNH(E)#1420008], 1 ♂ [BMNH(E)#1420009], 1 ♂ [BMNH(E)#1420007], 1 ♂ [BMNH(E)#1420010], 1 ♂ [BMNH(E)#1498785], 1 ♂ [BMNH(E)#1498790], 1 ♀ [BMNH(E)#1420011], (NHMUK), (Underwood), 1 ♂ [BMNH(E)#1498787], 1 ♂ [BMNH(E)#1498788], 1 ♂ [BMNH(E)#1498789], (NHMUK). (NHMUK). **Ecuador**: *Bolívar*: Balzapamba, [1°47'S, 79°10'W], 17 Jun 1899, 1 ♀, (ZSM); Río Chanchan, Guayaquil–Riobamba railway, Chimbo, [2°12'S, 79°8'W], 300 m, (Mathan, M. de), 1897, 1 ♂ [BMNH(E)#1420058], 1 ♂

[BMNH(E)#1420059], 305 m, (Rosenberg, W. F. H.), Aug 1897, 1 ♂ [BMNH(E)#1498844], 1 ♂ [BMNH(E)#1498845], 1 ♂ [BMNH(E)#1498846], 1 ♀ [BMNH(E)#1498847], (NHMUK); Río La Chima, tributary of Río de Las Juntas, La Chima, [1°55'35"S, 79°18'24"W], 300 m, (Mathan, M. de), 1 Sep 1893, 1 ♀ [BMNH(E)#1420060], (NHMUK); *Cañar*: 'Río Angas, nr. Huigra, Angas' – (error), (Lafébre, R. de), Dec 1974, 1 ♂ [FLMNH-MGCL-263344], 1 ♂ [FLMNH-MGCL-263345], 1 ♂ [FLMNH-MGCL-263351], 1 ♂ [FLMNH-MGCL-263356], 1 ♂ [FLMNH-MGCL-263359], 1 ♀ [FLMNH-MGCL-263369], (FLMNH); *Carchi*: Lita, ridge east of Río Baboso, [0°53'15"N, 78°26'18"W], 900 m, (Aldas, I.), 13 May 2015, 1 ♀ [FLMNH-MGCL-281216], (FLMNH); *Chimborazo*: Río Chanchan, Dos Puentes, [2°12'S, 79°8'W], 518 m, (Coxey, W. J.), Jan 1929, 2 ♂, 1 ♀, (CMNH), Mar 1931, 3 ♂, (CMNH); *Esmeraldas*: Esmeraldas, [0°59'N, 79°42'W], 0 m, (Lehmann), 1 ♂ [BMNH(E)#1420053], 1 ♀ [BMNH(E)#1420054], (NHMUK); Estación Científica Bilsa, [0°21'33"N, 79°42'2"W], 600 m, (Young, A.), Jul 1999, (collection unknown) (Young, A., undergraduate research project University of Leeds); km 12.5 Lita–San Lorenzo rd., Río Chuchuví, [0°52'51"N, 78°30'54"W], 750 m, (Aldas, I.), 12 May 2015, 1 ♂ [FLMNH-MGCL-281206], 1 ♂ [FLMNH-MGCL-281224], 1 ♂ [FLMNH-MGCL-281225], 1 ♂ [FLMNH-MGCL-281230], 1 ♂ [FLMNH-MGCL-281231], 1 ♂ [FLMNH-MGCL-281234], 1 ♂ [FLMNH-MGCL-281235], 1 ♂ [FLMNH-MGCL-281264], 1 ♂ [FLMNH-MGCL-281293], (FLMNH); km 12.5 Lita–San Lorenzo rd., Río Chuchuví, [0°52'51"N, 78°30'54"W], 800–900 m, (Christie, J., McLoughlin, E., Ryan, F., Zakrisson, A.), 19–22 Jul 2002, (collection unknown) (Cambridge University Expedition, 2002); km 17 San Lorenzo–Ibarra rd., San Francisco ridge, [1°6'26"N, 78°41'55"W], 200–250 m, (Willmott, K. R., J. I. R., J. C. R.), 6 Jul 2015, 1 ♂ [FLMNH-MGCL-209451], (FLMNH); km 40 Lita–San Lorenzo rd., El Durango, [1°2'27"N, 78°38'4"W], 250–400 m, (Christie, J., McLoughlin, E., Ryan, F., Zakrisson, A.), 6–9 Aug 2002, (collection unknown) (Cambridge University Expedition, 2002); Lita–San Lorenzo railroad, Ventanas, [0°56'9"N, 78°39'W], 450 m, (Christie, J., McLoughlin, E., Ryan, F., Zakrisson, A.), 14–20 Aug 2002, (collection unknown) (Cambridge University Expedition, 2002); Lita–San Lorenzo railway, Cachabé, [1°3'N, 78°48'W], 150 m, (Rosenberg, W. F. H.), Jan 1897, 1 ♂ [BMNH(E)#1498922; 'low c.'], 1 ♂ [BMNH(E)#1498923; 'low c.'], 1 ♀ [BMNH(E)#1498924; 'low c.'], 1 ♀ [BMNH(E)#1498925; 'low c.'], 1 ♀ [BMNH(E)#1498926; 'low c.'], 1 ♀ [BMNH(E)#1498927; 'low c.'], (NHMUK); Lita–San Lorenzo rd., NE San Francisco, ridge N La Ceiba, [1°7'48"N, 78°39'29"W], 250 m, (Aldaz, R.), Nov 2016, (INABIO); Río Santiago, Reserva de Tigrillo, lodge, [0°51'N, 78°46'37"W], 100 m, (Willmott, K. R., J. I. R., J. C. R.), 11, 13 Jul 2016, 1 ♀ [FLMNH-MGCL-209996], (FLMNH), (INABIO); Río Santiago, Reserva de Tigrillo, Peñón del Santo trail, [0°51'3"N, 78°46'40"W], 80 m, (Willmott, K. R., J. I. R., J. C. R.), 10, 13 Jul 2016, 1 ♂ [FLMNH-MGCL-209994], (FLMNH), (INABIO); Río Santiago, Reserva de Tigrillo, Pueblo Trail, [0°51'19"N, 78°47'23"W], 100–130 m, (Aldaz, R.), 11, 12 Jul 2016, (INABIO); W Maldonado–Selva Alegre rd., El Cerro, [0°58'22"N, 78°55'19"W], 235 m, (Willmott, K. R., Hall, J. P. W.), 21, 25 Jul 2011, 1

♂ [FLMNH-MGCL-151127], 1 ♂ [FLMNH-MGCL-151128], (FLMNH), 4 ♂, (INABIO); *Guayas*: Guayaquil–Riobamba railway, Bucay, [2°11'S, 79°6'W], 300 m, (Rhoads, S. N.), 1 ♂, (CMNH); Las Mercedes, c. 10 km S Naranjal, [2°45'56"S, 79°40'11"W], 270 m, (Willmott, K. R., Hall, J. P. W.), 19 May 2008, 1 ♂ [FLMNH-MGCL-118492], (FLMNH); *Imbabura*: Río Mira, Paramba, [0°49'N, 78°21'W], 1067 m, 1 ♀ [BMNH(E)#1420065], (NHMUK); Río Mira, Paramba, [0°49'N, 78°21'W], 915 m, (Rosenberg, W. F. H.), Mar 1897, 1 ♂ [BMNH(E)#1498848], 1 ♂ [BMNH(E)#1498849], 1 ♂ [BMNH(E)#1498850], 1 ♂ [BMNH(E)#1498851], 1 ♀ [BMNH(E)#1498852], (NHMUK); *Manabí*: La Crespa, [0°52'S, 79°52'W], 800 m, (Lafebre, R. de), May 1975, 1 ♀ [FLMNH-MGCL-257125], (FLMNH); *Pichincha*: [12 km E] Santo Domingo [de los Colorados], [Hotel] Tinalandia, [0°18'S, 79°4'W], 19 Aug 1976, 1 ♂ [FLMNH-MGCL-257076], (FLMNH), 19 Aug 1976, 1 ♂ [FLMNH-MGCL-257080], 1 ♂ [FLMNH-MGCL-257081], 1 ♂ [FLMNH-MGCL-257082], (FLMNH); [12 km E] Santo Domingo [de los Colorados], [Hotel] Tinalandia, [0°18'S, 79°4'W], 760 m, (Milner, P. F.), 1-5 Apr 1985, 1 ♂ [FLMNH-MGCL-257096], 1 ♂ [FLMNH-MGCL-257097], (FLMNH); [Alluriquín], Río Toachi, [0°19'6"S, 78°57'13"W], 701 m, (Harris, L. & C.), 21-23 Jul 1986, 1 ♂ [FLMNH-MGCL-295865], (FLMNH); [Alluriquín], Río Toachi, [0°19'6"S, 78°57'13"W], 800 m, (Brown, F. M.), Nov 1939, 1 ♂ [FLMNH-MGCL-263322], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], (DZUP), 5-12 May 1990, 1 ♂, (BME), (Harris, L. & C.), 25 Apr-1 May 1988, 1 ♀ [FLMNH-MGCL-264676], 1 ♀ [FLMNH-MGCL-264677], 1 ♀ [FLMNH-MGCL-264679], 1 ♀ [FLMNH-MGCL-264680], (FLMNH), 25 Apr-1 May 1988, 1 ♂ [FLMNH-MGCL-264669], (FLMNH), (Harris, L.), 25 Apr-1 May 1988, 1 ♂ [FLMNH-MGCL-1036228], (FLMNH), (Smith, J. A.), 6-11 May 1990, 4 ♂, (BME), 8-14 May 1996, 1 ♂, (BME); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 650 m, (Sullivan, J. B.), 1 Dec 1975, 1 ♀ [FLMNH-MGCL-257079], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 671 m, (Emmel, T. C.), 12 May 1985, 1 ♂ [FLMNH-MGCL-257070], 1 ♂ [FLMNH-MGCL-257071], 1 ♂ [FLMNH-MGCL-257072], (FLMNH), (Nation, J. L.), 12 May 1985, 1 ♀ [FLMNH-MGCL-257077], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 671-762 m, (Edwards, G. B.), 11-17 May 1986, 1 ♂ [FLMNH-MGCL-1036230], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 700 m, (Covell, C. V.), 19 May 1985, 1 ♂ [FLMNH-MGCL-257074], 1 ♂ [FLMNH-MGCL-257075], (FLMNH), 21 May 1985, 1 ♂ [FLMNH-MGCL-257073], (FLMNH), 24 May 1985, 1 ♀ [FLMNH-MGCL-257078], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 701 m, (Harris, L. & C.), 21-25 Jul 1986, 1 ♂ [FLMNH-MGCL-257090], 1 ♂ [FLMNH-MGCL-257091], 1 ♂ [FLMNH-MGCL-257092], 1 ♀ [FLMNH-MGCL-257093], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 848 m, (Douglas, M. G.), 6-11 May 1990, 1 ♂ [FLMNH-MGCL-257109], 1 ♂ [FLMNH-MGCL-257110], 1

♀ [FLMNH-MGCL-257112], (FLMNH); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 854 m, (Emmel, T. C.), 24 Jun 1973, 1 ♀ [FLMNH-MGCL-257101], (FLMNH); 12 km E Santo Domingo de los Colorados, Hotel Tinalandia, [0°18'S, 79°4'W], 750-850 m, (Austin, G. & A.), 10 May 1988, 1 ♂ [FLMNH-MGCL-257107], (FLMNH), 13 May 1988, 1 ♂ [FLMNH-MGCL-257106], (FLMNH), 14 May 1988, 1 ♂ [FLMNH-MGCL-257098], 1 ♂ [FLMNH-MGCL-257099], 1 ♂ [FLMNH-MGCL-257100], 1 ♀ [FLMNH-MGCL-257102], (FLMNH), 8 May 1988, 1 ♂ [FLMNH-MGCL-257105], 1 ♂ [FLMNH-MGCL-257108], 1 ♀ [FLMNH-MGCL-257103], 1 ♀ [FLMNH-MGCL-257104], 1 ♀ [FLMNH-MGCL-257111], (FLMNH); 16 km E Santo Domingo, [0°19'S, 79°0'W], 650 m, (Hyatt, J.), 1-4 Jul 1982, 1 ♂ [FLMNH-MGCL-257094], 1 ♂ [FLMNH-MGCL-257095], (FLMNH); 56 km N Quevedo, Estación Río Palenque, [0°36'12"S, 79°18'36"W], 180 m, (Sullivan, J. B.), 2 Dec 1975, 1 ♂ [FLMNH-MGCL-257088], 1 ♂ [FLMNH-MGCL-257089], (FLMNH); Hotel Tinalandia, Río Tanti, [0°20'S, 79°0'30"W], 750 m, (Hall, J. P. W., Willmott, K. R.), 7 Jan 1993, 1 ♀ [FLMNH-MGCL-257117], (FLMNH); km 20 Pacto-Guayabillas rd., [0°11'36"N, 78°51'30"W], 900 m, (Busby, R. C.), 20 Jan 2015, 1 ♂ [FLMNH-MGCL-195498], (FLMNH), (Willmott, K. R., Hall, J. P. W.), 7, 8 Aug 2011, 1 ♀ [FLMNH-MGCL-151129], (FLMNH), 2 ♂, (INABIO); 'Las Palmas' [=La Palma], [0°18'52"S, 78°55'41"W], 900 m, (DZUP); nr. La Unión del Toachi, Otongachi Reserve, [0°19'15"S, 78°56'6"W], 817 m, (Majerus, M.), 22 Feb 2007, 1 ♂ [BMNH(E)#1420045], 1 ♂ [BMNH(E)#1420046], 1 ♂ [BMNH(E)#1420047], 1 ♀ [BMNH(E)#1420048], 1 ♀ [BMNH(E)#1420049], (NHMUK); Pichincha, 1750 m, (Lafebre, R. de), Jun 1975, 1 ♂ [FLMNH-MGCL-1036226], (FLMNH); Reserva Mangaloma, [0°7'15"N, 78°59'37"W], 700-815 m, (Willmott, K. R., J. I. R., J. C. R.), 10 Jul 2015, 1 ♂ [FLMNH-MGCL-209452], (FLMNH), 1 ♂, (INABIO); Río Alambi, Reserva Maquipucuna, [0°5'42"N, 78°38'W], 1350 m, (Smith, N. J.), 2-3 Aug 1998, 1 ♂, (BME); Río Palenque, [0°36'12"S, 79°18'36"W], 200 m, (Nicolay, S. S.), 21 Sep 1975, 1 ♂ [FLMNH-MGCL-263357], (FLMNH); Río Palenque, [0°36'12"S, 79°18'36"W], 400 m, 10 Aug 1976, 1 ♂ [FLMNH-MGCL-257115], (FLMNH), 10 Aug 1976, 1 ♀ [FLMNH-MGCL-257118], (FLMNH), (Dodson, T.), 1975, 1 ♂ [FLMNH-MGCL-257120], (FLMNH), 1975, 1 ♂ [FLMNH-MGCL-257119], (FLMNH); Río Pilaton, Tandapi, [0°27'S, 78°46'W], 1450 m, (Harris, L. & C.), 29 Apr 1988, 1 ♂ [FLMNH-MGCL-257137], (FLMNH); Río Toachi, Al-luriquín, 800 m, (Brown, F. M.), Nov 1939, 1 ♀ [FLMNH-MGCL-263377], (FLMNH); San Pablo, [0°19'S, 79°6'W], 1100 m, (Lafebre, R. de), Jun 1970, 1 ♀ [FLMNH-MGCL-263375], (FLMNH); Santo Domingo de los Colorados, [0°15'S, 79°9'W], 200 m, (Goodfellow, W.), Oct 1898, 1 ♂ [BMNH(E)#1498853], (NHMUK); 'Santo Domingo de los Colorados', [0°19'S, 78°59'W], 600 m, 8 Aug 1976, 1 ♂ [FLMNH-MGCL-257083], 1 ♂ [FLMNH-MGCL-257084], 1 ♂ [FLMNH-MGCL-257085], 1 ♂ [FLMNH-MGCL-257086], 1 ♀ [FLMNH-MGCL-257087], (FLMNH); 'Santo Domingo de los Colorados', [0°19'S, 78°59'W], 610 m, (O'Shea, G.), 25 Jun 1983, 1 ♂ [FLMNH-MGCL-264670; Sta. 84], 1 ♂ [FLMNH-MGCL-264671; Sta. 80], 1 ♀

[FLMNH-MGCL-264678; Sta. 80], (FLMNH); Santo Domingo, [0°15'S,79°9'W], 350 m, (Jenkins, D. W.), 16 Nov 1975, 1 ♂ [FLMNH-MGCL-257116], (FLMNH); Taguaza, [0°18'S,79°2'W], 534 m, (Lafabre, R. de), Jun 1975, 1 ♂ [FLMNH-MGCL-264673], 1 ♂ [FLMNH-MGCL-264674], 1 ♂ [FLMNH-MGCL-264675], 1 ♂ [FLMNH-MGCL-264681], (FLMNH), 1 ♂ [FLMNH-MGCL-264672], 1 ♂ [FLMNH-MGCL-257114], (FLMNH), Jun 1975, 1 ♂ [FLMNH-MGCL-257113], 1 ♂ [FLMNH-MGCL-263051], (FLMNH); 'Toachi', [0°19'S,78°57'W], 600 m, (Velástegui, D.), 20 Jul 1968, 1 ♂ [MUSM-LEP-100440], (MUSM); *Not located: 'Ecuador'*, 1 ♂, (MNHU). **Nicaragua:** *Atlántico Norte*: 185 miles above C. Gracias, San Ramón, [14°40'N,84°41'W], 114 m, (Palmer, M. G.), May 1905, 1 ♂ [BMNH(E)#1498783], (NHMUK); Río Wanks, (Palmer, M. G.), 1905, 1 ♂ [BMNH(E)#1498782; Wet Seas.[on]], (NHMUK); *Atlántico Sur*: Bluefields, [12°1'N,83°46'W], (Sullivan, J. B.), 10 Dec 1975, 1 ♀ [FLMNH-MGCL-257149], (FLMNH), 11 Dec 1975, 1 ♀ [FLMNH-MGCL-257150], (FLMNH); Nueva Guinea, [11°40'N,84°27'W], (Anderson, R. A.), 26 Aug 1976, 1 ♂ [FLMNH-MGCL-263072], (FLMNH), 26 Oct 1976, 1 ♀ [FLMNH-MGCL-257143], (FLMNH), 27 Oct 1976, 1 ♂ [FLMNH-MGCL-257139], 1 ♂ [FLMNH-MGCL-257142], 1 ♂ [FLMNH-MGCL-263066], 1 ♀ [FLMNH-MGCL-257148], 1 ♀ [FLMNH-MGCL-263091], (FLMNH), 28 Aug 1976, 1 ♂ [FLMNH-MGCL-263067], (FLMNH), 28 Oct 1976, 1 ♂ [FLMNH-MGCL-257141], 1 ♀ [FLMNH-MGCL-257145], 1 ♀ [FLMNH-MGCL-257146], 1 ♀ [FLMNH-MGCL-257147], (FLMNH), 29 Oct 1976, 1 ♂ [FLMNH-MGCL-257140], 1 ♀ [FLMNH-MGCL-257144], (FLMNH); *Chontales*: 'Chontales' [=Santo Domingo], [12°15'44"N,85°4'58"W], 500 m, (Belt, T.), 1 ♂ [BMNH(E)#1420001], 1 ♀ [BMNH(E)#1420002], 1 ♀ [BMNH(E)#1420003], (NHMUK), (Janson), 1 ♂ [BMNH(E)#1420000], (NHMUK); *Not located: 'Nicaragua'*, 1 ♀ [BMNH(E)#1420004], (NHMUK). **Panama:** *Chiriquí*: Bugaba, [8°29'N,82°37'W], 250–475 m, (Champion, G. C.), 1 ♂ [BMNH(E)#1420015], 1 ♂ [BMNH(E)#1420019], 1 ♀ [BMNH(E)#1420026], (NHMUK); Bugaba, 240 m, 1 ♀ [BMNH(E)#1420028], (NHMUK); Bugaba, 244 m, (Watson), 1 ♂ [BMNH(E)#1498816], (NHMUK), (Watson, A.), 1 ♀ [BMNH(E)#1498823], (NHMUK); Chiriquí, [8°40'34"N,82°37'26"W], 2 ♂, (MNHU), (Ribbe), 1 ♂, 1 ♀, (MNHU); Chiriquí, [8°40'34"N,82°37'26"W], 760–1220 m, (Champion, G. C.), 1 ♂ [BMNH(E)#1420013], 1 ♂ [BMNH(E)#1420014], 1 ♂ [BMNH(E)#1420018], 1 ♀ [BMNH(E)#1420025], (NHMUK); David, [8°25'N,82°27'W], (Champion, G. C.), 1 ♂ [BMNH(E)#1420022], (NHMUK); Potrerillos, [8°48'N,82°30'W], 1100–1200 m, (Tr.ötsch), 1 ♂, (MNHU); *Coclé*: Cerro La Vieja Eco-Hotel, [8°40'2"N,80°12'4"W], 410 m, (Klein, T. W.), 5 Aug 2008, 1 ♂ [FLMNH-MGCL-257151], (FLMNH); El Valle, [8°36'N,80°8'W], 800–950 m, (Anderson, R. A.), 1 Oct 1984, 1 ♂ [FLMNH-MGCL-263083], (FLMNH); *Colón*: Gamboa, [9°7'13"N,79°41'59"W], 50 m, (Anderson, R. A.), 29 Jul 1985, 1 ♀ [FLMNH-MGCL-263090], (FLMNH); Gatún, [9°16'N,79°55'W], 110 m, (R. J. J.), 1 Jan 1946, 1 ♀ [FLMNH-MGCL-263094], (FLMNH), 3 Sep 1945, 1 ♂ [FLMNH-MGCL-263074], (FLMNH), (R. W.), 8 Sep 1945, 1 ♀ [FLMNH-MGCL-263126],

(FLMNH); Lion Hill, [9°13'40"N, 79°53'40"W], 80 m, (McLeannan), 1 ♂ [BMNH(E)#1420016], 1 ♂ [BMNH(E)#1420020], (NHMUK); Madden Forest, [9°12'45"N, 79°36'57"W], 80 m, (Anderson, R. A.), 29 Sep 1976, 1 ♀ [FLMNH-MGCL-263127], (FLMNH); Matachin, [9°7'1"N, 79°42'14"W], 30 m, (Thieme, O.), Jul 1877, 1 ♂ [BMNH(E)#1420023], 1 ♂ [BMNH(E)#1420024], (NHMUK); Piña, [9°16'50"N, 80°2'49"W], 10 m, 1 Mar 1969, 1 ♂ [FLMNH-MGCL-263062], (FLMNH), (King, H. L.), 1 Apr 1970, 1 ♀ [FLMNH-MGCL-263089], (FLMNH), 1 Jul 1970, 1 ♂ [FLMNH-MGCL-263070], (FLMNH), 11 Mar 1971, 1 ♂ [FLMNH-MGCL-263054], (FLMNH), 15 Jun 1970, 1 ♂ [FLMNH-MGCL-263061], (FLMNH), 16 Jul 1970, 1 ♂ [FLMNH-MGCL-263071], (FLMNH), 18 Jul 1970, 1 ♀ [FLMNH-MGCL-263093], (FLMNH), 18 Jun 1970, 1 ♂ [FLMNH-MGCL-263065], 1 ♂ [FLMNH-MGCL-263084], 1 ♂ [FLMNH-MGCL-263085], (FLMNH), 2 Aug 1970, 1 ♂ [FLMNH-MGCL-263075], (FLMNH), 20 Jun 1970, 1 ♂ [FLMNH-MGCL-263063], 1 ♂ [FLMNH-MGCL-263064], 1 ♂ [FLMNH-MGCL-263076], 1 ♂ [FLMNH-MGCL-263077], 1 ♂ [FLMNH-MGCL-263086], (FLMNH), 20 Jun 1972, 1 ♂ [FLMNH-MGCL-263059], (FLMNH), 22 Jul 1970, 1 ♂ [FLMNH-MGCL-263080], (FLMNH), 29 Jul 1970, 1 ♀ [FLMNH-MGCL-263096], (FLMNH), 3 Aug 1970, 1 ♂ [FLMNH-MGCL-263068], (FLMNH), 5 Aug 1970, 1 ♂ [FLMNH-MGCL-263069], 1 ♀ [FLMNH-MGCL-263087], 1 ♀ [FLMNH-MGCL-263098], (FLMNH), 6 Jun 1970, 1 ♂ [FLMNH-MGCL-263081], (FLMNH), 7 Jul 1970, 1 ♂ [FLMNH-MGCL-263078], (FLMNH), 9 Jul 1970, 1 ♀ [FLMNH-MGCL-263092], (FLMNH), (King, H. L.), 9 Jul 1970, 1 ♂ [FLMNH-MGCL-295864], (FLMNH); Piña, [9°16'50"N, 80°2'49"W], 100 m, (King, H. L.), 1 May 1971, 1 ♀ [FLMNH-MGCL-263095], (FLMNH); Piña, [9°16'50"N, 80°2'49"W], 200 m, (King, H. L.), 11 Jul 1972, 1 ♀ [FLMNH-MGCL-263088], (FLMNH), 13 Jul 1972, 1 ♀ [FLMNH-MGCL-263097], (FLMNH), 25 Jun 1972, 1 ♂ [FLMNH-MGCL-263058], (FLMNH), 30 Aug 1972, 1 ♂ [FLMNH-MGCL-263082], (FLMNH); Darién: Majé Island, Lake Bayano, 'Gorgas Bayano Sta.' [=Gorgas Memorial Laboratory], (Jenkins, D. W.), 25 Dec 1975, 1 ♀ [FLMNH-MGCL-257152], (FLMNH); Veraguas, (Arcé), 1 ♂ [BMNH(E)#1420017], 1 ♂ [BMNH(E)#1420021], 1 ♀ [BMNH(E)#1420027], (NHMUK); Panamá: Cerro Campana, [8°41'N, 79°55'W], 750-792 m, (Anderson, R. A.), 5 Dec 1978, 1 ♂ [FLMNH-MGCL-263079], (FLMNH), (King, H. L.), 11 Jan 1973, 1 ♀ [FLMNH-MGCL-263125], (FLMNH); near Gamboa, [9°7'13"N, 79°41'59"W], 30-150 m, (Majerus, M.), 22 Sep 2001, 1 ♀ [BMNH(E)#1420029], (NHMUK); Summit, [9°3'53"N, 79°38'49"W], 90 m, (Robbins, R. K.), 30 Nov 1978, 1 ♀ [FLMNH-MGCL-263124], (FLMNH); Not located: Isthmus of Panamá, Dec 1907, 1 ♂ [BMNH(E)#1498793], 1 ♂ [BMNH(E)#1498794], 1 ♂ [BMNH(E)#1498795], 1 ♂ [BMNH(E)#1498796], 1 ♂ [BMNH(E)#1498797], (NHMUK); 'Panama', 1 ♂ [BMNH(E)#1498798], (NHMUK).

Other records: Colombia: Antioquia: Caracoli, El Cascarón-Finca Pataratas, 1000 m, (Henao, E.), 2 Oct 2004, 1 ♂/♀ [MEFLG-15503; jama], 1 ♂/♀ [MEFLG-8488; jama], (MEFLG); Puerto Berrio, Berlin, [6°31'N, 74°26'29"W], 115 m, (Alvarez, C. F.), 11 Jan 2008, 1 ♂/♀ [MEFLG-15507; jama, borde bosque], 1 ♂/♀ [MEFLG-15511;

jama, borde bosque], 1 ♂/♀ [MEFLG-15516; jama, borde bosque], (MEFLG), 13 Jan 2008, 1 ♂/♀ [MEFLG-15517; jama, borde bosque], (MEFLG), 14 Jan 2008, 1 ♂/♀ [MEFLG-15508; jama], 1 ♂/♀ [MEFLG-15510; jama, borde bosque], (MEFLG), (Marín, M. A.), 11 Jan 2008, 1 ♂/♀ [MEFLG-15509; jama, interior bosque 150 m], (MEFLG), 13 Jan 2008, 1 ♂/♀ [MEFLG-15515; jama, interior bosque 100 m], (MEFLG), 14 Jan 2008, 1 ♂/♀ [MEFLG-15513; trampa-fruta, interior bosque 100 m], (MEFLG); San Roque, San José del Nus, [6°28'42"N, 74°51'9"W], 1000 m, (Marín, M. A.), 29-Nov-08, 1 ♂/♀ [MEFLG-15504; jama], 1 ♂/♀ [MEFLG-15505; jama], 1 ♂/♀ [MEFLG-15506; jama], 1 ♂/♀ [MEFLG-15512; jama], 1 ♂/♀ [MEFLG-15514; jama], (MEFLG). **Ecuador:** *Carchi:* Lita, ridge east of Río Baboso, [0°53'15"N, 78°26'18"W], 1000 m, (Willmott, K. R., Hall, J. P. W.), Jul, (W&H); *Esmeraldas:* Reserva Río Canandé, [0°29'N, 79°12'4"W], 400 m, (Levy, E.), 2011, (QCAZ) (Checa, F., pers. comm., by email 26 Jun 2012); [km 40 Lita-San Lorenzo rd.], 'Durango' [=El Durango], [1°2'27"N, 78°38'4"W], 500 m, (Piñas, F.), 20 Jul 2003, 1 ♂/♀ [FDPR-18157], (FRPI) (DABD of FRPI); c. km 5 San Mateo-Pto. Libre rd., Cerro Mutiles, [0°54'N, 79°36'W], 100 m, (Willmott, K. R.), 9 May 2000, (W&H); hill at jct. rd. to Ricaurte, km 17 San Lorenzo-Lita rd., [1°10'25"N, 78°44'45"W], 100 m, (Willmott, K. R., Hall, J. P. W.), 2, 4 Dec 1996, (W&H); km 10 San Lorenzo-Lita rd., Estación Experimental 'La Chiquita', [1°13'49"N, 78°45'57"W], 50 m, (Willmott, K. R., Hall, J. P. W.), 2,3 Dec 1996, (W&H), 3 Mar 2001, (W&H), 7 May 2000, (W&H); km 12.5 Lita-San Lorenzo rd., Río Chuchuví, [0°52'51"N, 78°30'54"W], 800–900 m, (Willmott, K. R., Hall, J. P. W.), 15,16,18 Jul 1999, (W&H); km 15 Lita-San Lorenzo rd., [0°53'52"N, 78°31'29"W], 800 m, (Willmott, K. R., Hall, J. P. W.), 6 May 2000, (W&H); km 16 Lita-San Lorenzo rd., Anchayacu, [0°53'13"N, 78°31'49"W], 950–1000 m, (Willmott, K. R.), 1 Jul 1998, (W&H); km 17 Lita-San Lorenzo rd., El Encanto, [0°53'35"N, 78°32'13"W], 850–900 m, (Willmott, K. R., Hall, J. P. W.), Jul, (W&H); km 18.5 San Mateo-Pto. Libre rd., Zapatta, [0°53'6"N, 79°32'25"W], 500 m, (Willmott, K. R., Hall, J. P. W.), 5,6 Mar 2001, (W&H); km 24 Lita-San Lorenzo rd., Finca Durán, [0°56'20"N, 78°33'30"W], 600 m, (Willmott, K. R.), 22, 24 Jul 1999, (W&H); km 40 Lita-San Lorenzo rd., El Durango, [1°2'27"N, 78°38'4"W], 300-400 m, (Willmott, K. R., Hall, J. P. W.), 8 May 2000, (W&H), Aug, (W&H), Jul, (W&H), Mar, (W&H); km 44 Lita-San Lorenzo rd., La Punta, [1°3'55"N, 78°39'W], 300 m, (Willmott, K. R., Hall, J. P. W.), 20,21,25 Aug 1996, (W&H); km 6 San Mateo-Pto. Libre rd., [0°53'13"N, 79°35'16"W], 350 m, (Willmott, K. R., Hall, J. P. W.), 6 Mar 2001, (W&H); Reserva Canandé Lodge, [0°31'16"N, 79°12'30"W], 420 m, (Willmott, K. R., Hall, J. P. W.), 30 Jul 2011, (W&H); Río Cachaví, km 20 Lita-San Lorenzo rd., 1 km W Alto Tambo, [0°54'44"N, 78°32'50"W], 700-750 m, (Hall, J. P. W.), 2 Mar 2001, (W&H); Río San Miguel, San Miguel, [0°45'N, 78°55'48"W], 100 m, (Willmott, K. R., Hall, J. P. W.), 9–11 Jun 1994, (W&H); San Lorenzo, [1°2'27"N, 78°38'4"W], 300 m, (Piñas, F.), 19 Jul 2003, 1 ♂/♀ [FDPR-18191], (FRPI) (DABD of FRPI); San Lorenzo-Lita rd., Tundaloma Lodge, [1°10'40"N, 78°44'54"W], 100 m, (Willmott, K. R., Hall, J. P. W.), 17–19 Jul 2011, (W&H); *Imbabura:* 37 km N Pedro Vicente Maldonado, Rumiñahui, [0°16'44"N, 78°59'54"W], 500 m,

(Willmott, K. R., Hall, J. P. W.), 9 Mar 2001, (W&H); c. 6 km E Lita, Cachaco, ridge to south, [0°48'47"N, 78°25'W], 1300 m, (Willmott, K. R.), 16,23 Jul 1999, (W&H); S of Santa Rita de Cachaco, S bank Río Verde, [0°44'38"N, 78°23'W], 1450 m, (Willmott, K. R.), 3 Aug 1999, (W&H); *Pichincha*: [Pedro Vicente] Maldonado, [0°4'53"N, 79°2'57"W], 1100 m, (Piñas, F.), 13 Jul 2001, 1 ♂/♀ [FDPR-16680], (FRPI) (DABD of FRPI); [Pedro Vicente] Maldonado, [0°4'53"N, 79°2'57"W], 710 m, (Piñas, F.), 15 May 2004, 1 ♂/♀ [FDPR-16651], (FRPI) (DABD of FRPI); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 800 m, (Covell, C. C.), 28 May 1996, 1 ♂/♀ [FDPR-18207], (FRPI), (Gil, J.), 14 Feb 2000, 1 ♂/♀ [FDPR-18179], (FRPI), (Piñas, F.), 1 Nov 1999, 1 ♂/♀ [FDPR-16633], (FRPI), 11 Aug 2000, 1 ♂/♀ [FDPR-18189], 1 ♂/♀ [FDPR-18212], (FRPI), 13 Dec 2002, 1 ♂/♀ [FDPR-16634], 1 ♂/♀ [FDPR-16636], 1 ♂/♀ [FDPR-16638], 1 ♂/♀ [FDPR-18149], 1 ♂/♀ [FDPR-18172], 1 ♂/♀ [FDPR-18174], (FRPI), 14 Feb 2000, 1 ♂/♀ [FDPR-18176], (FRPI), 15 Jun 1996, 1 ♂/♀ [FDPR-16640], 1 ♂/♀ [FDPR-18148], 1 ♂/♀ [FDPR-18150], 1 ♂/♀ [FDPR-18151], 1 ♂/♀ [FDPR-18152], 1 ♂/♀ [FDPR-18168], 1 ♂/♀ [FDPR-18201], 1 ♂/♀ [FDPR-18202], 1 ♂/♀ [FDPR-18203], 1 ♂/♀ [FDPR-18208], (FRPI), 18 Sep 1999, 1 ♂/♀ [FDPR-16683], (FRPI), 20 Mar 2001, 1 ♂/♀ [FDPR-18159], 1 ♂/♀ [FDPR-18200], (FRPI), 21 Aug 1999, 1 ♂/♀ [FDPR-18169], (FRPI), 25 Jul 2000, 1 ♂/♀ [FDPR-18164], (FRPI), 6 Sep 2000, 1 ♂/♀ [FDPR-16632], 1 ♂/♀ [FDPR-18155], 1 ♂/♀ [FDPR-18163], (FRPI), 6 Sep 2002, 1 ♂/♀ [FDPR-16642], (FRPI), 7 Oct 2001, 1 ♂/♀ [FDPR-16689], 1 ♂/♀ [FDPR-16695], 1 ♂/♀ [FDPR-18144], (FRPI), 8 Sep 2001, 1 ♂/♀ [FDPR-18130], 1 ♂/♀ [FDPR-18137], (FRPI) (DABD of FRPI); 12 km E Santo Domingo de los Colorados, [Hotel] Tinalandia, [0°18'S, 79°4'W], 80–800 m, (Piñas, F.), 15 Jun 1996, 1 ♂/♀ [FDPR-18192], (FRPI) (DABD of FRPI); Hotel Tinalandia, Río Tanti, [0°20'S, 79°0'30"W], 750–800 m, (Willmott, K. R., Hall, J. P. W.), 29 Jun 1993, (W&H), 8–14 May 1994, (W&H); La Esperie, [0°20'S, 78°58'W], 1205–1250 m, (Piñas, F.), 13 Jun 2001, 1 ♂/♀ [FDPR-16635], (FRPI) (DABD of FRPI); La Esperie, [0°20'S, 78°58'W], 1250 m, (Piñas, F.), 14 Oct 1999, 1 ♂/♀ [FDPR-18181], (FRPI), 30 Jun 2001, 1 ♂/♀ [FDPR-18153], 1 ♂/♀ [FDPR-18154], (FRPI), 4 Sep 1999, 1 ♂/♀ [FDPR-16639], (FRPI), 7 Feb 1998, 1 ♂/♀ [FDPR-16693], 1 ♂/♀ [FDPR-16706], 1 ♂/♀ [FDPR-16707], 1 ♂/♀ [FDPR-18213], (FRPI) (DABD of FRPI); Río Pilaton, Tandapi, [0°27'S, 78°46'W], 1550 m, (Willmott, K. R., Hall, J. P. W.), Aug, (W&H); Río Toachi, Alluriquín, [0°19'S, 78°59'45"W], 900 m, (Piñas, F.), 2 Sep 1999, 1 ♂/♀ [FDPR-18170], 1 ♂/♀ [FDPR-18206], (FRPI), 21 Sep 2000, 1 ♂/♀ [FDPR-18186], (FRPI), 29 Jul 2000, 1 ♂/♀ [FDPR-16686], (FRPI), Sep 1998, 1 ♂/♀ [FDPR-16678], (FRPI) (DABD of FRPI); San Miguel de Los Bancos, [0°1'24"N, 78°53'45"W], 1000 m, (Piñas, F.), 17 Nov 1995, 1 ♂/♀ [FDPR-16687], (FRPI) (DABD of FRPI); 'Toachi', [0°19'S, 78°57'W], 1100 m, (Piñas, F.), 1 Mar 2000, 1 ♂/♀ [FDPR-16701], (FRPI), 7 Oct 1995, 1 ♂/♀ [FDPR-16645], (FRPI) (DABD of FRPI); 'Toachi', [0°19'S, 78°57'W], 800 m, (Piñas, F.), 7 Oct 1997, 1 ♂/♀ [FDPR-16692], (FRPI) (DABD of FRPI).

Amiga arnaca sericeella

Specimens examined (46 ♂, 23 ♀): Guatemala: Alta Verapaz: ‘forests of N Vera Paz’, (Bates, H. W.), 1 ♀ [HT *sericeella*: ‘Godman-Salvin Coll. 1904-1. B.C.A. Lep. Rhop. Euptychia sericella, Bates.’//’B.M. TYPE No. Rh3131 Euptychia sericella, ♀ Bates.’//’Type. Sp. Figured.’//’Forests of N. Vara Paz F.D.G. & O.S.’//’Type H.T.’//’♀’], (NHMUK), (F. D. G. & O. S.), 1 ♀ [BMNH(E)#1267030], (NHMUK); Choctún, [15°40'N,90°25'W], (Godman, F. D., Salvin, O.), 1 ♀ [BMNH(E)#1420483], (NHMUK). **Honduras:** Copán: Copán Ruinas, [15°8'N,88°18'W], 1320 m, Mar 2006, 1 ♂ [FLMNH-MGCL-264632], (FLMNH), Mar 2006, (FLMNH). **Mexico:** Chiapas: Bombaná, (Wind, R.), 9-11 Oct 1973, 1 ♀ [FLMNH-MGCL-1036244], 1 ♀ [FLMNH-MGCL-1036246], (FLMNH); Campet, [16°58'N,93°15'W], (Wind, R.), 1969, 1 ♂ [FLMNH-MGCL-207911], (FLMNH); mountains above Escuintla, 610 m, (Wind, R.), 8 Sep 1974, 1 ♀ [FLMNH-MGCL-207912], (FLMNH); Mt. above San Quintín, (Wind, R.), 20–26 Nov 1973, 1 ♀ [FLMNH-MGCL-264079], (FLMNH), 26 Feb 1973, 1 ♂ [FLMNH-MGCL-207899], 1 ♂ [FLMNH-MGCL-207900], 1 ♂ [FLMNH-MGCL-207901], 1 ♂ [FLMNH-MGCL-207902], 1 ♂ [FLMNH-MGCL-207903], 1 ♂ [FLMNH-MGCL-207904], 1 ♂ [FLMNH-MGCL-207908], 1 ♂ [FLMNH-MGCL-207909], 1 ♀ [FLMNH-MGCL-207905], 1 ♀ [FLMNH-MGCL-207906], 1 ♀ [FLMNH-MGCL-207907], (FLMNH); Palestina, [16°30'43"N,91°45'56"W], 1400 m, 1 ♂ [FLMNH-MGCL-207910], (FLMNH); Pichucalco, [17°31'N,93°9'W], (Escalante, T.), 8 Sep 1974, 1 ♀ [FLMNH-MGCL-207913], (FLMNH); San Quintín, [16°24'N,91°20'W], (Wind, R.), 3 May 1973, 1 ♂ [FLMNH-MGCL-1036243], (FLMNH); Tapilula, [17°14'N,93°2'W], (Wind, R.), 14-15 Nov 1973, 1 ♀ [FLMNH-MGCL-264080; 30], (FLMNH); Oaxaca: Mpio. Comaltepec, Vista Hermosa, [17°41'N,96°25'W], 1000 m, (Díaz Francés, A.), Jul 1964, 1 ♂ [FLMNH-MGCL-207884], 1 ♂ [FLMNH-MGCL-207885], 1 ♂ [FLMNH-MGCL-207886], 1 ♂ [FLMNH-MGCL-207887], (FLMNH); Soyolapan el Bajo, [17°44'N,96°21'W], 183 m, (Ross, G. N.), 26 Aug 1961, 1 ♀ [FLMNH-MGCL-264077], (FLMNH), 9 Aug 1961, 1 ♀ [FLMNH-MGCL-264078], (FLMNH); Totontepec, [17°13'N,96°3'W], Jun 1945, 1 ♂ [FLMNH-MGCL-207895], (FLMNH); Tuxtepec, [18°6'N,96°7'W], (Díaz Francés, A.), Aug 1967, 1 ♂ [FLMNH-MGCL-207888], 1 ♂ [FLMNH-MGCL-207889], 1 ♂ [FLMNH-MGCL-207890], (FLMNH); Veracruz: Catemaco 8 mi SSE, 549 m, (Ross, G.N.), 16 Oct 1962, 1 ♂ [FLMNH-MGCL-295866; 3187], (FLMNH); Catemaco, [18°25'N,95°7'W], Jun 1959, 1 ♂ [FLMNH-MGCL-207894], (FLMNH), (Escalante, T.), Sept 1965, 1 ♀ [FLMNH-MGCL-1036247], (FLMNH); Los Tuxtlas, [18°27'N,95°10'W], 500 m, (Díaz Francés, A.), Jul 1971, 1 ♀ [FLMNH-MGCL-207898], (FLMNH); Presidio, [18°41'N,96°45'W], Sep 1914, 1 ♂, (ZSM), (Escalante, T.), Jul 1950, 1 ♀ [FLMNH-MGCL-207896], (FLMNH), Jun 1947, 1 ♂ [FLMNH-MGCL-207893], (FLMNH), Jun 1951, 1 ♀ [FLMNH-MGCL-207897], (FLMNH), Jun 1955, 1 ♂ [FLMNH-MGCL-207891], (FLMNH), Jun 1956, 1 ♂ [FLMNH-MGCL-207892], (FLMNH), (Lau, A. B.), 15 Jun 1966, 1 ♂, (BME); Presidio, [18°41'N,96°45'W], 900

m, (Welling, E. C.), 11 Jul 1975, 1 ♂ [FLMNH-MGCL-207883], (FLMNH); Veracruz, [19°12'N, 96°8'W], (Ross, G. N.), 13 Apr 1965, 1 ♂ [FLMNH-MGCL-264085; 5126], (FLMNH), 16 Oct 1962, 1 ♂ [FLMNH-MGCL-264066; 3189], 1 ♂ [FLMNH-MGCL-264082; 3188], 1 ♂ [FLMNH-MGCL-264083; 3190], (FLMNH), 18 Oct 1962, 1 ♂ [FLMNH-MGCL-264073; 3221], 1 ♂ [FLMNH-MGCL-264074; 3222], 1 ♂ [FLMNH-MGCL-264081; 3223], (FLMNH), 21 Jun 1963, 1 ♂ [FLMNH-MGCL-264084; 4040], (FLMNH), 24 Oct 1962, 1 ♂ [FLMNH-MGCL-264086; 3376], (FLMNH), 24 Sep 1962, 1 ♂ [FLMNH-MGCL-264071; 2955], 1 ♂ [FLMNH-MGCL-264072; 2956], (FLMNH), 27 Sep 1962, 1 ♂ [FLMNH-MGCL-264067; 3026], (FLMNH), 29 Sep 1962, 1 ♂ [FLMNH-MGCL-264068; 3024], 1 ♂ [FLMNH-MGCL-264069; 3025], 1 ♂ [FLMNH-MGCL-264070; 3027], 1 ♀ [FLMNH-MGCL-264075; 3028], 1 ♀ [FLMNH-MGCL-264076; 3029], (FLMNH); *Not located*: 'Mexico', 1 ♂, (ZSM). **Country unknown**: *Not located*: no data, 1 ♂ [BMNH(E)#1420484], (NHMUK).

***Amiga arnaca*, subspecies not recorded at time of data entry**

Specimens examined (35 ♂, 6 ♀): Honduras: *Not located*: 'Honduras' – (error), 1 ♂ [BMNH(E)#1498781], 1 ♀ [BMNH(E)#1498951], (NHMUK). **Colombia**: *Cundinamarca*: 'Bogotá', [4°35'N, 74°4'W], 2600–2900 m, 1 ♂ [BMNH(E)#1420037; 'Reçu du Frère Apollinaire-Marie de Bogotá'], 1 ♂ [BMNH(E)#1498799], 1 ♂ [BMNH(E)#1498800], 1 ♂ [BMNH(E)#1498801], 1 ♂ [BMNH(E)#1498802], 1 ♂ [BMNH(E)#1498803], 1 ♂ [BMNH(E)#1498804], 1 ♂ [BMNH(E)#1498805], 1 ♂ [BMNH(E)#1498806], 1 ♂ [BMNH(E)#1498807], 1 ♂ [BMNH(E)#1498808], 1 ♂ [BMNH(E)#1498809], 1 ♂ [BMNH(E)#1498810], 1 ♂ [BMNH(E)#1498811], 1 ♂ [BMNH(E)#1498812], 1 ♂ [BMNH(E)#1498813], 1 ♂ [BMNH(E)#1498814], 1 ♂ [BMNH(E)#1498815], 1 ♂ [BMNH(E)#1498818], 1 ♂ [BMNH(E)#1498819], 1 ♂ [BMNH(E)#1498820], (NHMUK); *Not located*: 'Colombia', 1 ♂ [BMNH(E)#1420042], 1 ♂ [BMNH(E)#1498839], 1 ♂ [BMNH(E)#1498966], 1 ♀ [BMNH(E)#1498817], (NHMUK). **Ecuador**: *Not located*: 'Ecuador', 1 ♂ [BMNH(E)#1420062], 1 ♂ [BMNH(E)#1420063], 1 ♂ [BMNH(E)#1420064], 1 ♀ [BMNH(E)#1420194], (NHMUK). **Venezuela**: *Not located*: 'Venezuela', 1 ♂ [BMNH(E)#1420071], 1 ♂ [BMNH(E)#1420072], 1 ♂ [BMNH(E)#1498902], 1 ♀ [BMNH(E)#1420073], 1 ♀ [BMNH(E)#1420074], (NHMUK), (Dyson), 1 ♂ [BMNH(E)#1420069], 1 ♂ [BMNH(E)#1420070], (NHMUK). **Country unknown**: *Not located*: no data, 1 ♂ [FLMNH-MGCL-263105], 1 ♂ [FLMNH-MGCL-263123], (FLMNH).

Supplementary material I

Results of maximum likelihood analysis based on each individual dataset of anchored hybrid enrichment and four genes (COI, EF1a, RPS5, GAPDH)

Authors: Shinichi Nakahara, Gerardo Lamas, Stephanie Tyler, Mario Alejandro Marín, Blanca Huertas, Keith R. Willmott, Olaf H. H. Mielke, Marianne Espeland

Data type: statistical data

Explanation note: Support values indicate ultrafast bootstrap.

Copyright notice: This dataset is made available under the Open Database License (<http://opendatacommons.org/licenses/odbl/1.0/>). The Open Database License (ODbL) is a license agreement intended to allow users to freely share, modify, and use this Dataset while maintaining this same freedom for others, provided that the original source and author(s) are credited.

Link: <https://doi.org/10.3897/zookeys.821.31782.suppl1>