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IN COLOMBIA AND A NEW RELATED GENUS FROM BRAZIL AND
BOLIVIA (ARANEAE: THERAPHOSIDAE)**

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Spot the difference: on the genus *Hapalopus* Ausserer, 1875 in Colombia and a new related genus from Brazil and Bolivia (Araneae: Theraphosidae)

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ABSTRACT

An incongruence in palpal bulb and spermathecal morphologies between groupings of species of the genus *Hapalopus* Ausserer, 1875 has persisted for some time. We redefine *Hapalopus* based on examination of the holotype male of the type species, *Hapalopus formosus* Ausserer, 1875, housed in the Naturhistorisches Museum Wien. Three new species of *Hapalopus* are described from Colombia: *H. guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.**, *H. platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.**, and *H. vangoghi* Osorio, Benavides, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** The new genus *Notahapalopus* Sherwood, Gabriel, Peñaherrera-R., Osorio, Benavides, Hörweg, Brescovit & Lucas **gen. nov.** is described to house *Notahapalopus aymara* (Perdomo, Panzera & Pérez-Miles, 2009) **comb. nov.** (type species), *Notahapalopus gasci* (Maréchal, 1996) **comb. nov.**, *N. parauapebas* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.**, and *N. serrapelada* (Fonseca-Ferreira, Zampaulo & Guadanucci, 2017) **comb. nov.** Discussion on the biogeography of *Hapalopus* and *Notahapalopus* **gen. nov.** is also provided. *Hapalopus lesleyae* Gabriel, 2011 is transferred to *Jambu* Miglio, Perafán & Pérez-Miles, 2024 based on palpal bulb morphology, giving the new combination *Jambu lesleyae* **comb. nov.**

Key words: biogeography, morphology, spider, tarantula, taxonomy.

INTRODUCTION

Ausserer (1875) established the genus *Hapalopus* Ausserer, 1875 to house an adult male specimen from Colombia, with a yellow-spotted abdominal pattern which he named *Hapalopus formosus* Ausserer, 1875 (Fig. 1A). The abdominal pattern is described as consisting of bright yellow spots on the lateral faces, a broken longitudinal band on the dorsal face, and a black band on the ventral abdomen. Four years later, Karsch (1879) described the enigmatic species *Typhochlaena magdalena* Karsch, 1879, which was also described as

having four yellow spots on the lateral face of the abdomen. Simon (1892) synonymised *Typhochlaena* C. L. Koch, 1850 with *Avicularia* Lamarck, 1818, which by consequence transferred *T. magdalena* to *Avicularia*.

Simon (1903: 929) restored *Hapalopus* and its type species *H. formosus*, transferring the Guatemalan *Hapalopus pentaloris* (Simon, 1888) from *Cyclosternum*. Simon (1903: figs. 1080–1081) included two figures of *H. formosus* – a palpal bulb attached to the palp in ventral view, and the tibial apophysis of leg I in ventral view (Fig. 1B). Furthermore, he transferred several other species he had once regarded as belonging in his *Hapalopus sensu lato* (see Simon, 1887, 1888, 1889) into new genera described in the same work, i.e. *Cyriocosmus* Simon, 1903 and *Hemiergus* Simon, 1903, or in one case for an African species, *Cyclosternum africanus* (Simon, 1887), to the genus *Selenogyrus* Pocock, 1897.

Schenkel (1953) provides a description and illustrations of the palpal bulb and tibial apophysis of a red-orange spotted male from Venezuela, determined as *H. formosus* (Fig. 1C). However, we suspect this is a misidentification and that it may instead refer to the Venezuelan species *H. nigriventris* (see below). Gerschman & Schiapelli (1973) provide excellent illustrations of the male palpal bulb, tibial apophysis, palp (tibia and cymbium), and the female spermathecae and ocular tubercle (Fig. 1D) of specimens determined as *H. formosus* in the Muséum national d'Histoire naturelle, Paris, thereby the first authors to assign any known female to this taxon. These specimens were collected from Santa Marta, the type locality of *H. magdalena*.

Schmidt (1986, 1993, 1997) reproduced the palpal bulb and tibial apophysis illustrations from Simon (1903) and that of the spermathecae from Gerschman & Schiapelli (1973). Smith (1986, 1987) also reproduced the drawings from Simon (1903) but without the figure of the spermathecae. Schmidt (1995) analysed the original description of Karsch (1879) and directly examined the holotype of *A. magdalena*, synonymising it with *H. formosus* based on the morphology of the tibial apophysis and its abdominal pattern. He suggests that the incongruence of this species existing in the genus *Avicularia* for so long was a combination of the supposed ‘reverence’ of Simon by other arachnologists, and their poor understanding of Latin. For completeness, it is prudent to note *Typhochlaena* would later be revalidated by Bertani (2012) and remains a valid genus today.

Pérez-Miles *et al.* (1996: 49, fig. 22) included a prolateral view of the palpal bulb of the holotype of *H. formosus*, using this species as a comparison during their cladistic analysis. Use of previously-published genitalic figures of *H. formosus* to compare against other theraphosines was continued by Vol (1999, 2001), Schmidt (2003), and Pérez-Miles (2020).

Meanwhile, the taxonomic history of other species presently placed in *Hapalopus* is more complex. Mello-Leitão (1939) described *Cyriocosmus nigriventis* Mello-Leitão, 1939 (Fig. 1E) based on a red-spotted female from Falcón, Venezuela. A slightly smaller second specimen, also thought to be female, was later examined by Gabriel (2016) and found to be an immature male; inspection of the palpal tarsus showed the male was not nearing maturity so both specimens can effectively be regarded as immature (Gabriel, 2016).

Caporiacco (1955) described *Hapalopus triseratus* Caporiacco, 1955 also based on a female with a golden-spotted abdomen pattern from Mérida, Venezuela. In the same work, he also described *Proshapalopus variegatus* Caporiacco, 1955 also based only on a female from Venezuela but being much larger, with a different abdominal pattern, and from the distant locality of Santa Ana (situated on the Península de Paraguaná, Falcón State).

Valerio (1982) described *Metriopelma colorata* Valerio, 1982, which is an orange-red spotted species, based on the female from Río Cupé, Darién, Panama (for detailed discussion of abdominal pattern colours in theraphosines, see Gabriel, 2016, 2020; Gabriel & Sherwood, 2019, 2022).

Metriopelma was synonymised, with very weak justification, with *Crypsidromus* Ausserer, 1871 by Raven (1985). Pérez-Miles *et al.* (1996: 52) synonymised *Crypsidromus* with *Lasiadora*, which transferred many other species, including *M. colorata*, indirectly to *Lasiadora* C. L. Koch, 1850. This placement was refuted one page later by Pérez-Miles *et al.* (1996: 53) who restored this species to *Metriopelma*. In the same year, Maréchal (1996) described the barychelid *Psalistops gasci* Maréchal, 1996 from French Guiana based on the female.

Huber, Samm & Schmidt (1996) and Rudloff (1997) considered *P. variegatus* a *nomen dubium*, although later workers seemingly did not follow this proposal. Pérez-Miles (1998) revised *Cyriocosmus* Simon, 1903, describing *C. butantan* Pérez-Miles, 1998 from Brazil based on the male, and transferring *C. nigriventris* to the genus *Metriopelma* (as *Metriopelma nigriventris*), indicating he didn't think these two species were congeneric.

Bertani (2001) transferred *P. variegatus* to *Metriopelma* based on characters found in contemporaneous female congeners of the genus *Metriopelma*, namely: the absence of Type I urticating setae, absence of a retrolateral pad of scopula on femur IV, and the fused spermathecae. However, the transfer was thus not based on comparison against the type species, known only from the male. None of the species with the female described which were placed in *Metriopelma* during the time of Bertani's work remained in this genus after the work of Gabriel (2016). A second revision of *Cyriocosmus* was produced by Fukushima *et al.* (2005) in which *C. butantan* was transferred to *Hapalopus* after extensive discussion about the position of the embolus and 'paraembolic' apophysis, and with the first description of the female. Those authors also transferred *M. nigriventris* to *Hapalopus*.

Perdomo *et al.* (2009) described a striking new species of *Hapalopus* from Bolivia, *H. aymara* Perdomo, Panzera & Pérez-Miles (2009), based on both sexes. Shortly after, Gabriel (2011) described a new species, *Hapalopus lesleyae* Gabriel, 2011, based on a male from Guyana.

Gabriel (2016) extensively revised the genera *Davus* O. Pickard-Cambridge, 1892, *Metriopelma*, and *Schizopelma* F. O. Pickard-Cambridge, 1897 which consequently resulted in transfers for the species misplaced in *Metriopelma* – *M. coloratus* and *M. variegatus* were transferred to *Hapalopus* based on abdominal patterning, geographical distribution, and spermathecal morphology. Gabriel (2016: 79) also stated that: "The abdominal pattern of *H. nigriventris* may indicate a possible intermediate form between *Davus* and *Hapalopus*, or a possible intermediary genus", showing the abdominal pattern of *H. nigriventris* consisted of broken stripes, not spots as in other *Hapalopus sensu stricto* or as stated in the original description. Gabriel (2016) also suggested that *H. nigriventris* may be synonymous with *H. variegatus* but made no synonymy as the holotype of the latter was not available. He also clarified *Metriopelma* Becker, 1878 was a Mexican endemic genus containing only *M. breyeri* (Becker, 1878). The type species is known only from the male, and both an abdominal pattern and tibial apophysis are absent. Thus, *Metriopelma sensu stricto* was shown to be distinctly different from the other genera discussed in the present work and many of the species previously transferred to it (e.g. Valerio, 1982; Pérez-Miles *et al.*, 1996; Bertani, 2001) were misplaced.

Fonseca-Ferreira *et al.* (2017) tentatively recorded *H. aymara* from Brazil based on the female and described a new species from both sexes, *H. serrapelada* Fonseca-Ferreira, Zampaulo & Guadanucci, 2017. Mori & Bertani (2020) transferred the ‘barychelid’ *P. gasci* to *Hapalopus* based on the spermathecal morphology and presence of urticating setae. Gabriel & Sherwood (2022) redescribed the holotype female of *H. coloratus* and discussed its distribution and variation in colouration. López Aguilar & Bedoya Roqueme (2022) reported *Hapalopus* sp. from Honduras, but without species-level identification, their work instead focusing more on cannibalism observed in this population. Most recently, Miglio *et al.* (2024) described *Jambu* Miglio, Perafán & Pérez-Miles, 2024, transferring *H. butantan* to this genus and describing two new species.

In this work, we reevaluate several species currently housed in *Hapalopus*, also providing a re-diagnosis of *Hapalopus sensu stricto* and a redescription of the holotype male of *H. formosus*. Furthermore, recent examination of material from Colombia revealed three new species of *Hapalopus* which are also described here. The subsequent re-diagnosis of *Hapalopus* makes it clear several current species are misplaced, and we accordingly describe one new genus for these, and transfer one additional species to *Jambu*. Finally, the first insights into the biogeography of *Hapalopus* and *Notahapalopus* **gen. nov.** are provided.

MATERIALS AND METHODS

Specimens were examined under binocular microscopes. Photographs of palpal bulbs, tibial apophyses, and spermathecae were made using a Leica M125C or a Leica S8APO stereomicroscope, auto-montaged using Leica Application Suite version 4.6.0. Description style follows Sherwood *et al.* (2020). Coloration patterns are described from specimens preserved in 70–80% ethanol. Spermathecae dissected by LMO were treated with 10% KOH to remove excess soft tissue, those by DS and RG were cleared manually with micro-pins. Abbreviations, Repositories of material examined: AMNH = American Museum of Natural History, New York, United States; BMNH = Natural History Museum, London, United Kingdom; CAUA = Colección de Artrópodos de la Universidad del Atlántico, Barranquilla, Colombia; FCE-MY = Colección Aracnología, Sección Entomología, Facultad de Ciencias, Montevideo, Uruguay; IBSP = Instituto Butantan, São Paulo, Brazil; MCZ = Museum of Comparative Zoology, Harvard University, Cambridge, United States; MIUP = Museo de Invertebrados G. B. Fairchild, Universidad de Panama, Panama City, Panama; MNHN = Muséum national d'Histoire naturelle, Paris, France; NHMW = Naturhistorisches Museum Wien, Vienna, Austria; OUMNH = Oxford University Museum of Natural History, Oxford, England; ZMB = Museum für Naturkunde, Berlin, Germany. Type material of the new species are deposited in AMNH (*H. platnicki* **sp. nov.**), CAUA (*H. guerreroi* **sp. nov.** and *H. vangoghi* **sp. nov.**), and IBSP (*N. serrapelada* **sp. nov.**) respectively. Structures: ALE = anterior lateral eyes, AME = anterior median eyes, PLE = posterior lateral eyes, PME = posterior median eyes; PB = prolateral branch (of tibial apophysis), RB = retrolateral branch (of tibial apophysis). Other: coll. = collector; colln. = collection; det. = determined by. Leg spine terminology follows Petrunkevitch (1925) with the modifications proposed by Bertani (2001): d = dorsal, v = ventral, r = retrolateral, p = prolateral. Palpal bulb terminology follows Bertani (2000) with modifications for the retrolateral keel: A = apical keel, Em = embolus, PA = paraembolic apophysis, PI = prolateral inferior keel, PS = prolateral superior keel, RS = retrolateral superior keel, SA = subapical keel, TA = tegular apophysis, TH = tegular heel; with the additions proposed by Gabriel & Sherwood (2020): ER = embolic ridge, PR = prolateral ridge, PAR = prolateral apical ridge, PC = prolateral crease; and the updated definition of prolateral accessory central keel(s) (PACK) and prolateral accessory inferior keel (PAIK) given by Peñaherrera-R. *et al.* (2024), modified from Ferretti *et al.*

(2023). Leg formulae start with the longest leg to the shortest in order of decreasing size, e.g. 4,1,2,3. Urticating setae terminology follows Cooke, Roth & Miller (1972). All measurements are in mm.

Two new morphological terms are introduced. **Metatarsal pit(s)** are one or two depressions which we discovered on the ventral metatarsus I of *Hapalopus* males, the shape and size of the pit(s) have probable taxonomic significance. A **keelar apophysis** is the embolic projection found on either a prolateral or subapical keel, previously confused by earlier authors with the paraembolic apophysis (see Discussion).

Biogeographic classification follows Morrone *et al.* (2022). Maps were made using ArcGIS and then edited into compound figures using Photoshop version 23.5. The type localities, for the maps, of the previously known species of *Hapalopus* were obtained from the original descriptions of Ausserer (1875), Mello-Leitão (1939), Valerio (1982), Caporiacco (1995), Maréchal (1996), Perdomo *et al.* (2009), and Fonseca-Ferreira *et al.* (2017), respectively. Additional records of *H. coloratus* were obtained from Gabriel & Sherwood (2022) and geographical coordinates obtained from Corro-Chang & Cambra (2011). Georeferences of inexact localities were made using Google Earth. We used information in Mori & Bertani (2020) for the type locality of *Notahapalopus gasci* **comb. nov.** Ambiguous localities (e.g. Bogotá, in actuality merely the place of export for the type species) were only represented on the map with a general marker with a question mark. The position of stars with question marks thus do not indicate exacting point records.

TAXONOMY

Hapalopus Ausserer, 1875

Hapalopus Ausserer, 1875: 175.

Typhochlaena: Karsch (1879) (in part).

Avicularia: Simon (1892) (in part).

Cyriocosmus: Mello-Leitão (1939) (in part).

Proshapalopus: Caporiacco (1955) (in part).

Metriopelma: Valerio (1982), Pérez-Miles *et al.*, (1996), Bertani (2001) (in part).

Crypsidromus: Raven (1985) (in part).

Lasiadora: Pérez-Miles *et al.* (1996) (in part).

Hapalopus: Fukushina *et al.* (2005), Perdomo *et al.* (2009), Fonseca-Ferreira *et al.* (2017) (misidentifications).

Hapalopus: Simon (1903), Schenkel (1953), Caporiacco (1955), Schmidt (1986, 1993, 1997), Smith (1986, 1987), Pérez-Miles *et al.* (1996), Vol (1999, 2001), Schmidt (2003), Gabriel (2016), Pérez-Miles (2020), Gabriel & Sherwood (2022), López Aguilar & Bedoya Roqueme (2022).

Type species: *Hapalopus formosus* Ausserer, 1875 by monotypy.

Diagnosis: Males of *Hapalopus* can be distinguished from those of other theraphosine genera by the following combination of characters: (1) one or two main prolateral keels without a keelar apophysis but with strong distal torsion; (2) prolateral superior keel (if present) short but almost retrolaterally positioned; (3) subapical keel with a short keelar apophysis extended towards the apex, creating a ring-shaped keel; (4) the presence of a single (most species) or two (*H. platnicki* **sp. nov.**) apically-situated prolateral accessory inferior keels, enlarged, with basal to medial crest; (5) presence of a spotted pattern on the lateral, dorsal, and/or ventral faces of the abdomen (often also with lines dorsally, some species also with intermittent

speckling laterally); (6) presence of an elongate (at least as twice as long as wide) retrolateral cymbial apophysis, and (7) presence of one or two metatarsal pits (metatarsal pits absent in all other known theraphosine genera). Further distinguished, in females, from the closely related *Notahapalopus* **gen. nov.** by the rounded spermathecal receptacle (Y-shaped in *Notahapalopus* **gen. nov.**) and by the presence of a spotted abdominal pattern (absent in *Notahapalopus* **gen. nov.**). Additionally, females of *Hapalopus* somewhat resemble those of *Davus*, *Bonnetina*, *Magnacarina*, and *Schizopelma* by the single, domed and hypersclerotised spermathecal receptacle; however they can be distinguished by the elongated bursa copulatrix (vs. short or almost inconspicuous bursa copulatrix in those four genera).

Distribution: Colombia, Honduras, Panama, Venezuela (Figs. 17–19).

Remarks: It is possible that the misidentified male in Schenkel (1953) is the undescribed male of *H. nigriventris*, based on the description of the abdominal pattern (see Gabriel, 2016) and close proximity of the respective localities (Figs. 17–19). Schenkel (1953) describes the abdomen pattern, translated here from the original German, as: “[a] row of six similarly coloured, somewhat transverse spots, which become smaller towards the back”. This is similar to the illustration of *H. nigriventris* depicted by Gabriel (2016: figs. 67–68) as opposed to the four, round, lateral spots described for the Colombian *H. formosus*. However, we have not yet been able to examine Schenkel’s specimen, although arrangements are currently being made to hopefully include it in a future work. Nonetheless, we are confident he was not describing a specimen of *H. formosus*.

We have made several attempts over five years to gain access to the holotypes of *H. triseratus* and *H. variegatus*, housed in the Universidad Central de Venezuela, but have been unable to examine them at the time of writing. Berdondini & Whitman (2003) state that a supposedly juvenile female paratype of *H. triseratus* is deposited in Museo di Storia Naturale di Firenze “La Specola”. Unfortunately, attempts to examine this specimen have also been unsuccessful. Without examining the specimen, it is impossible to tell if it is a juvenile female or simply that this species is sexually mature at a (comparatively) small size. Given both species are disjunct from all those treated here, including within different ecosystems, altitudinal ranges and biogeographical provinces (*sensu* Morrone *et al.* 2022) we rule them out as being conspecific with any taxa described here. As herein demonstrated, *Hapalopus* is diverse in sympatry in a relatively small sampled area of Colombia. The localities for the two species in Venezuela are from even more different ecoregions and general habitat than those of the species discussed in this work. Furthermore, it is possible *H. variegatus* is synonymous with *H. nigriventris* (see above), a morphospecies which is delineated in this work from all other species where females are known.

Species included: *H. coloratus*, *H. guerreroi* **sp. nov.**, *H. nigriventris*, *H. formosus*, *H. platnicki* **sp. nov.**, *H. triseriatus*, *H. vangoghi* **sp. nov.**, and *H. variegatus*.

***Hapalopus formosus* Ausserer, 1875 (Figs. 1A–B, D, 2–6)**

Hapalopus formosus Ausserer, 1875: 175, pl. 6, figs. 17–18.

Typhochlaena magdalena Karsch, 1879: 106.

Avicularia magdalanae: Simon (1892): 171.

Hapalopus formosus: Simon (1903): 929, figs. 1080–1081.

Hapalopus formosus: Schenkel (1953): 1, figs. 1a–c (likely misidentification).

Hapalopus formosus: Gerschman & Schiapelli (1973): 71, figs. 79–84.

Hapalopus formosus: Schmidt (1986): 41, figs. 9–10.

Hapalopus formosus: Smith (1986): 84, fig. 41h.
Hapalopus formosus: Smith (1987): 84, fig. 41h.
Hapalopus formosus: Schmidt (1993): 66, fig. 98–100.
Hapalopus formosus: Schmidt (1995): 11 (synonymy of *A. magdalena*).
Hapalopus formosus: Pérez-Miles *et al.* (1996): 48, fig. 22.
Hapalopus formosus: Schmidt (1997): 18, figs. 135–137.
Hapalopus formosus: Vol (1999): 11, fig. J.
Hapalopus formosus: Vol (2001): 7, figs. 12.
Hapalopus formosus: Schmidt (2003): 132, figs. 164–166.
Hapalopus formosus: Pérez-Miles (2020): 8, fig. 1.8c

Type material: Holotype ♂ *Hapalopus formosus* (NHMW 112), Bogotá, Colombia, 1872, coll. Nolken, acquisition number 1873.1.19, examined; holotype ♂ *Typhochlaena magdalena* (ZMB 2570), Santa Marta, Magdalena, Colombia, coll. Tetens, examined.

Diagnosis: Males of *H. formosus* (Figs. 3A–L, 4A–D, 5A–E) can be distinguished from those of *H. guerreroi* **sp. nov.** by the presence of a PS, a single apical keel, two metatarsal pits, and the developed keelar apophysis on the subapical keel (PS absent, two apical keels, one metatarsal pit, and a weakly developed keelar apophysis on the subapical keel present in *H. guerreroi* **sp. nov.** cf. Figs. 7A–E, 8A–E) and the absence on the abdominal pattern of triangular margins to the dorso-lateral lines (present in *H. guerreroi* **sp. nov.**, cf. Figs. 7J–L). It differs from *H. platnicki* **sp. nov.** by the presence of a single PAIK (two PAIK in *H. platnicki* **sp. nov.** cf. Figs. 10A–E), the anterior two lateral spots triangular-shaped (anterior two lateral spots rounded and not triangular-shaped in *H. platnicki* **sp. nov.** cf. Figs. 10J–L), and the comparatively smaller lateral spots overall. Further distinguished from males of all other known congeners by the well-developed (Fig. 3I) cymbial apophysis (developed in *H. guerreroi* **sp. nov.** and *H. platnicki* **sp. nov.**, cf. Figs. 7I, 10I). Females (Figs. 6A–F) can be distinguished from those of *H. guerreroi* **sp. nov.**, *H. nigriventris*, and *H. vangoghi* **sp. nov.** by the semicircular spermathecal receptacle (spermathecae T-shaped in *H. guerreroi* **sp. nov.**, circular in *H. nigriventris* and *H. vangoghi* **sp. nov.**, cf. Figs. 9E–F, 13E–F, Gabriel, 2016). It also differs from *H. coloratus* by the much more apically rounded anterior edge of the receptacle (almost straight in *H. coloratus*, cf. Gabriel & Sherwood, 2022), and from *H. platnicki* **sp. nov.** by the anterior edge of the spermathecae rounded (asymmetrical in *H. platnicki* **sp. nov.**, cf. Fig. 12F) and the abdominal patterning differences (cf. Figs. 12C–E) discussed above in the differentiation of males. Females are additionally distinguished from *H. guerreroi* **sp. nov.** and *H. vangoghi* **sp. nov.** by the dorso-lateral abdominal pattern consisting only of spots (lines also present alongside spots dorso-laterally in *H. guerreroi* **sp. nov.** and *H. vangoghi* **sp. nov.**, cf. Figs. 9B–D, 13B–D).

Redescription of holotype male (NHMW 112): Total length including chelicerae: 22.5. Carapace: length 9.7, width 8.3. Caput: slightly raised. Ocular tubercle: raised, length 1.2, width 1.7. Eyes: AME > ALE, ALE > PLE, PLE > PME, anterior eye row procurved, posterior row slightly recurved. Clypeus: narrow; clypeal fringe: long. Fovea: shallow, slightly recurved. Chelicera: length 3.9, width 2.0. Abdomen: length 8.9, width 2.9. Maxilla with 100–120 cuspules covering approximately 60% of the proximal edge. Labium: length 0.8, width 1.1, with 40–50 cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 3.5, width 2.8, with three pairs of sigillae. Tarsus I fully scopulate, tarsus II divided by line of setae, tarsi III–IV divided by band of setae. Metatarsal scopulae: I 59%; II 93%; III 33%; IV ascopulate. Lengths of legs and palpal segments: see table 1, legs 4,1,2,3. Spination: femur I d 0–0–1, II d 0–0–1, III d 0–

0–2, IV d 0–0–1, palp d 0–0–1, tibia I d 1–1–0, v 0–3–0, II d 1–1–0, v 3–3–2, III d 2–0–2, v 3–2–2, IV d 2–0–2, v 3–4–3, palp r 0–0–5, metatarsus I v 0–0–1 (apical), II v 3–0–1 (apical), III d 1–2–2, IV 4–2–3 (apical), IV d 1–2–3, v 3–3–5 (3 apical). Tibia I with paired tibial apophysis, RB longer than PB, PB with large megaspine prolaterally (Figs. 3F–H). Femur III: incrassate. Palpal tibia: slightly incrassate, with comb of spines retrolaterally. Palpal cymbium with well-developed, elongate, retrolateral apophysis (Fig. 3I). Metatarsus I: strongly curved (Fig. 3H), closes on apex of PB and against prolateral face of RB, two metatarsal pits present. Posterior lateral spinnerets with three segments, basal 1.0, median 0.8, digitiform apical 1.6. Posterior median spinnerets with one segment. Palpal bulb with TH developed; embolus short and thick, tapering sharply only in apical quarter; PS, PI, A, and SA developed, PAIK well-developed, developed keelar apophysis present on SA, a single PAIK present; ER, PR, and PAR absent, PC present, constricted in apical half (Figs. 3A–E). Urticating setae: Type III present dorsally. Colour: alcohol preserved brown; abdomen totally abraded; original pattern uninterpretable (Figs. 3J–L).

Table 1: *Hapalopus formosus* Ausserer, 1875 holotype male (NHMW 112), leg and palp lengths.

	I	II	III	IV	Palp
Femur	8.0	7.2	6.0	8.2	4.7
Patella	4.2	4.0	3.3	3.6	2.7
Tibia	6.3	5.2	4.5	6.7	4.3
Metatarsus	5.3	5.2	5.7	8.7	–
Tarsus	3.7	3.0	3.3	4.2	1.2
Total	27.5	24.6	22.8	31.4	12.9

Closure of tibial apophysis against metatarsus, detail of metatarsal pits, and colouration of non-type male (CAUA_Ara0054): Given the fragility of the holotype, these characters are described here in greater detail based on a recently collected non-type male. Metatarsus I: strongly curved, closing on apex of PB and against prolateral face of RB, with two metatarsal pits present (Figs. 5A–E). Colour: carapace dark brown, clothed medially with yellow setae, some arranged in partial striae, cephalic area behind caput with dense arrangement of yellow setae, tapering towards fovea; abdomen with three blood-orange dorso-medial spots, medial spot largest, proximal spot smallest, distal spot partially blended with urticating patch; lateral face with five spot, distal-most three spots with line connecting downwards towards ventral face; ventral face with three pairs of blood-orange spots on an otherwise dark brown surface, proximal pair covering book lungs, distal pair situated laterally either side of spinnerets, all three pairs partially viewable also in lateral view (Figs. 4A–D).

Description of non-type female (CAUA_Ara0054): Total length including chelicerae: 28.1. Carapace: length 10.5, width 9.6. Caput: raised. Ocular tubercle: raised, length 1.1, width 1.7. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior row slightly procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, procurved. Chelicera: length 4.2, width 2.5. Abdomen: length 13.4, width 8.4. Maxilla with 120–150 cuspules, covering approximately 60% of proximal edge. Labium: length 1.3, width 2.0, with 50–60 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 4.8, width 4.4, with three pairs of sigillae. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 60%; II 60%; III 50%; IV 20%. Lengths of leg and palpal segments: see table 2, legs 4,1,2,3. Spination: femur II d 0–0–1, palp d 0–0–1, tibia I v 0–1–0, II v 0–0–1 (apical), III p 1–1–0, r 1–0–0, v 0–1–2 (apical), IV p 1–0–1, r 1–0–1, v 0–1–3 (2 apical), palp v 0–1–3 (apical), metatarsus I v 1–0–1 (apical), II v 1–0–1, III p 1–1–1, r 0–1–1, v 2–2–4 (3 apical), IV p 0–2–1, r 0–2–1, v 2–2–4 (3 apical). Posterior lateral spinnerets with three segments: basal 1.7, medial 1.4, digitiform apical 2.0. Posterior median spinnerets with one segment. Spermathecae: with a single semicircular, protruding, and hypersclerotised

receptacle, situated on a short but wide bursa copulatrix, with apical sclerotization, anterior edge of receptacle well-rounded (Figs. 6E–F). Urticating setae: Type III present dorsally. Colour: as in male (Figs. 6A–D).

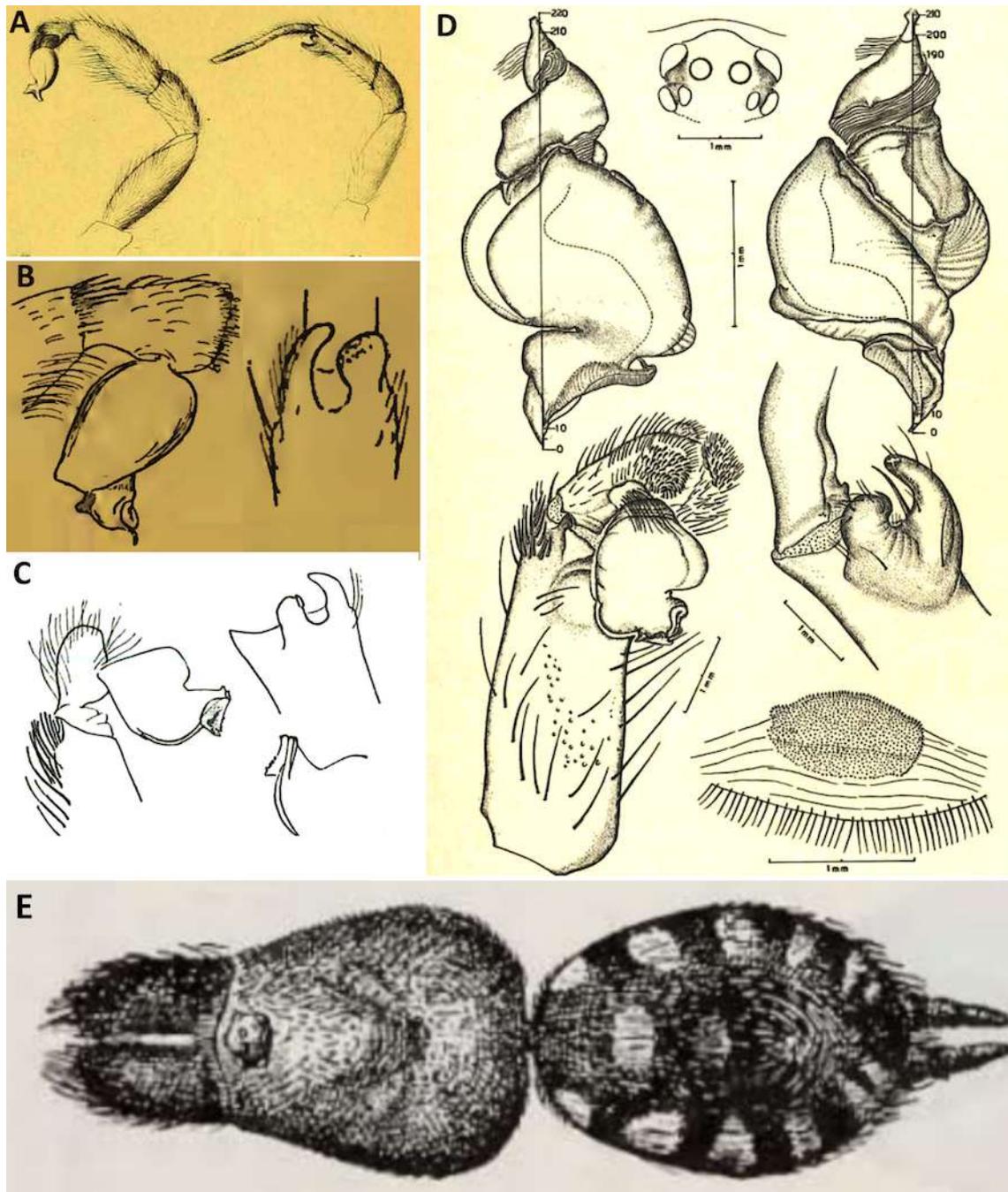


Fig. 1: Illustrations of *Hapalopus* Ausserer, 1875 from 1875–1953 in the historical literature. **A** Palp and leg I *H. formosus* drawings from the original description (Ausserer, 1875), **B** Ibid, drawings of non-type material from Santa Marta (Simon, 1903), **C** *Hapalopus* sp. palp bulb, and tibial apophysis, drawings of male from Falcón State (Schenkel, 1953), **D** new palp bulb and tibial apophysis drawings of male used by Simon (1903) and new drawings of spermathecae and ocular tubercle of a topotypic female (Schiapelli & Gerschman, 1973), **E** habitus of *H. nigriventris* (Mello-Leitão, 1939).

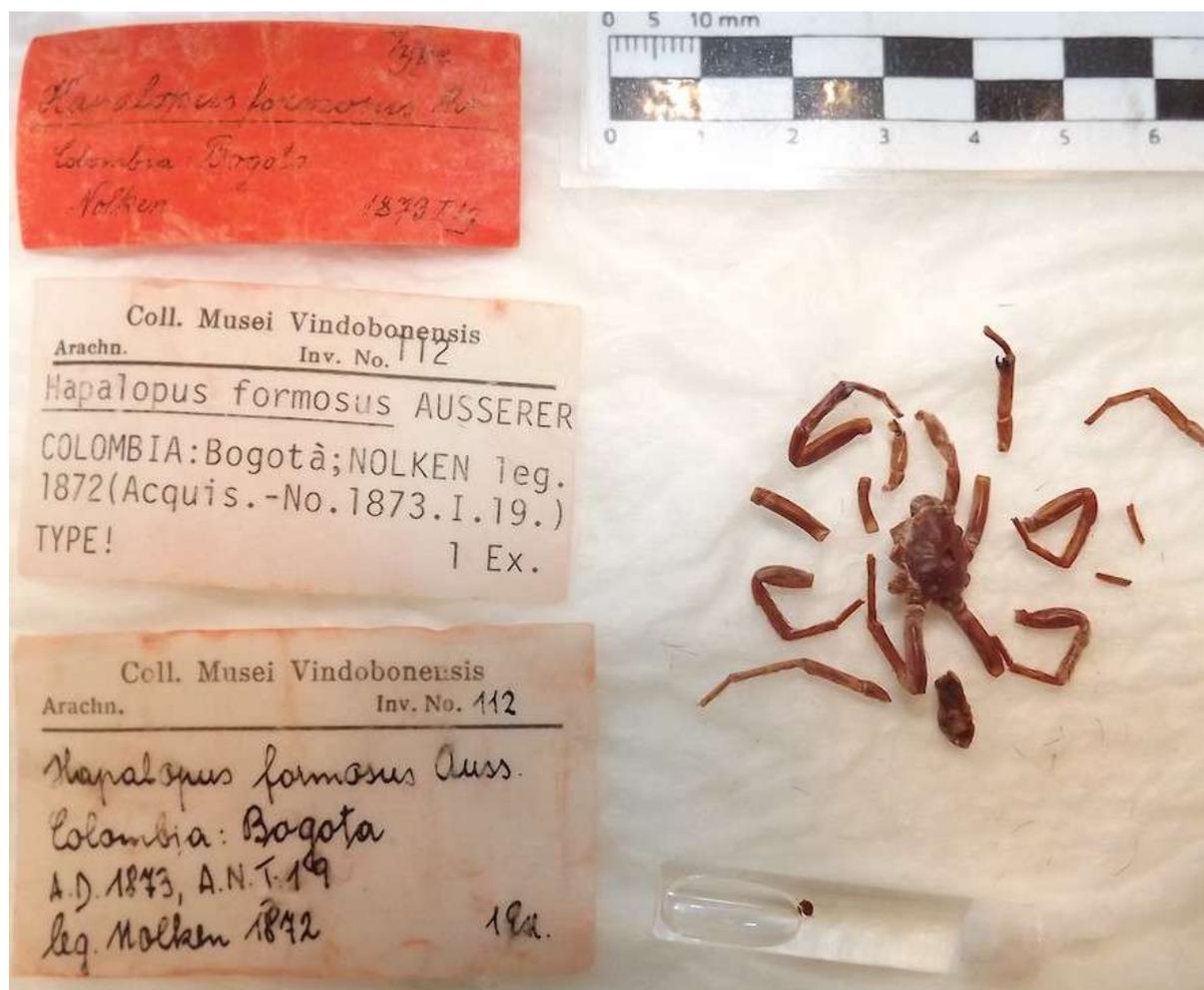


Fig. 2: *Hapalopus formosus* Ausserer, 1875 holotype male (NHMW 112), habitus of specimen and data labels. Scale bar = 1mm.

Other material examined: 2♂♂, 2♀♀, 2 imm. (CAUA_Ara0054), Atlántico, Piojó, Reserva El Palomar, Colombia (10°46'06"N, 75°09'03"W), 138 m a.s.l., from tropical dry forest, ground hand collecting, 06/07/2019, coll. L. Osorio & S. García Atencia; 1♂, 1♀ (MNHN AR-4568), S. Martha (Santa Marta), coll. De Dalmas, 18412, 9884, E. Simon colln., *H. formosus* det. B. Gerschman and R. Schiapelli [1968], *H. triseratus* det. R. Gabriel 22/10/2007, *H. formosus* det. D. Sherwood 27/03/2024.

Distribution: Colombia (Figs. 17–18, see also Remarks).

Table 2: *Hapalopus formosus* Ausserer, 1875 non-type female (CAUA_Ara0054), leg and palp lengths.

	I	II	III	IV	Palp
Femur	8.1	6.7	6.5	8.6	5.8
Patella	5.5	4.4	3.7	4.5	3.7
Tibia	5.8	4.9	4.2	6.6	3.6
Metatarsus	4.8	4.4	4.5	8.1	–
Tarsus	2.9	3.1	3.3	4.1	3.1
Total	27.1	23.5	22.2	31.9	16.2

Remarks: We confirm that Schmidt (1995) was correct in synonymising *H. magdalena* (Karsch, 1879) with *H. formosus*. The lack of mention of quantity of spots on the abdomen

by Karsch (1879) was likely due to the condition of the specimen. In addition to the holotype, we have also examined topotypic material from Santa Marta in MNHN – the very same two specimens illustrated by Gerschman & Schiapelli (1973).

According to Ausserer (1875), as well as the data label (Fig. 2), the type locality of *Hapalopus formosus* is supposedly Santa Fé de Bogotá (Bogotá Department), Colombia at approximately 1500–1700 metres above sea level. Nonetheless, all other examined historical and freshly collected specimens have been collected from the localities of Santa Marta and Reserva El Palomar (~4–320 and 138 m. a. s. l., respectively), both closely located to each other on the Caribbean coast of Colombia (in the Atlántico and Magdalena Departments). In comparison with the type locality, these records are ~720 km and ~660 km NNW from Santa Fé de Bogotá and located in extremely different elevations, ecoregions, and ecosystems. Thus, we seriously doubt the reliability of the type locality and conclude that Santa Fé de Bogotá was simply the place of export, as is quite common for old theraphosids. Furthermore, the collector of this specimen, Nolken, also donated other invertebrates to NHMW with what are now considered unambiguous and non-georeferenceable localities such as New Granada (e.g. Sehnal, 2000). New Granada relates to a large area spanning several modern countries in northern South America and technically also parts of eastern Central America. This gives additional evidence that the geographic information on the type labels of this species is erroneous. For this reason, we restrict the distribution of *H. formosus* to the localities of Santa Marta (11°14'16"N, 74°11'00"W) and Reserva El Palomar (10°46'06"N, 75°09'03"W) in Colombia.

***Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas sp. nov. (Figs. 7–9)**

LSID urn:lsid:zoobank.org:act:F5CAB439-FAFD-4E17-BF5E-3EC11DE6B69D

Type material: Holotype ♂ (CAUA_Ara0105), Riohacha, Comunidad de Plan Bonito, La Guajira, Colombia (11°24.865'N 72°45.937'W), 19 m a.s.l., from tropical dry Forest, ground hand collecting, 24/10/2021, coll. L. Benavides; paratype ♀ (CAUA_Ara0106), same data.

Diagnosis: Males of *H. guerreroi* sp. nov. (Figs. 7A–L, 8A–F) can be distinguished from those of *H. formosus* and *H. platnicki* sp. nov. by the presence of two apical keels and a single metatarsal pit (a single apical keel and two metatarsal pits in *H. formosus* and *H. platnicki* sp. nov., cf. Figs. 3A–E, 5A–E, 10A–E, 11A–E), absence of a PS (present in *H. formosus* and *H. platnicki* sp. nov.), and further by the abdominal pattern, inclusive of triangular edges to the dorso-lateral lines (triangular edges absent in *H. formosus* and *H. platnicki* sp. nov., cf. Figs. 4B–D, 10J–L). Further distinguished from both species by the weakly-developed keelar apophysis on the subapical keel (developed in *H. formosus* and *H. platnicki* sp. nov., cf. Figs. 3A–E, 10A–E) and further from *H. formosus* by the developed cymbial apophysis (well-developed in *H. formosus*, cf. Fig. 10I). Additionally distinguished from *H. platnicki* sp. nov. by the presence of a single PAIK (two PAIK in *H. platnicki* sp. nov., cf. Figs. 10A–E). Females (Figs. 9A–F) can be distinguished from all other known female congeners by the T-shaped spermathecal receptacle and the triangular lateral edges of the dorso-lateral lines on the abdomen (receptacle semicircular in *H. formosus*, *H. nigriventris*, and *H. platnicki* sp. nov., cf. Figs. 6E–F, 12F, Gabriel, 2016; circular in *H. coloratus* and *H. vangoghi* sp. nov., cf. Figs. 13E–F, Gabriel & Sherwood, 2022; abdominal pattern without dorso-lateral lines or lines not triangular-shaped in all other known female congeners).

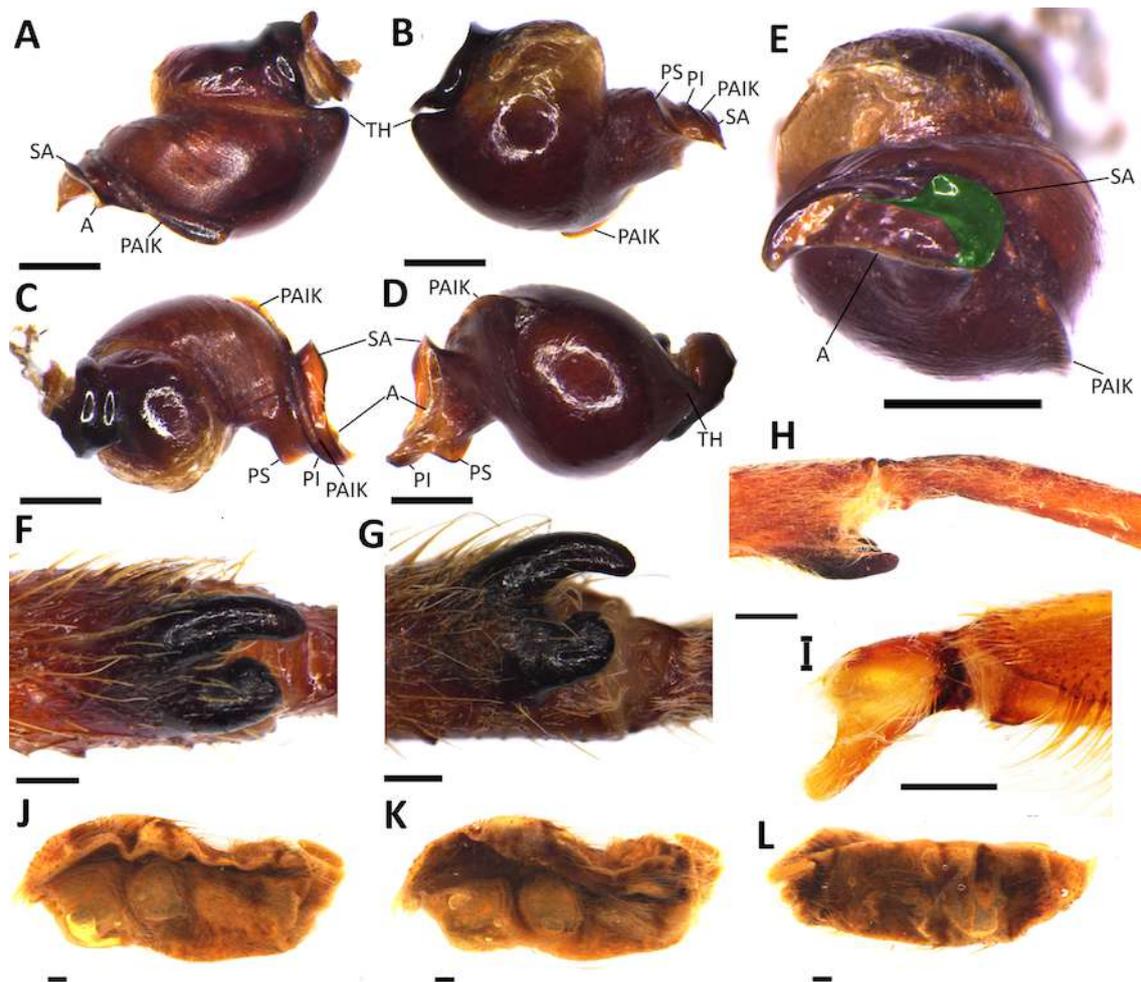


Fig. 3: *Hapalopus formosus* Ausserer, 1875 holotype male (NHMW 112), **A–E** palpal bulb (right-hand side), **F–H** tibial apophysis (right-hand side), **I** cymbium (right-hand side), **J–L** abdomen. **A** prolateral view, **B** retrolateral view, **C** dorsal view, **D** ventral view, **E** apical view (keelar apophysis highlighted in green), **F** ventral view, **G** prolatero-ventral view, **H** retrolateral view, **I** retrolateral view, **J** dorsal view, **K** lateral view, **L** ventral view. Scale bars = 0.5mm. Abbreviations: A = apical keel, PAIK = prolateral accessory inferior keel, PI = prolateral inferior keel, PS = prolateral superior keel, SA = subapical keel, TH = tegular heel.

Etymology: The specific epithet is a patronym in honour of Dr Roberto Guerrero Flórez, in recognition of his support and vast contribution to the divulgation of arthropod knowledge through his teaching work.

Description of holotype male: Total length including chelicerae: 17.9. Carapace: length 7.3, width 6.6. Caput: slightly raised. Ocular tubercle: raised, length 0.7, width 1.3. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior eye row slightly procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: transverse deep, procurved. Chelicera: length 2.4, width 1.4. Abdomen: length 8.2, width 5.2. Maxilla with 50–54 cuspules covering approximately 30% of the proximal edge. Labium: length 0.8, width 1.1, with 33–35 cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 3.2, width 2.9, with three pairs of sigillae. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 66%; II 66%; III 25%; IV 20%. Lengths of legs and palpal segments: see table 3, legs 4,1,2,3. Spination: femur III d 1–0–2, IV d 0–0–1, tibia I p 1–0–1, v 2–3–1 (apical), II p 1–1–0, v 3–3–3 (apical), III p 0–1–0, r 1–1–0, v 2–2–2 (apical), IV p 1–0–1, r 1–0–1, v 2–2–2, metatarsus I p 1–1–0, v 0–0–1 (apical), II p 1–1–0, v 3–0–1 (apical), III p 1–1–1, r 0–1–1, v 1–1–2, IV p 0–1–1, r 0–1–1, v 2–2–4 (3 apical). Tibia I with paired tibial

apophysis, RB longer than PB and with a subapical spine (Figs. 7F–H). Femur III: incrassate. Palpal tibia: slightly incrassate with numerous, distally positioned, elongated spiniform setae. Palpal cymbium with developed, elongate, retrolateral apophysis (Fig. 7I). Metatarsus I: slightly curved (Figs. 7H), a single medially-situated metatarsal pit present (Figs. 8A–E). Posterior lateral spinnerets with three segments, basal 1.1, median 1.0, digitiform apical 1.1. Posterior median spinnerets with one segment. Palpal bulb with TH developed; embolus short and thick, tapering sharply only in apical quarter; PS absent, PI, PAIK, A, and SA developed, A keel consisting of two distinct paths (A1 and A2), keelar apophysis present on SA, weakly developed, a single PAIK present; ER, PR, and PAR absent, PC present, constricted in apical half. Urticating setae: Type III present dorsally. Colour: carapace light brown, clothed with black setae, lighter in cephalic part; abdomen with two yellow dorso-medial spots, distal spot blended with urticating setae patch, lateral flanks with almost continuous line formed from fused spots, end of line broken into two distinctive spots, each slightly triangular-shaped at top and at bottom with a line connecting downwards towards ventral face; ventral face with three pairs of yellow spots either side on an otherwise light-brown surface, nearly fully fused into a single line, proximal pair covering book lungs, distal pair situated laterally either side of spinnerets, all three pairs of spots partially viewable in lateral view (Figs. 7J–L).

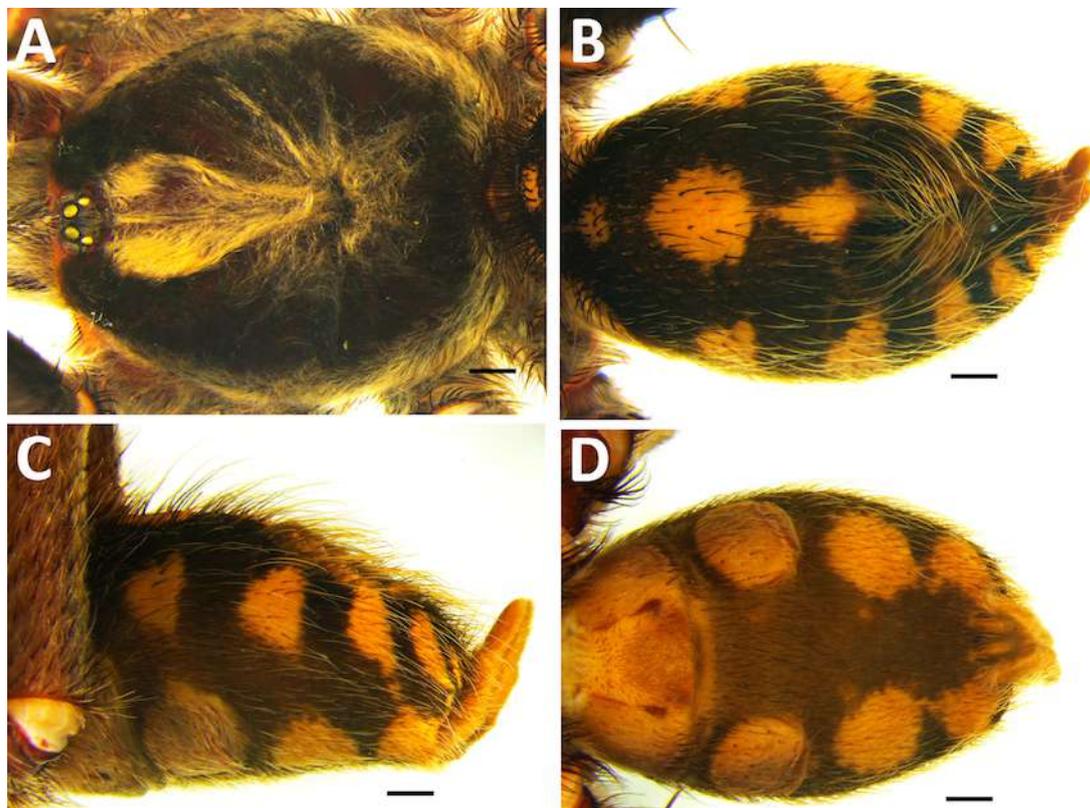


Fig. 4: *Hapalopus formosus* Ausserer, 1875 non-type male (CAUA_Ara0054), **A** carapace, dorsal view, **B** abdomen, dorsal view, **C** abdomen, lateral view, **D** abdomen, ventral view. Scale bars = 0.5mm.

Table 3: *Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male (CAUA_Ara0105), leg and palp lengths.

	I	II	III	IV	Palp
Femur	6.4	5.8	5.9	6.5	4.3
Patella	3.9	3.6	3.2	3.0	2.5
Tibia	5.1	4.3	3.4	5.9	3.7
Metatarsus	4.7	5.0	4.2	7.5	–
Tarsus	3.3	3.3	2.4	4.2	1.7
Total	23.4	22.0	19.1	27.1	12.2

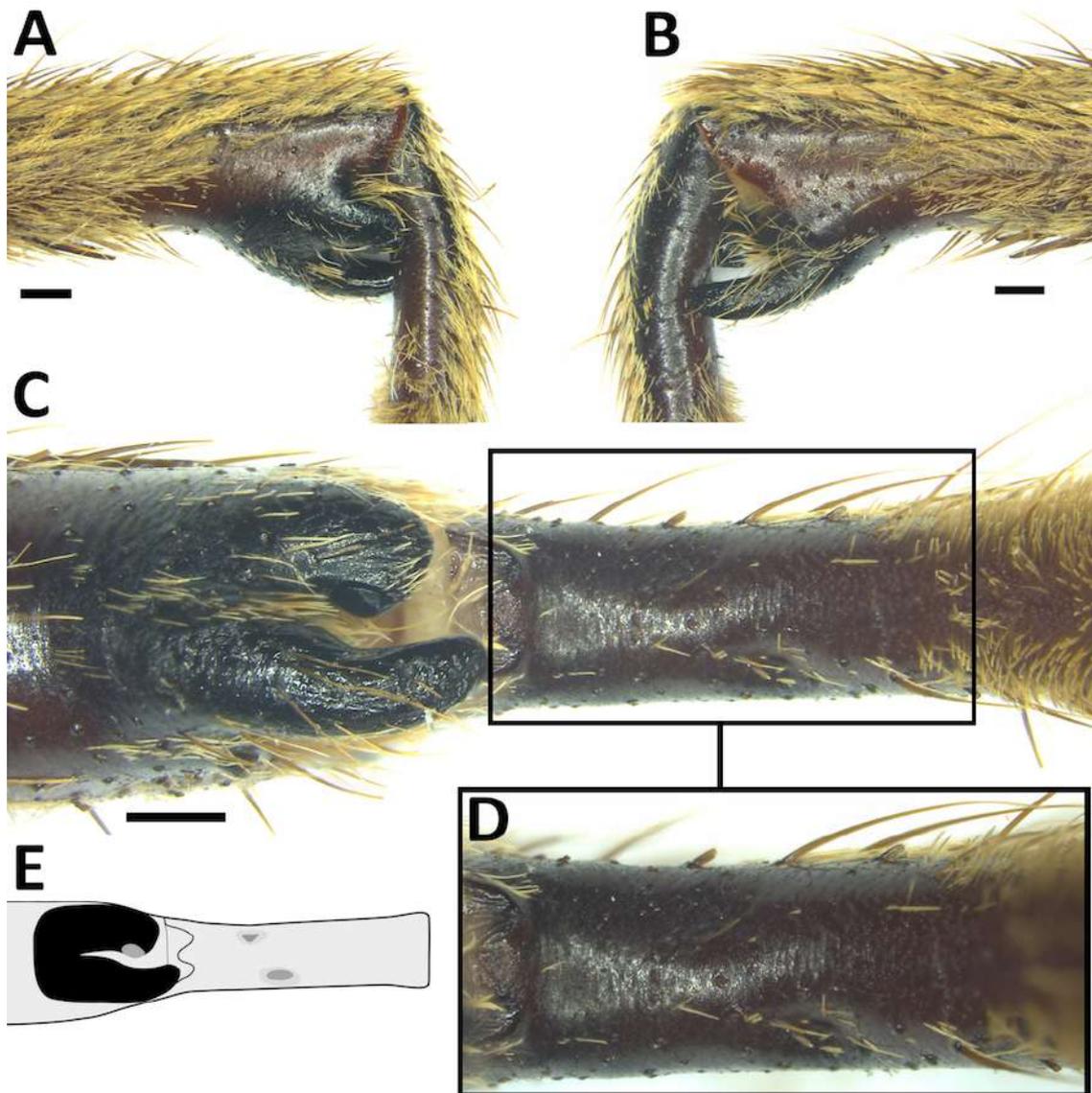


Fig. 5: *Hapalopus formosus* Ausserer, 1875 non-type male (CAUA_Ara0054), **A–B** closure of tibial apophysis against metatarsus I, **C–E** detail of metatarsal pits. **A** prolateral view, **B** retrolateral view, **C** posterior third of metatarsus, showing pits, ventral view, **D** close-up of metatarsal pits, ventral view, **E** illustration of pits, ventral view. Scale bars = 0.5mm.

Description of paratype female: Total length including chelicerae: 18.7. Carapace: length 7.7, width 7.2. Caput: raised. Ocular tubercle: slightly raised, length 0.9, width 1.4. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior row slightly procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: transverse deep, procurved. Chelicera: length 3.0, width 1.5. Abdomen: length 8.2, width 5.2. Maxilla with 80–86 cuspules, covering approximately 40% of proximal edge. Labium: length 1.0, width 1.7, with 40–44 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 3.4, width 3.4, with three pairs of sigillae. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 70%; II 70%; III 25%; IV 20%. Lengths of leg and palpal segments: see table 4, legs 4,1,3,2. Spination: femur II d 0–0–1, III d 0–0–1, IV d 0–0–1, tibia II p 0–0–1, III: v 0–1–0, p 0–0–1, IV p 1–0–0, v 0–2–2 (apical), palp v 0–0–3 (apical), metatarsus I v 2–0–1 (apical), II v 2–0–2 (apical), III p 1–1–1, r 0–1–1, v 0–1–3 (apical), IV p 0–1–1, r 0–1–1, v 2–2–3 (apical). Posterior lateral spinnerets with three segments: basal 1.2, medial 0.9, digitiform apical 0.9. Posterior median spinnerets with one segment. Spermathecae: with a single T-shaped hypersclerotised receptacle, situated on an

elongated bursa copulatrix; anterior half of receptacle more strongly sclerotised than posterior half (Figs. 9E–F). Urticating setae: Types III and IV present dorsally. Colour: pattern as in male (Figs. 9A–D).

Other material examined: 1 imm. (AMNH_IZC 00357356), Valledupar, Cesar Department, Colombia, 4–9.VI.1968, coll. B. Malkin.

Distribution: Known only the type locality, Riohacha, Comunidad de Plan Bonito, La Guajira, Colombia; additionally, also from non-type material from Valledupar, Cesar Department, Colombia (Figs. 17–18).

Remarks: In addition to the type material, a non-type juvenile (clearly identifiable based on the abdominal pattern) of *H. guerreroi* **sp. nov.** was found in the tube containing five specimens of *H. platnicki* **sp. nov.** (see below). This juvenile of *H. guerreroi* **sp. nov.** is explicitly excluded from the type series.

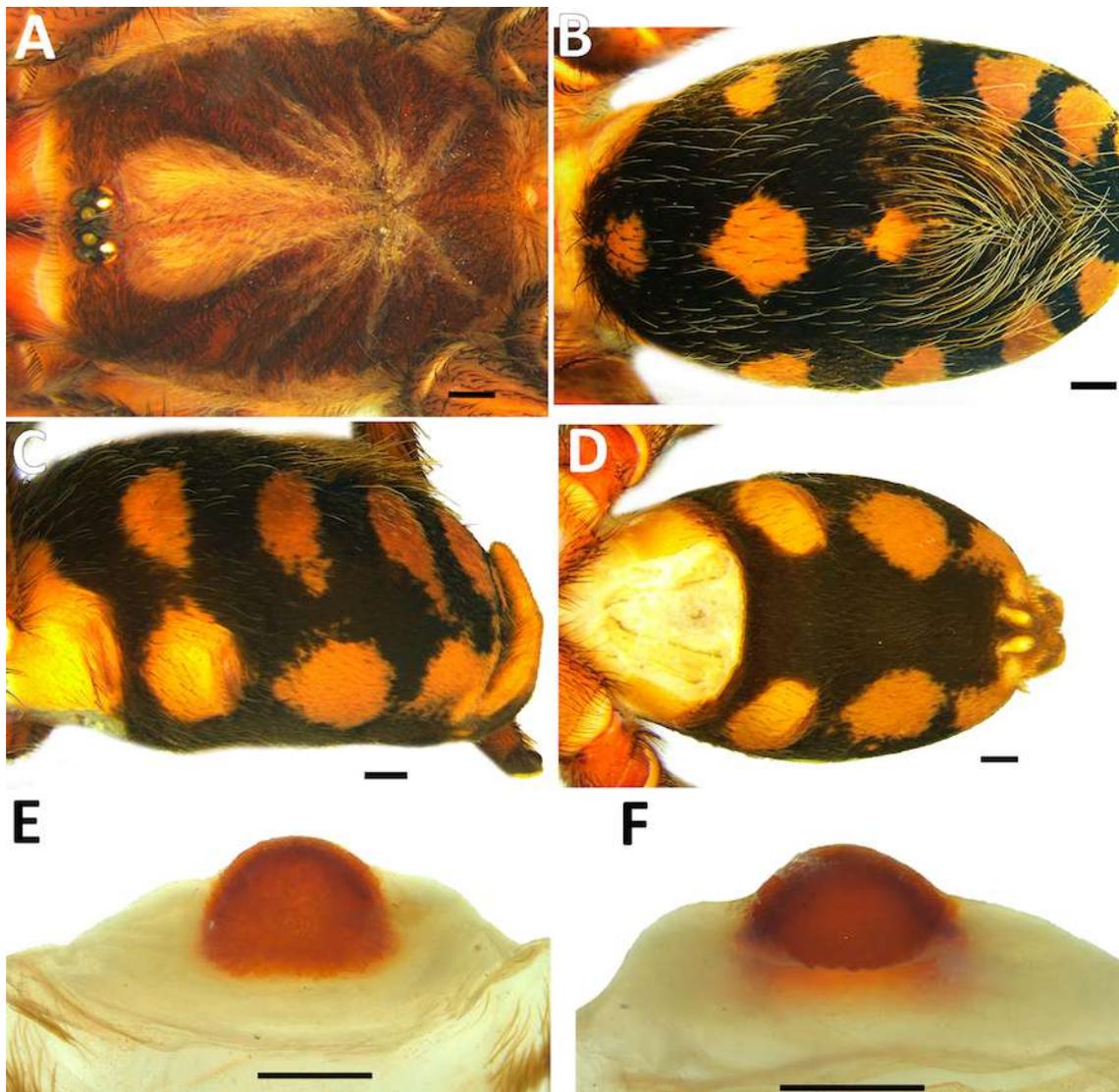


Fig. 6: *Hapalopus formosus* Ausserer, 1875 non-type female (CAUA_Ara0054), **A** carapace, dorsal view, **B** abdomen, dorsal view, **C** abdomen, lateral view, **D** abdomen, ventral view, **E** spermathecae, dorsal view, **F** spermathecae, ventral view. Scale bars = 0.5mm.

Table 4: *Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** paratype female (CAUA_Ara0106), leg and palp lengths.

	I	II	III	IV	Palp
Femur	5.1	4.3	3.3	5.4	3.7
Patella	3.8	3.2	3.0	3.1	2.2
Tibia	3.8	3.0	2.6	4.0	2.3
Metatarsus	2.1	2.2	3.5	5.0	–
Tarsus	1.6	1.8	2.3	2.8	2.0
Total	16.4	14.5	14.7	20.3	10.2

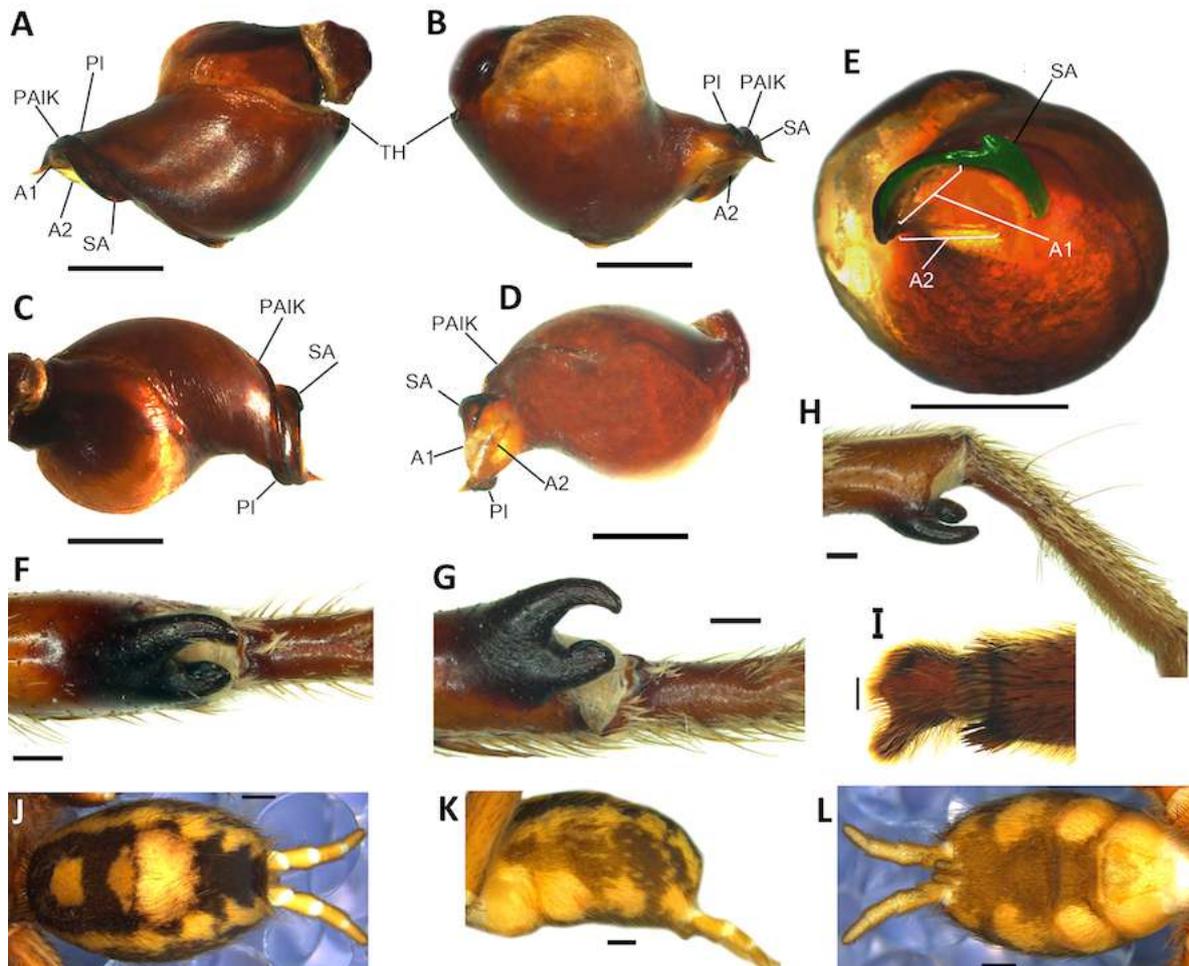


Fig. 7: *Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male (CAUA_Ara0105), **A–E** palpal bulb (right-hand side), **F–H** tibial apophysis (right-hand side), **I** cymbium (right-hand side), **J–L** abdomen. **A** prolateral view, **B** retrolateral view, **C** dorsal view, **D** ventral view, **E** apical view (keelar apophysis highlighted in green), **F** ventral view, **G** prolatero-ventral view, **H** retrolateral view, **I** retrolateral view, **J** dorsal view, **K** lateral view, **L** ventral view. Scale bars = 0.5mm. Abbreviations: A = apical keel (split in two distinct parts, as A1 and A2), PAIK = prolateral accessory inferior keel, PI = prolateral inferior keel, SA = subapical keel, TH = tegular heel.

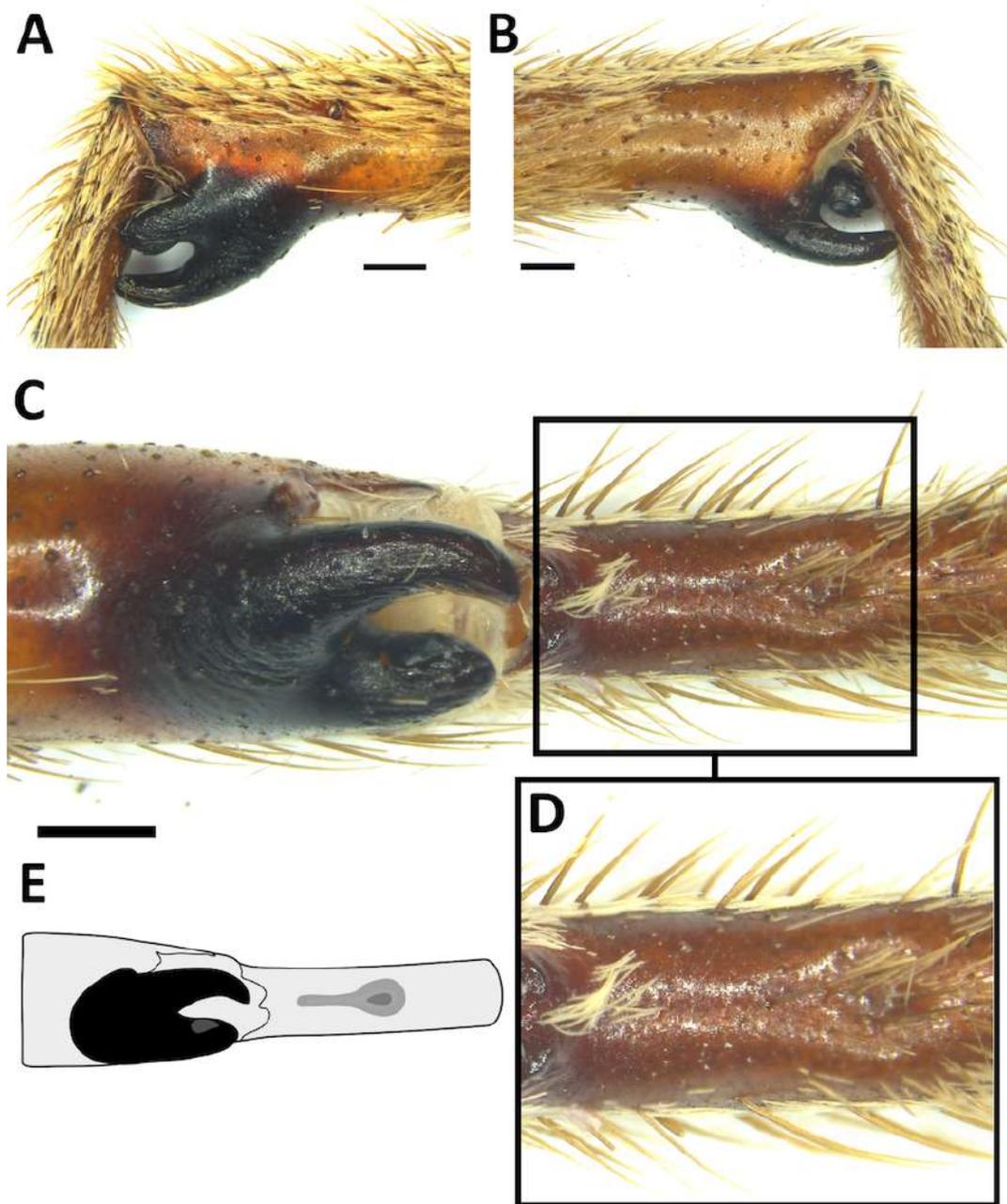


Fig. 8: *Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male (CAUA_Ara0105), **A–B** closure of tibial apophysis against metatarsus I, **C–E** detail of metatarsal pits. **A** prolateral view, **B** retrolateral view, **C** posterior third of metatarsus, showing pits, ventral view, **D** close-up of metatarsal pits, ventral view, **E** illustration of pits, ventral view. Scale bars = 0.5mm.

***Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** (Figs. 10–12)**

LSID urn:lsid:zoobank.org:act:70829F86-BC3A-4648-8B09-443D21AF5541

Type material: Holotype ♂ (AMNH_IZC 00357356), Valledupar, Cesar Department, Colombia, 4–9.VI.1968, coll. B. Malkin; paratypes 1♂, 1♀ (AMNH_IZC 00357356), same data.

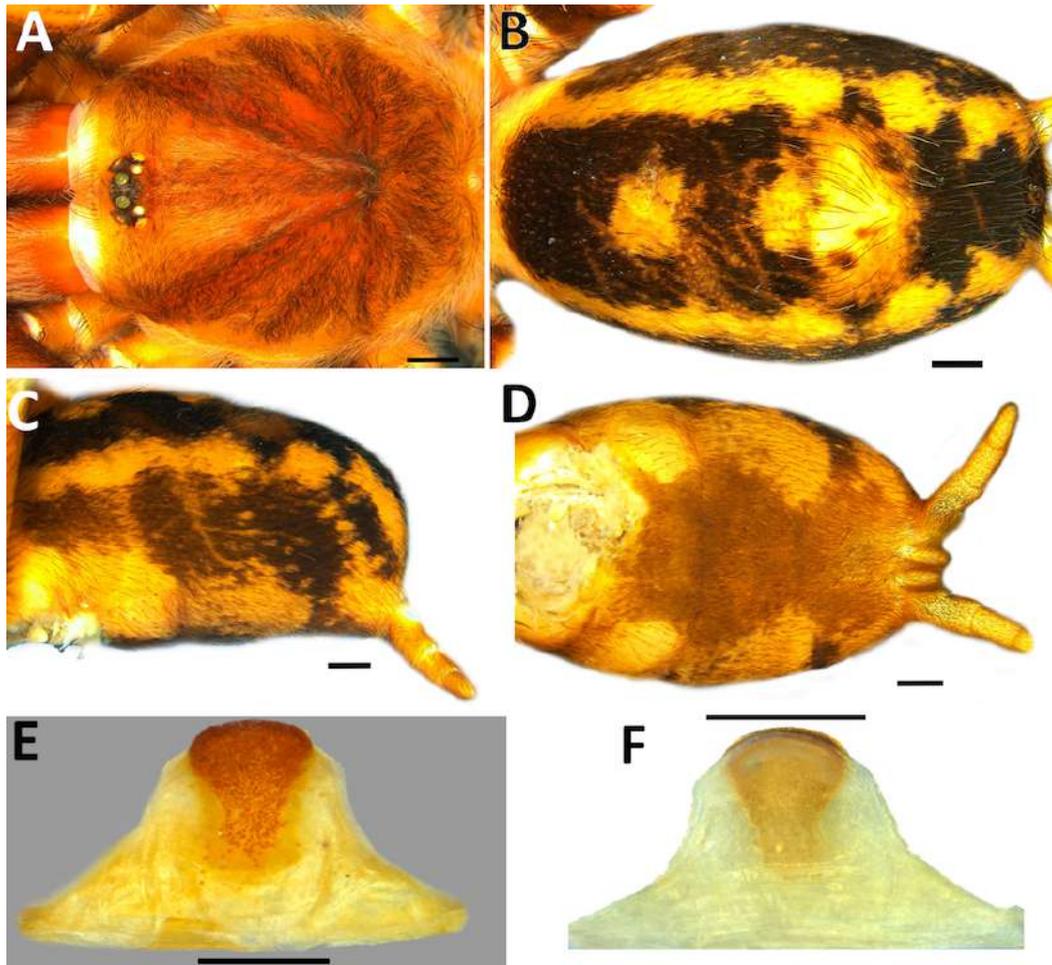


Fig. 9: *Hapalopus guerreroi* Benavides, Osorio, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** paratype female (CAUA_Ara0106), **A** carapace, dorsal view, **B** abdomen, dorsal view, **C** abdomen, lateral view, **D** abdomen, ventral view, **E** spermathecae, dorsal view, **F** spermathecae, ventral view. Scale bars = 0.5mm.

Diagnosis: Males of *H. platnicki* **sp. nov.** (Figs. 10A–L) can be distinguished from those of *H. formosus* by the presence of two PAIK (one in *H. formosus*, cf. Figs. 3A–E), developed cymbial apophysis (well-developed in *H. formosus*, cf. Fig. 3I), the anterior two lateral spots rounded and not triangular-shaped (triangular-shaped in *H. formosus* cf. Figs. 4B–C), and the comparatively, and consistently, smaller lateral spots overall. *Hapalopus platnicki* **sp. nov.** can be distinguished from the male of *H. guerreroi* **sp. nov.** by the presence of a PS, a single apical keel, two metatarsal pits, and the developed keelar apophysis on the subapical keel (PS absent, two apical keels, one metatarsal pit, and a weakly developed keelar apophysis on the subapical keel present in *H. guerreroi* **sp. nov.**, cf. Figs. 7A–E, 8A–E) and the absence of triangular margins to the dorso-lateral lines of the abdominal pattern (present in *H. guerreroi* **sp. nov.**, cf. Figs. 7J–K). Females (Figs. 12A–F) can be distinguished from those of *H. guerreroi* **sp. nov.**, *H. nigriventris*, and *H. vangoghi* **sp. nov.** by the semicircular spermathecal receptacle (spermathecae T-shaped in *H. guerreroi* **sp. nov.**; circular in *H. nigriventris*, and *H. vangoghi* **sp. nov.**, cf. Figs. 9E–F, 13E–F, Gabriel, 2016), from *H. coloratus* by the more apically rounded anterior edge of the receptacle (almost straight in *H. coloratus*, cf. Gabriel & Sherwood, 2022), and from *H. formosus* by the anterior edge of the spermathecae asymmetrical (rounded in *H. formosus*, cf. Figs. 6E–F). Further distinguished from *H. formosus* by the differences in the abdominal pattern (Figs. 12C–E) mentioned above for males, and from *H. guerreroi* **sp. nov.** and *H. vangoghi* **sp. nov.** by the absence of dorso-

lateral lines on the abdomen (present in *H. guerreroi* **sp. nov.** and *H. vangoghi* **sp. nov.**, cf. Figs. 9B–C, 13B–C).

Etymology: The specific epithet is a patronym in honour of the late Norman I. Platnick (1951–2020). Norm made great contributions to spider taxonomy, and several of us benefited from his advice and pleasant correspondence during our careers. It seems fitting to name a species after him which is deposited in the American Museum of Natural History, where he dedicated so much of his life.

Description of holotype male: Total length including chelicerae: 14.9. Carapace: length 6.8, width 5.2. Caput: slightly raised. Ocular tubercle: raised, length 0.5, width 0.9. Eyes: AME > ALE, ALE > PLE, PLE > PME, anterior eye row procurved, posterior row slightly recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, transverse. Chelicera: length 2.0, width 0.8. Abdomen: length 6.1, width 3.2. Maxilla with 100–120 cuspules covering approximately 53% of the proximal edge. Labium: length 0.6, width 1.0, with 27 cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 2.7, width 2.2, with three pairs of sigillae. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 68%; II 76%; III 54%; IV 23%. Lengths of legs and palpal segments: see table 5, legs 4,1,2,3. Spination: femur II d 0–0–1, III d 0–1–2, IV d 1–0–4, tibia I d 0–0–2, v 0–3–3, II d 0–1–0, v 4–3–2, III d 2–1–2, v 4–2–3, IV d 1–3–4, v 2–4–2, palp p 1–1–0, metatarsus I v 0–0–1 (apical), II d 0–1–2, v 2–1–1 (apical), III d 2–1–2, v 1–2–5 (3 apical), IV d 2–2–2, v 3–2–4 (apical). Tibia I with paired tibial apophysis, RB longer than PB, PB noticeably wider than RB, PB with large megaspine prolaterally (Figs. 10F–H). Femur III: incrassate. Palpal tibia: incrassate, with comb of spines retrolaterally. Palpal cymbium with developed, elongate, retrolateral apophysis (right cymbium damaged, here illustrated from left, Fig. 9I). Metatarsus I: slightly curved (Fig. 10H), two metatarsal pits present (Figs. 11A–E). Posterior lateral spinnerets with three segments, basal 0.8, median 0.5, digitiform apical 1.0. Posterior median spinnerets with one segment. Palpal bulb with TH developed; embolus short and wide, tapering sharply only in apical quarter; PS, PI, PAIK, A, and SA developed, developed keelar apophysis present on SA, two PAIK present; ER, PR, and PAR absent, PC present constricted all but the basal quarter (Figs. 10A–E). Urticating setae: Type III present dorsally. Colour: carapace brown, lacking patterning or striae; abdomen with three large yellow dorso-medial spots, interconnected by a thin yellow line; lateral face with four nearly equidistantly spaced spots; ventrally with three pairs of spots, one covering the first pair of book lungs, distal pair situated laterally either side of the spinnerets (Figs. 10J–L).

Table 5: *Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male (AMNH_IJC 00357356) leg and palp lengths.

	I	II	III	IV	Palp
Femur	5.4	5.2	4.4	5.7	3.5
Patella	2.8	2.4	1.9	2.5	1.6
Tibia	5.0	3.9	3.2	5.3	2.8
Metatarsus	3.8	4.0	4.1	6.1	–
Tarsus	2.7	2.5	2.5	3.0	0.7
Total	19.7	18.0	16.1	22.6	8.6

Description of paratype female: Total length including chelicerae: 17.3. Carapace: (damaged) length 6.2, width 4.4. Caput: raised. Ocular tubercle: slightly raised, length 0.4, width 1.3. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: short. Fovea: deep, transverse. Chelicera: length 3.0, width 1.4. Abdomen: (damaged) length 8.1, width 4.0. Maxilla with 40–50 cuspules, covering approximately 30% of proximal edge. Labium: length 0.6, width 1.0, with 30 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-

sternal mounds: joined. Sternum: length 2.6, width 2.3, with three pairs of sigillae. Tarsi I–III fully scopulate, tarsus IV divided by band of setae. Metatarsal scopulae: I 52%; II 50%; III 33%; IV 15%. Lengths of leg and palpal segments: see table 6, legs 4,1,2,3. Spination: femur III d 0–0–1, IV d 0–0–1, tibia I v 0–1–0, II v 0–10, III d 0–2–2, v 1–2–2, IV d 1–1–1, v 1–2–2, palp v 1–0–1, metatarsus I v 1–0–1 (apical), II v 0–1–2 (apical), III d 1–2–2, v 1–0–3 (apical), IV d 0–0–2, v 2–2–3 (apical), p 0–1–1, r 0–1–1. Posterior lateral spinnerets with three segments: basal 1.0, medial 9.4, digitiform apical 0.8. Posterior median spinnerets with one segment. Spermathecae with a single semicircular, hypersclerotised, receptacle, situated on an extremely short bursa copulatrix, anterior edge of receptacle asymmetrical (Fig. 12F). Urticating setae: Type III present dorsally. Colour: as in male but carapace markings less distinct (Figs. 12B–E).

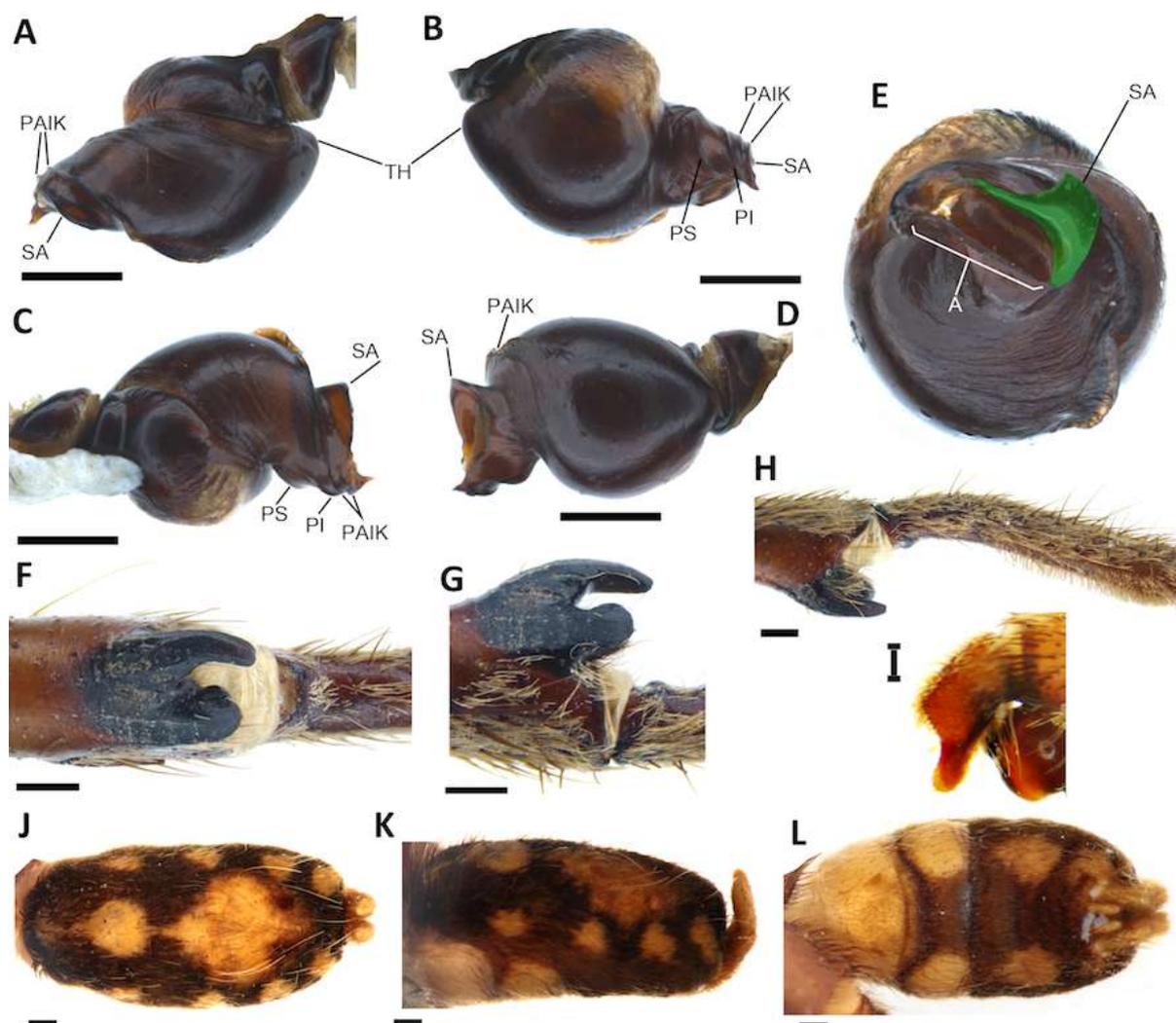


Fig. 10: *Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas *sp. nov.* holotype male (AMNH_IZC 00357356), **A–E** palpal bulb (right-hand side), **F–H** tibial apophysis (right-hand side), **I** cymbium (left-hand side, palpal bulb undissected), **J–L** abdomen. **A** prolateral view, **B** retrolateral view, **C** dorsal view, **D** ventral view, **E** apical view (keelar apophysis highlighted in green), **F** ventral view, **G** prolatero-ventral view, **H** retrolateral view, **I** retrolateral view, **J** dorsal view, **K** lateral view, **L** ventral view. Scale bars = 0.5mm. Abbreviations: A = apical keel, PAIK = prolateral accessory inferior keel, PI = prolateral inferior keel, PS = prolateral superior keel, SA = subapical keel, TH = tegular heel.

Table 6: *Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** paratype female (AMNH_IZC 00357356) leg and palp lengths.

	I	II	III	IV	Palp
Femur	4.1	3.3	2.9	4.4	3.1
Patella	2.6	2.0	2.0	2.5	1.8
Tibia	2.9	2.4	1.9	3.1	2.2
Metatarsus	2.5	2.0	2.8	4.4	–
Tarsus	1.6	1.5	1.5	2.4	2.0
Total	13.7	11.2	11.1	16.8	9.1

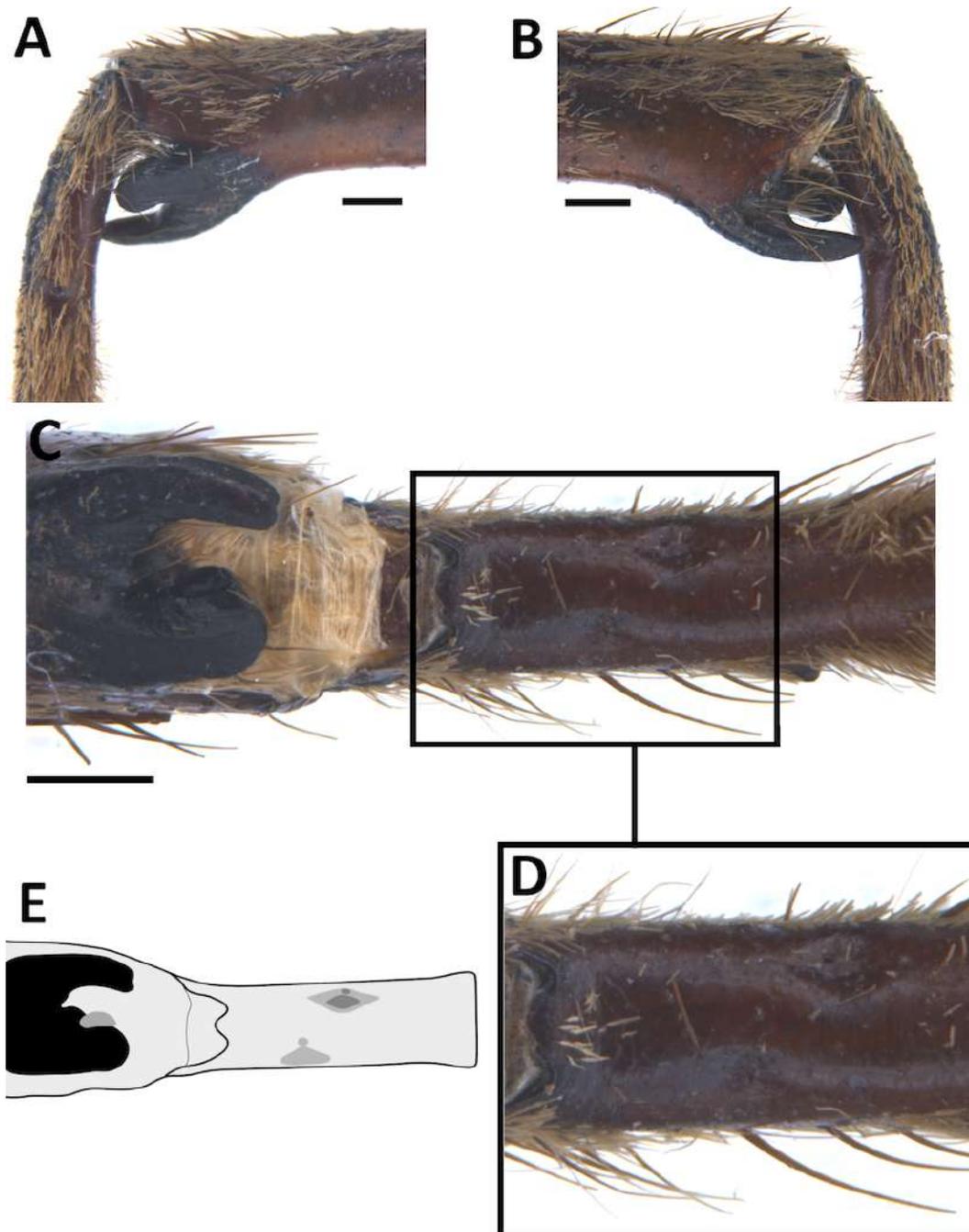


Fig. 11: *Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male (AMNH_IZC 00357356), **A–B** closure of tibial apophysis against metatarsus I, **C–E** detail of metatarsal pits. **A** prolateral view, **B** retrolateral view, **C** posterior third of metatarsus, showing pits, ventral view, **D** close-up of metatarsal pits, ventral view, **E** illustration of pits, ventral view. Scale bars = 0.5mm.

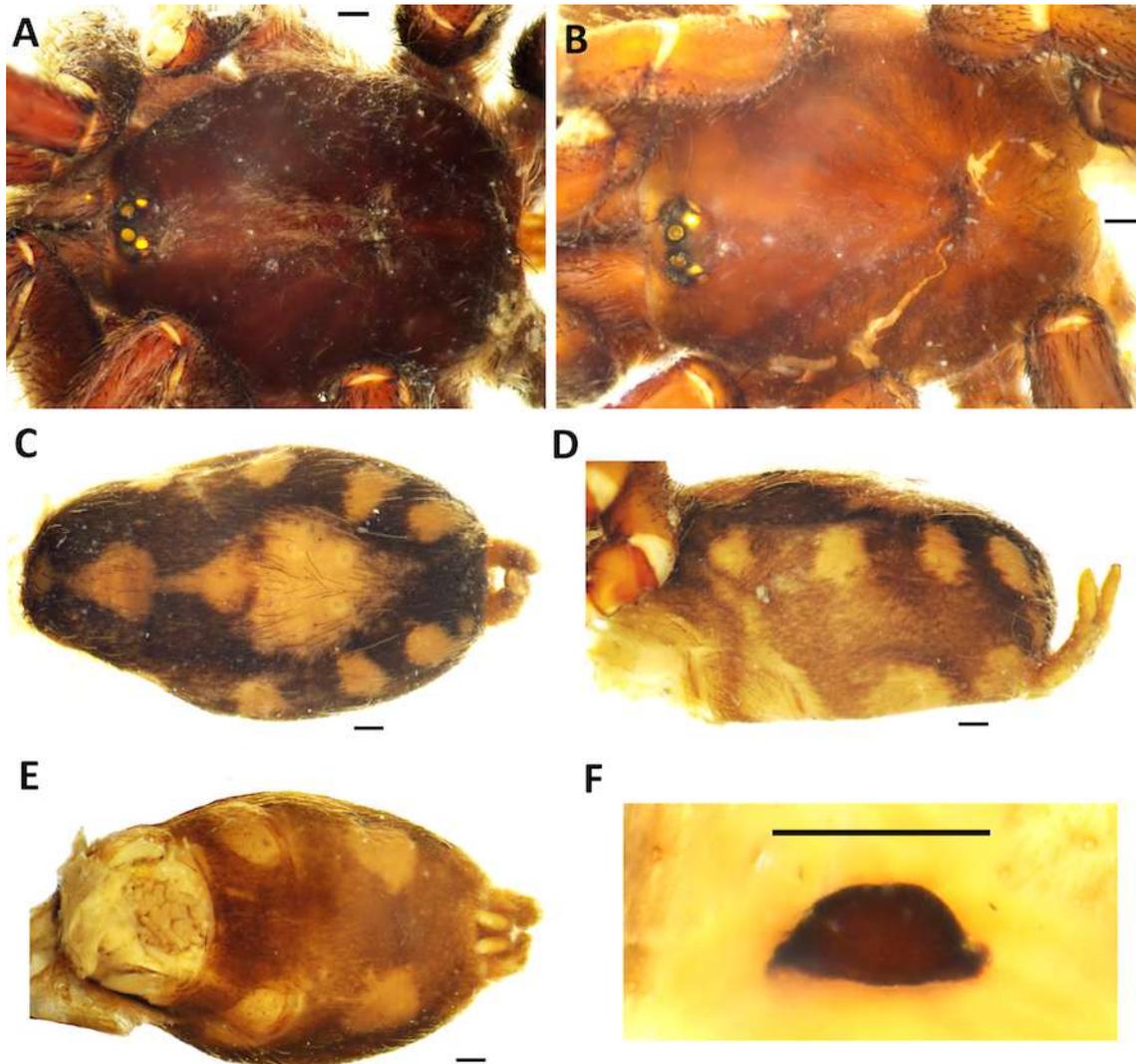


Fig. 12: *Hapalopus platnicki* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype male and paratype female (AMNH_IZC 00357356), **A** carapace of male, dorsal view, **B** carapace of female, dorsal view, **C** abdomen of female, dorsal view, **D** abdomen of female, lateral view, **E** abdomen of female, ventral view, **F** spermathecae, dorsal view. Scale bars = 0.5mm.

Other material examined: 2 imm. (AMNH_IZC 00357356), Valledupar, Cesar Department, Colombia, 4–9.VI.1968, coll. B. Malkin.

Distribution: Known only from the type locality, Valledupar, Cesar Department, Colombia (Figs. 17–18).

Remarks: The tube containing the holotype male and paratype male and female also contains two conspecific juveniles and, additionally, a juvenile of *H. guerreroi* **sp. nov.** These juvenile specimens are explicitly here not designated as paratypes for the respective species.

***Hapalopus vangoghi* Osorio, Benavides, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** (Figs. 13–14)**

LSID urn:lsid:zoobank.org:act:905CA917-F968-466D-B319-49CC36F922B2

Type material: Holotype ♀ (CAUA_Ara0103), Becerril, Vivienda Estados Unidos, Forest, Cesar, Colombia (9°38'03.2"N, 73°06'56.4"W), 987 m a.s.l., ground hand collecting, 11/04/2021, coll. L. Osorio; paratypes 1 ♀ (CAUA_Ara0104), same data.

Diagnosis: Females of *H. vangoghi* **sp. nov.** (Figs. 13A–E, 14A–B) can be distinguished from those of *H. coloratus*, *H. formosus*, and *H. guerreroi* **sp. nov.** by the circular spermathecae (spermathecae semicircular in *H. coloratus* and *H. formosus*, T-shaped in *H. guerreroi* **sp. nov.**, cf. Figs. 6E–F, 9E–F, Gabriel & Sherwood, 2022), and from those of *H. nigriventris* by the presence of parallel dorso-lateral lines extending from the anterior to medial thirds of the abdominal patterning (dorso-lateral lines absent in *H. nigriventris* cf. Gabriel, 2016). Further distinguished from *H. coloratus*, *H. formosus*, and *H. platnicki* **sp. nov.** by the presence of aforementioned dorso-lateral lines (absent in *H. coloratus*, *H. formosus*, and *H. platnicki* **sp. nov.**, cf. Figs. 6B–C, 12C–D, Gabriel & Sherwood, 2022), and from *H. guerreroi* **sp. nov.** by the smaller dorso-medial spot (larger in *H. guerreroi* **sp. nov.**, cf. Figs. 9B–C).

Etymology: The specific epithet is a patronym in honour of the iconic 19th century Dutch painter Vincent Willem van Gogh (1853–1890), considered one of the leading exponents of post-impressionism.

Description of holotype female: Total length including chelicerae: 24.4. Carapace: length 8.7, width 8.1. Caput: raised. Ocular tubercle: slightly raised, length 1.2, width 1.5. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row slightly procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: transverse deep, procurved. Chelicera: length 4.1, width 2.6. Abdomen: length 11.5, width 10.0. Maxilla with 70–100 cuspules, covering approximately 60% of proximal edge. Labium: length 1.5, width 2.1, with 57 cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: joined. Sternum: length 4.3, width 4.2, with three pairs of sigillae. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 64%; II 54%; III 43%; IV scopula absent. Lengths of leg and palpal segments: see table 7, legs 4,1,2,3. Spination: femur I d 0–0–1, II d 0–0–1, IV d 0–0–1, palp d 0–0–1, tibia III p 0–1–1, r 0–0–1, v 0–2–2 (apical), IV r 1–0–1, v 0–2–2 (apical), palp 0–0–4 (3 apical), metatarsus I v 0–1–1 (apical), II v 1–2–1 (apical), III p 1–1–1, r 0–1–1, v 3–2–3 (apical), IV p 0–1–1, r 0–1–1, v 2–2–3 (2 apical). Posterior lateral spinnerets with three segments: basal 1.5, medial 1.4, digitiform apical 1.5. Posterior median spinnerets with one segment. Spermathecae: with a single circular hypersclerotised receptacle, situated on an elongated bursa copulatrix base, almost entirely sclerotised (Figs. 13E–F). Urticating setae: Types III and IV present dorsally. Colour: carapace light brown, clothed with black setae, margins yellow-beige around almost entire carapace; abdomen with two blood-orange dorso-medial spots, distal spot smaller and fused partially covered by urticating patch, lateral flanks with a single line formed from fused spots, distal-most two spots more distinct, with intermittent blood-orange speckles; lateral face with numerous speckles; ventral face with three pairs of spots on an otherwise dark-brown surface, distal pair more line-shaped and situated laterally from the spinnerets (Figs. 13A–D). Colour in life as above, but more vibrant (Figs. 14A–B).

Other material examined: 3 imm. (CAUA_Ara0104), Becerril, Vda. Estados Unidos, Forest, Cesar, Colombia (9°38'03.2"N, 73°06'56.4"W), 987 m a.s.l., ground hand collecting, 11/04/2021, coll. L. Osorio.

Distribution: Known only from the type locality, Becerril, Cesar, Colombia (Figs. 17–18).

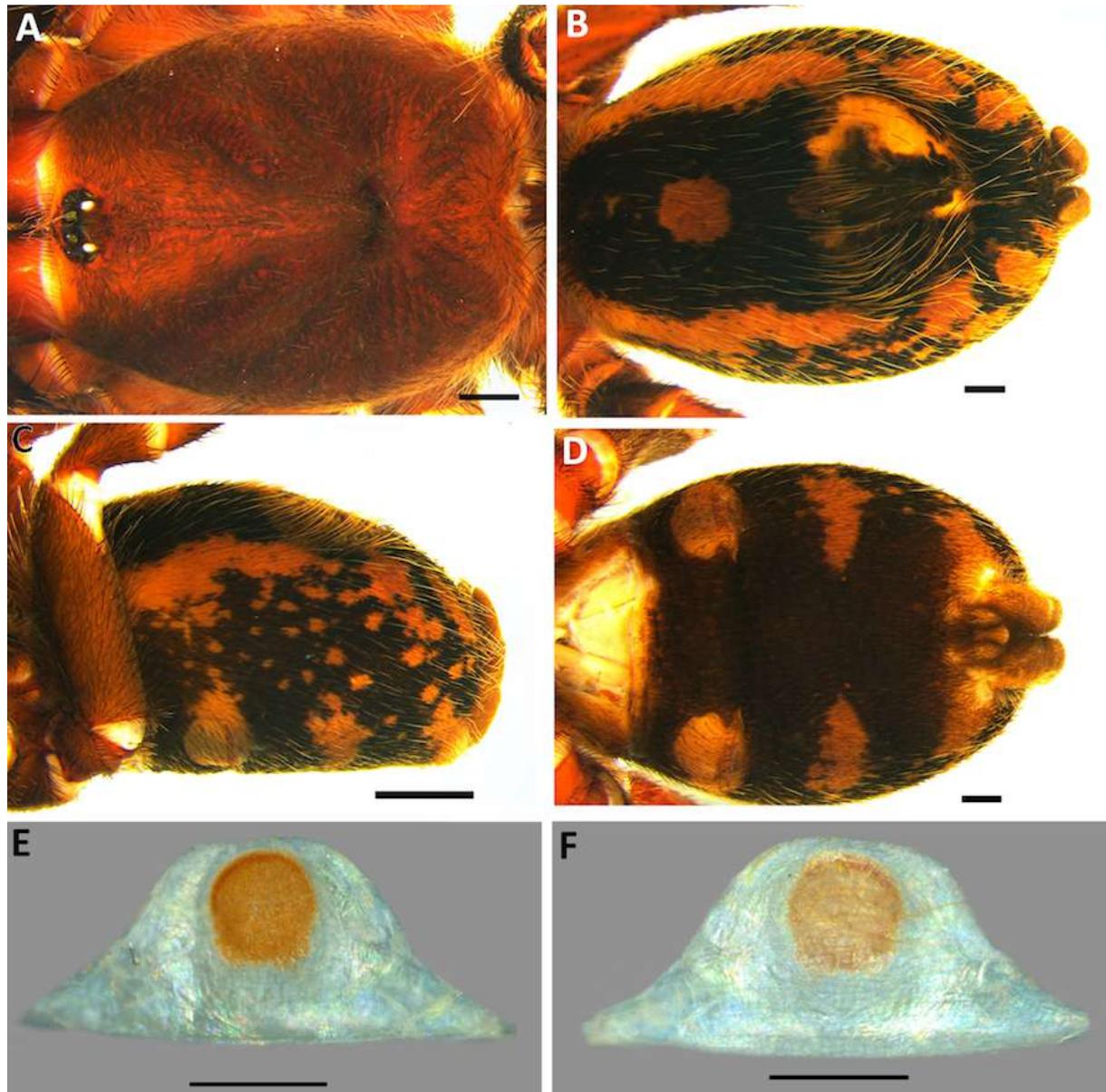


Fig. 13: *Hapalopus vangoghi* Osorio, Benavides, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype female (CAUA_Ara0103), **A** carapace, dorsal view, **B** abdomen, dorsal view, **C** abdomen, lateral view, **D** abdomen, ventral view, **E** spermathecae, dorsal view, **F** spermathecae, ventral view. Scale bars = 0.5mm.

Remarks: Three juveniles are also present in the jar (CAUA_Ara0104) containing one of the paratype females. The three juveniles are hereby explicitly excluded from the type series.

Table 7: *Hapalopus vangoghi* Osorio, Benavides, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype female (CAUA_Ara0103), leg and palp lengths.

	I	II	III	IV	Palp
Femur	6.9	6.0	5.1	7.3	4.4
Patella	4.7	4.2	3.6	4.2	3.5
Tibia	5.3	4.4	3.8	5.4	3.7
Metatarsus	3.8	3.6	4.6	7.1	–
Tarsus	2.6	2.8	2.9	3.4	2.9
Total	23.3	21.0	20.0	27.4	14.5



Fig. 14: *Hapalopus vangoghi* Osorio, Benavides, Sherwood, Gabriel, Peñaherrera-R., Hörweg, Brescovit & Lucas **sp. nov.** holotype female (CAUA_Ara0103), habitus in life, **A** dorsal view, **B** dorso-lateral view.

Notahapalopus* Sherwood, Gabriel, Peñaherrera-R., Osorio, Benavides, Hörweg, Brescovit & Lucas **gen. nov.*

LSID urn:lsid:zoobank.org:act:E77E1B77-099C-49CC-9E34-7581FF474087

Type species: *Hapalopus aymara* Perdomo, Panzera & Pérez-Miles, 2009 by designation herein.

Diagnosis: Males of *Notahapalopus gen. nov.* (Figs. 15A–F, 16A–C) are distinguished from those of the most closely related genera – *Davus* and *Hapalopus* – by the following combination of characteristics: (1) absence of a prolateral inferior keel (present in *Davus* and *Hapalopus*, cf. Gabriel, 2016; Figs. 3A–E, 7A–E, 10A–E), (2) prolateral superior keel with a short or medially enlarged keelar apophysis (prolateral superior keel without keelar apophysis in *Davus* and *Hapalopus*, cf. Gabriel, 2016; Figs. 3A–E, 7A–E, 10A–E), (3) presence of multiple prolateral accessory inferior keels ventrally positioned (except *N. serrapelada comb. nov.*; not ventrally positioned in *Davus* and *Hapalopus*, cf. Gabriel, 2016; Figs. 3A–E, 7A–E, 10A–E), and (4) absence of a spotted and/or striped abdominal pattern (present in both *Davus* and *Hapalopus* cf. Gabriel, 2016; Figs. 4B–D, 6B–D, 7J–L, 9B–D, 10J–L, 12C–E, 13B–E, 14A–B). Further distinguished from *Hapalopus* by the absence of a keelar apophysis on the subapical keel and the absence of metatarsal pits on leg I (both present in *Hapalopus*, cf. Figs. 3A–E, 7A–E, 10A–E). *Notahapalopus gen. nov.* somewhat resembles *Cyriocosmus* (cf. Fukushima *et al.*, 2005) in the medium size of the keelar apophysis (e.g. the type species, *N. aymara comb. nov.*, Figs. 15A–D), but is readily distinguished by the non-filiform embolus (embolus filiform in *Cyriocosmus*, cf. Fukushima *et al.*, 2005), and is further distinguished in females by the fused, Y-shaped, spermathecae (spermathecae not fused and Y-shaped in *Cyriocosmus*, cf. Fukushima *et al.*, 2005). Females are also readily distinguished from those of *Davus* and *Hapalopus* by the protruding, hypersclerotised, and Y-shaped (e.g. Fig. 16C) spermathecal receptacle emerging from an elongated bursa copulatrix (not protruding nor hypersclerotised, and rounded spermathecal receptacle emerging from a short or elongated bursa copulatrix in *Davus* and *Hapalopus*, respectively, cf. Gabriel, 2016; Figs. 6E–F, 7E–F, 12F, 13E–F).

Etymology: The generic epithet is a combination of the phrase “not a” and the genus name *Hapalopus*, in reference that the species in this new genus showed clear signs they did not belong to *Hapalopus sensu stricto*. The gender is masculine.

Distribution: French Guiana, Brazil, and Bolivia (Figs. 17, 20).

Species included: *N. aymara* **comb. nov.**, *N. gasci* **comb. nov.**, *N. parauapebas* **sp. nov.**, *N. serrapelada* **comb. nov.**

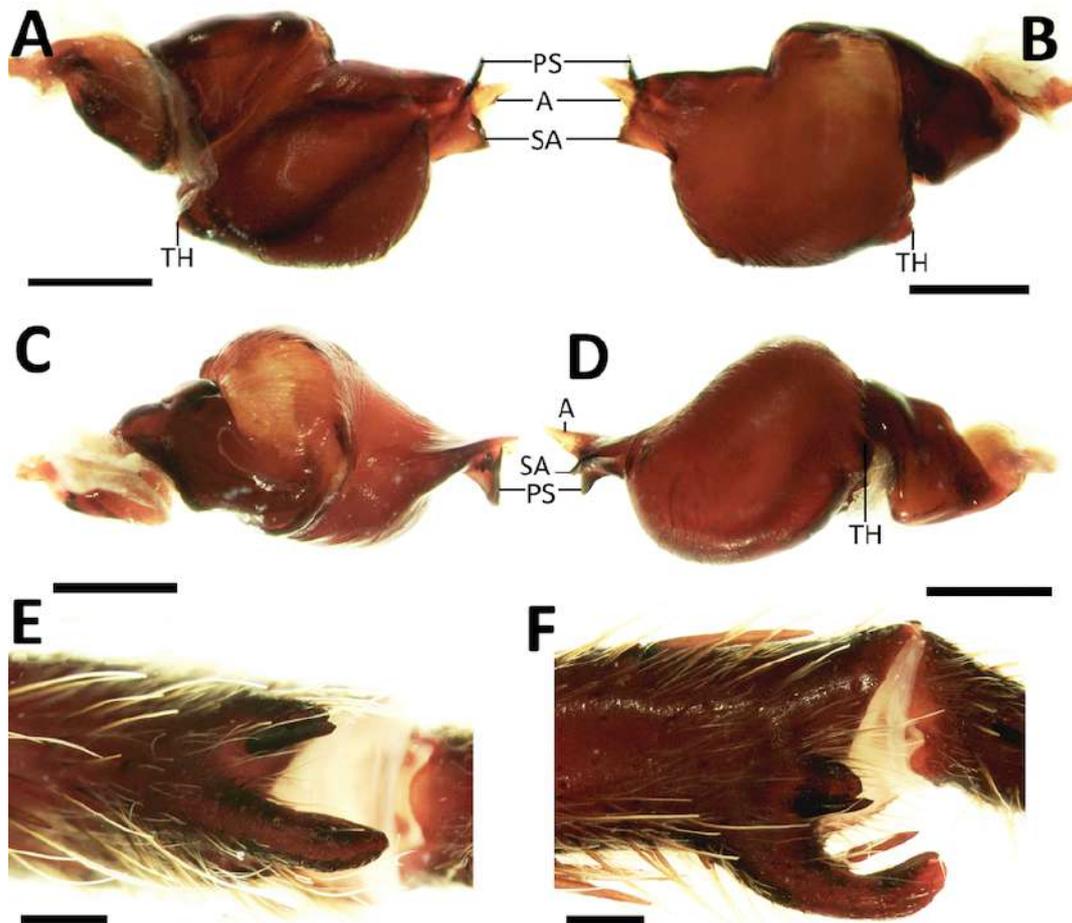


Fig. 15: *Notahapalopus aymara* (Perdomo, Panzera & Pérez-Miles, 2009) **gen. et comb. nov.** holotype male (FCE-MY 734), **A–D** palpal bulb (left-hand side), **E–F** tibial apophysis (left-hand side), **A** prolateral view, **B** retrolateral view, **C** dorsal view, **D** ventral view, **E** ventral view, **F** prolateral view. Scale bars = 1mm. Photographs by, and courtesy of, Fernando Pérez-Miles. Abbreviations: A = apical keel, PS = prolateral superior keel, SA = subapical keel, TH = tegular heel.

***Notahapalopus aymara* (Perdomo, Panzera & Pérez-Miles, 2009) **comb. nov.** (Fig. 15)**
Hapalopus aymara Perdomo, Panzera & Pérez-Miles, 2009: 53, figs. 1–9.

Type material: Holotype ♂ (FCE-MY 734), Rurrenabaque, Beni, Bolivia [= 14°26'43"S, 67°31'1.4"W, see Remarks], coll. P. Stevens, examined by photographs (courtesy of Fernando Pérez-Miles); paratype ♂ (FCE-MY 735), same data, not examined; paratype ♂ (FCE-MY 0736), same data, not examined; paratype 1 ♀ (FCE-MY 737), same data, but raised to maturity in laboratory, not examined.

Diagnosis: Males of *Notahapalopus aymara* **comb. nov.** differ from those of *N. serrapelada* **comb. nov.** by having a PI keel with a well-developed distal crest and a median keelar apophysis, SA keel apically extended with a developed crest, and the presence of multiple, short, ventrally positioned PAIK keels, and the absence of a RS keel (PS keel with a well-developed short median keelar apophysis, single but elongated PAIK keel weakly developed, presence of an RS keel, and SA keel less extended, without a crest, in *N. serrapelada* **comb. nov.**). Females somewhat resemble those of *N. parauapebas* **sp. nov.** but can be differentiated by the base of the receptacle approximately half the width of the bursa copulatrix (three quarters the width of the bursa copulatrix in *N. parauapebas* **sp. nov.**); additionally, differs from *N. gasci* **comb. nov.** by the non-ovate shape of the apical lobes (ovate in *N. gasci* **comb. nov.**), and from *N. serrapelada* **comb. nov.** by the absence of apical concavity of the spermathecal lobes (present in *N. serrapelada* **comb. nov.**).

Remarks: Perdomo *et al.* (2009) provided a reasonably complete description of this Bolivian species. However, recently we also examined the palpal bulb and tibial apophysis of the holotype male by photographs to interpret these characters with a modern context (Figs. 15A–F). It is clear this species is not congeneric with *Hapalopus sensu stricto*, given the considerable number of differences in both the palpal bulb and tibial apophysis (see generic diagnosis). The geographical coordinates of the type locality provided for the species in the original description was wrongly georeferenced (seconds must be a number greater than or equal to 0 and less than 60, whereas Perdomo *et al.* (2009) indicated the longitude data as 67°30'85"W). Fortunately, the textual description of the type locality helped us to georeference and propose the following coordinates to correct the distribution coordinates of *N. aymara* **comb. nov.**: 14°26'43"S, 67°31'1.4"W.

***Notahapalopus gasci* (Maréchal, 1996) comb. nov.**

Psalistops gasci Maréchal, 1996: 590, figs. 1a–c, 2.

Hapalopus gasci: Mori & Bertani (2020): 47, figs. 54–59.

Type material: See Mori & Bertani (2020).

Diagnosis: Females of *Notahapalopus gasci* **comb. nov.** differ from those of all other known congeners by the oval apical lobes (not oval in *N. aymara* **comb. nov.**, *N. parauapebas* **sp. nov.**, and *N. serrapelada* **comb. nov.**).

Remarks: The description and illustrations in Mori & Bertani (2020) demonstrate that this pattern-less species from French Guiana has spermathecal morphology entirely incongruent with *Hapalopus sensu stricto*. However, it is somewhat similar to that of *Notahapalopus gen. nov.* Therefore, we tentatively transfer this species from *Hapalopus*, giving the new combination *Notahapalopus gasci* **comb. nov.** It is important that the male be collected and described to better understand the placement of this species which may belong to its own genus; however, to conclude this without the male would be premature. Here, the priority is to remove it from *Hapalopus sensu stricto*.

***Notahapalopus parauapebas* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas sp. nov. (Fig. 16C)**

Hapalopus aymara: Fonseca-Ferreira, Zampaulo & Guadanucci, 2017: 188, figs. 26–28 (misidentification).

LSID urn:lsid:zoobank.org:act:433439AB-AB70-422E-B276-A1FE151BAB96

Type material: Holotype ♀ (IBSP 166642), Parauapebas, Serra Norte, Floresta Nacional dos Carajás, Pará, Brazil, cave GEM-1179, 26 February 2011, coll. R. A. Zampaulo, examined; paratypes 1 ♀ (IBSP 166641), Parauapebas, Serra Norte, Floresta Nacional dos Carajás, Pará, Brazil, cave GEM-1690, 17 March 2011, coll. R. A. Zampaulo, examined; 1 ♀ (IBSP 166640), Parauapebas, Serra Norte, Floresta Nacional dos Carajás, Pará, Brazil, cave GEM-1750, 16 March 2011, coll. R. A. Zampaulo, examined; 1 ♀ (IBSP 166639), Curionópolis, Serra Leste, Pará, Brazil, cave SL-31, 4 December 2010, coll. R. A. Zampaulo, examined; 1 ♀ (IBSP 166638), Curionópolis, Serra Leste, Pará, Brazil, cave SL-52, 3 June 2010, coll. R. A. Zampaulo, examined.

Diagnosis: Females of *Notahapalopus parauapebas* **sp. nov.** differ from those of *N. aymara* **comb. nov.** by the base of the receptacle three quarters the width of the bursa copulatrix (half the width in *N. aymara* **comb. nov.**), from *N. gasci* **comb. nov.** by the non-ovate shape of the apical lobes (ovate in *N. gasci* **comb. nov.**), and from *N. serrapelanda* **comb. nov.** by the absence of apical concavity of the spermathecal lobes (apically concave in *N. serrapelanda* **comb. nov.**).

Etymology: The specific epithet is a noun in apposition, in reference to the type locality.

Description of holotype female: Total length including chelicerae: 15.5. Carapace: length 8.1, width 6.1. Caput: raised. Ocular tubercle: slightly raised, length 0.6, width 1.3. Eyes: AME > ALE, ALE > PLE, PLE > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, recurved. Chelicera: length 3.1, width 1.8. Abdomen: length 7.5, width 4.3. Maxilla with 130–150 cuspules, covering approximately 53% of proximal edge. Labium: length 0.9, width 1.1, with 100–110 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: length 3.6, width 3.2, with three pairs of sigilla. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 60%; II 50%; III 40%; IV 40%. Lengths of leg and palpal segments: see table 8, legs 4,1,2,3. Spination: femur palp p 0–0–1, tibia I v 0–1–0, II v 0–1–0, p 0–0–1, III v 0–2–2, p 0–1–1, r 0–1–1, IV v 1–2–2, p 0–1–1, r 0–1–1, palp v 0–1–2, r 1–1–1, metatarsus I v 0–1–1 (apical), II v 1–1–1 (apical), p 0–0–1, r 0–0–1, III v 2–2–2 (apical), p 0–1–1, r 0–0–1, IV v 2–2–2 (apical), p 0–1–0, r 1–0–0. Posterior lateral spinnerets with three segments: basal 1.7, medial 1.5, digitiform apical 2.3. Posterior median spinnerets with one segment. Spermathecae with a hypersclerotised Y-shaped receptacle, with two well-defined, non-ovate, apical lobes; receptacle emergent from elongate and membranous bursa copulatrix (Fig. 16C). Urticating setae: Type III present dorsally. Stridulation organ absent. Colour: alcohol preserved brown.

Table 8: *Notahapalopus parauapebas* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **gen. et sp. nov.** holotype female (IBSP 166642), leg and palp lengths.

	I	II	III	IV	Palp
Femur	6.4	5.2	4.5	6.4	4.3
Patella	3.7	3.0	2.8	3.0	3.0
Tibia	4.6	3.8	3.1	5.4	3.1
Metatarsus	3.4	3.2	3.8	5.8	–
Tarsus	2.5	2.4	2.6	3.1	2.8
Total	23.1	17.6	16.8	23.7	13.2

Other material examined. 1 imm. ♀ (IBSP 166643), Brazil, Pará, Serra Leste, Curionópolis, cave SL-52, 3 June 2010, coll. R. A. Zampaulo.

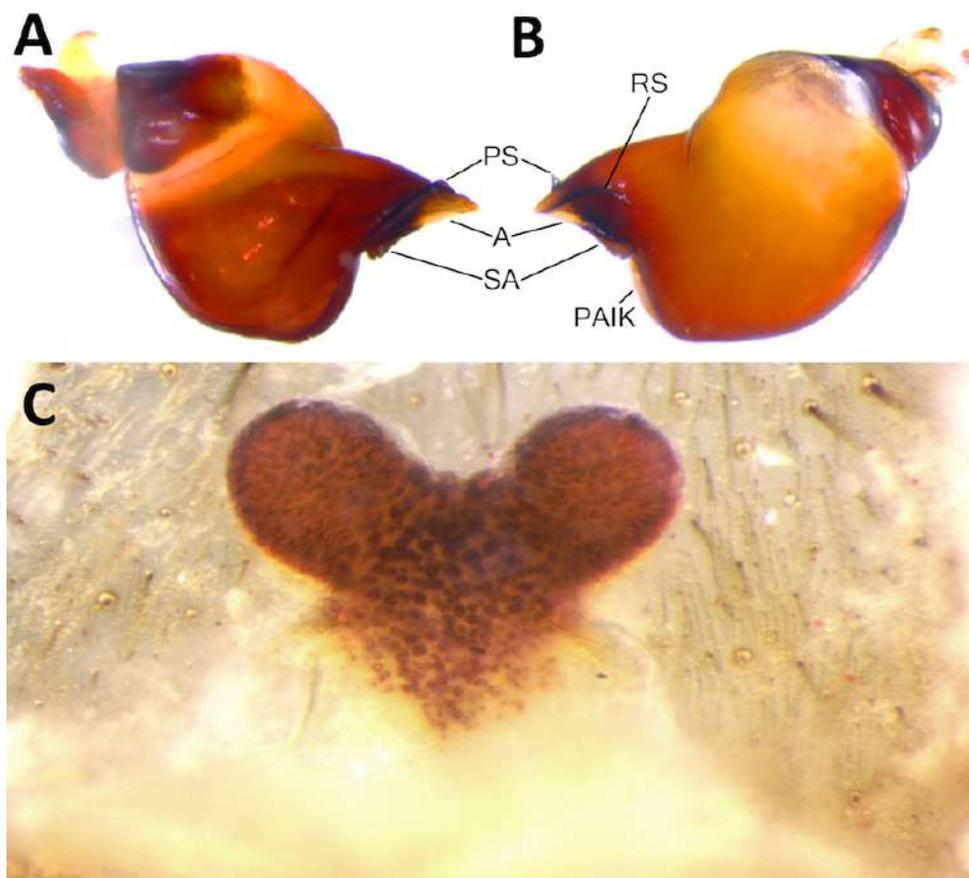


Fig. 16: *Notahapalopus* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **gen. nov.**, genitalia of two species. **A–B** *Notahapalopus serrapelada* (Fonseca-Ferreira, Zampaulo & Guadanucci, 2017) **gen. et comb. nov.** holotype male (IBSP 166623), palpal bulb (left-hand side), **A** prolateral view, **B** retrolateral view; **C** *Notahapalopus parauapebas* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **gen. et sp. nov.** holotype female (IBSP 166642), spermathecae, dorsal view. Abbreviations: A = apical keel, PAIK = prolateral accessory inferior keel, PS = prolateral superior keel, RS = retrolateral superior keel, SA = subapical keel.

Distribution: Known only from the type locality, Parauapebas, Serra Norte, Floresta Nacional dos Carajás, Pará State, Brazil, cave GEM-1179 (Fig. 17, 20).

Remarks: The morphological differences in the spermathecae (Fig. 16C) and clearly disjunct biogeographical distributions indicate that *N. parauapebas* **sp. nov.** is distinct from *N. aymara* **comb. nov.** The possibility that this Brazilian taxon was a new species was pondered by Fonseca-Ferreira *et al.* (2017), but they opted to consider it conspecific with *N. aymara* **comb. nov.** [as *Hapalopus aymara*] in the aim of being conservative. Our direct examination of the type material confirms this species differs from *N. aymara* **comb. nov.** In addition to the type series designated here, we also examined an immature female (IBSP 166643) which is explicitly excluded from type status.

***Notahapalopus serrapelada* (Fonseca-Ferreira, Zampaulo & Guadanucci, 2017) comb. nov. (Figs. 16A–B)**

Hapalopus serrapelada Fonseca-Ferreira, Zampaulo & Guadanucci, 2017: 186, figs. 13–25.

Type material: Holotype ♂ (IBSP 166623), Curionópolis, Serra Leste, Pará, Brazil, cave SL-06, 28/06/2010, coll. R. A. Zampaulo, examined; paratype 1 ♀ (IBSP 166622), Curionópolis, Serra Leste, cave SL-97, 28/07/2010, coll. R. A. Rampaulo, examined; paratype 1 ♀ (IBSP

166621), Parauapebas, Serra Norte, Floresta Nacional dos Carajás, Pará, Brazil, cave GEM-1712, 30/10/2010, coll. R. A. Zampaulo, examined.

Diagnosis: Males of *Notahapalopus serrapelada* **comb. nov.** differ from those of *N. aymara* **comb. nov.** by the PS keel with a well-developed median and a short keelar apophysis, single but elongated PAIK keel weakly developed, presence of an RS keel, and SA keel less extended, without a crest (PI keel with well-developed distal crest and a median keelar apophysis, SA keel apically extended with a developed crest, presence of, ventrally positioned, multiple and short PAIK keels, and absence of RS keel in *N. aymara* **comb. nov.**). Females differ from all other known congeners by the presence of apical concavity of the spermathecal lobes, making each receptacle caliciform-shaped (apical concavity absent on lobes in *N. aymara* **comb. nov.**, *N. gasci* **comb. nov.**, and *N. parauapebas* **sp. nov.**).

Remarks: The description of this Brazilian species was highly detailed, and our own examination of the holotype male confirms its palpal bulb morphology (Figs. 16A–B) fits that of *Notahapalopus* **gen. nov.** This species also shows a spermathecal morphology congruent with *Notahapalopus* **gen. nov.**, as exemplified by Fonseca-Ferreira *et al.* (2017), in addition to absence of a conspicuous abdominal pattern. Therefore, based on genital organ morphology and lack of an abdomen pattern, we transfer *H. serrapelanda* to *Notahapalopus* **gen. nov.** resulting in the new combination *Notahapalopus serrapelada* **comb. nov.**

DISCUSSION

Morphology

Through the examination of some type specimens, formerly housed in *Hapalopus*, we have found a morphological resemblance in the embolic projections that provided further information for taxa grouping, in relation to the general position of these structures (prolateral and subapical). Palpal bulb keel morphology in *Hapalopus* and *Notahapalopus* **gen. nov.** therefore shows a relationship to other Hapalopini genera such as *Davus* and *Cyriocosmus* (e.g. Fukushima *et al.*, 2005: figs. 1–10, 11–20, 21–22; Sherwood & Gabriel 2023: 61, figs. 8–11). After a detailed analysis, we concluded that these projections complemented part of the same keels that were identified by Bertani (2000) as the prolateral (superior and inferior) keels and subapical keel. Nevertheless, the classification of these projections in relation to the placement of the prolateral and subapical keels was unclear if they were individually analysed. For this reason, we consider these projections as a compound structure within the principal keels from which they originate. Thus, if one of these projections is present it should be described (e.g. elongation and direction of projection) within the description of the respective keel from which it originates.

Traditionally these embolic projections in theraphosids, specifically Hapalopini genera, were referred as paraembolic apophyses (e.g. *Cyriocosmus* Simon, 1903, see Fukushima *et al.* 2005). However, the use of this term for these structures was wrongly used in relation to what is truly considered a paraembolic apophysis (e.g. Raven, 1980; Schwendinger, 1991; Passanha & Brescovit, 2018). Accordingly, this led to confusion of two different and distinct structures, which could have contributed towards an underestimation of the potential evolutionary history within the theraphosine tree of life. Although ongoing research will cover this issue in more detail (Peñaherrera-R. *et al.* in prep.), herein we emphasise that the paraembolic apophysis *sensu stricto* is an enlargement of the ventral (e.g. *Jambu* Miglio, Perafán & Pérez-Miles, 2024) or dorsal (e.g. *Magnacarina* Mendoza, Loch, Kaderka,

Medina & Pérez-Miles, 2016) surface of the tegulum or the basal section of the embolus. This enlarged surface arises and follows the same direction of embolus or the opposite (creating almost a concave general shape of the apical part of the bulb), being a possible analogous structure to the conductor (see Raven, 1980). Based on this clarification, we herein propose the term keelar apophysis as a replacement name for the embolic projections present on the prolateral and subapical keels. Contrary to the paraembolic apophysis, the keelar apophysis is the extension of the keel cuticle and in most of the cases is dorsally projected with (e.g. *Davus fasciatus* O. Pickard-Cambridge, 1892) or without (e.g. *Hapalopus* and *Notahapalopus* **gen. nov.** species) dorso-distal serration. In most of the cases, the keelar apophysis basally originates as a regular keel, then at the medial section of the keel the projection occurs (medial to distal in the case of *N. aymara* **comb. nov.**). If a distal extension of the keel with a keelar apophysis is present, generally this section is considerably reduced and/or weakly developed.

It is important to give a clear definition to the term “ring-shaped keel” used by Fukushima *et al.* (2005) as a definitive character for *Hapalopus*, as this character was misinterpreted by Perdomo *et al.* (2009) and other works on “*Hapalopus*” subsequently. The ring-shaped keel is properly defined as the expansion of the subapical keel by result of the curvature of the keelar apophysis. The presence of a true ring-shaped keel (i.e. on the subapical keel, not the prolateral keels as in other genera, Table 9) is indeed characteristic (e.g. Figs. 3A–E, 7A–E, 10A–E) of *Hapalopus sensu stricto*. As shown here, in *H. guerreroi* **sp. nov.** (Figs. 7A–E) the ring-shaped keel is less developed and slightly closer to the prolateral keels than in *H. formosus* and *H. platnicki* **sp. nov.** (cf. Figs. 3A–E, 10A–E). Nonetheless, it still emerges from the subapical keel, reinforcing the generic diagnosis, and merely demonstrating the character also has use at the species level.

In truly monophyletic known Theraphosinae genera which have a single domed and rounded spermathecal receptacle, there is no variance in the character state where a congeneric taxon has a spermathecal receptacle that is decidedly not rounded and domed (i.e. Y-shaped, heart-shaped, or possessing more than one non-anomalous spermathecal lobe) (Gabriel, 2016; Sherwood *et al.*, 2021). For these reasons, we consider *Notahapalopus* **gen. nov.** clearly distinct from females of *Hapalopus sensu stricto* based on spermathecal morphology. The presence vs. absence of an abdominal pattern may be another character of use in differentiating specific genera within this larger grouping, this should be addressed in greater detail by a future work with access to greater sample sizes; ideally, in addition to traditional taxonomic description of alcohol-preserved specimens, the habitus of live specimens of both sexes from topotypic localities should be photographed and illustrated for all species whose colouration is known only from preserved material. However, this is clearly outside the scope of this work. Furthermore, like many theraphosid genera (see Sherwood *et al.*, 2022) we emphasise that Hapalopini would benefit from a broad-sampling molecular study. Additionally, across this study and the new delimitation of *Hapalopus*, genetic approaches concerning the phylogenetic relationship hypotheses of *Hapalopus* proposed by Turner *et al.* (2017) and Ortiz *et al.* (2018) should be reconsidered. It remains to be determined whether all specimens they sequenced under the name *Hapalopus* coincide with *Hapalopus sensu stricto* or whether they may belong to other (including undescribed) Hapalopini genera.

Table 9: Comparison of palpal bulb morphology between some genera of Hapalopini with a keelar apophysis. Homologous keel: present (+) or absent (–). Abbreviations: A = apical keel, ER = embolic ridge, PACK = prolateral accessory central keel, PAIK = prolateral accessory inferior keel, PAR = prolateral apical ridge, PC =

prolateral crease, PI = prolateral inferior keel, PR = prolateral ridge, PS = prolateral superior keel, RS = retrolateral superior keel, SA = subapical keel.

Genus	Keel(s)							Notes
	PS	PI	RS	RI	A	SA	PAIK	
<i>Hapalopus</i> Ausserer, 1875	+/-	+	+	-	+	+	+	PI and PS (if present) distally restricted. PS almost retrolaterally positioned. SA with keelar apophysis, dorsally projected. PAIK extended from basal to distal with a basal to medial crest.
<i>Notahapalopus</i> gen. nov.	+	-	+/-	-	+	+	+	PS with keelar apophysis, dorsally projected. SA crested but without keelar apophysis. In excess of seven PAIK surrounding the ventroprolateral and ventroretrolateral surfaces of the bulb.
<i>Davus</i> O. Pickard- Cambridge, 1892	+	+	+	+	+	+/-	+	PI with keelar apophysis, dorsally projected. Size variable between species. SA absent except in <i>D. ruficeps</i> , where it is present, and crested, but lacks a keelar apophysis. Multiple elongated PAIK and a single PAK present.

The description of different colours for spots on the abdomen (e.g. ‘yellow’, ‘golden’, ‘red-orange’, ‘orange’), by various authors (e.g. Ausserer, 1875; Karsch, 1879; Mello-Leitão, 1939; Schenkel, 1953; Caporiacco, 1955) may suggest at first glance a useful taxonomic feature. However, as already demonstrated by Sherwood *et al.* (2021: figs. 1–3), the colouration of *Hapalopus* spiders varies greatly before and after ecdysis, thus the use of colouration of the spots has no taxonomic value. Gabriel & Sherwood (2022) discussed how Valerio (1982) mentioned the holotype of *H. coloratus* has red spots whereas material they examined had yellow spots. It was doubted that such colouration would change from red to orange, and it was also noted that specimens in sympatry for several *Hapalopus* species were observed to contain both red-spotted and yellow-spotted specimens. Whether this is the result of sexual dimorphism and/or ontogeny remains unknown. Significant differences in colouration in the related genus *Davus* was explored by Gabriel (2020), who showed marked variation even in a single specimen of *D. fasciatus* over the duration of its lifespan. Gabriel & Sherwood (2019) had also shown the ontogenetic colour change of another Hapalopini species, namely *Chromatopelma cyaneopubescens* Strand, 1907.

Distribution and biogeography

The genus *Hapalopus* seems to be restricted to the Caribbean coastal region of Colombia and Venezuela, the Darién and Bocas del Toro regions of Panama, and the Pacific lowlands of Honduras, with an altitudinal range of approximately 4–1200 m a.s.l. (Figs. 17–19); *H. triseriatus* and *H. vangoghi* **sp. nov.** have the highest altitudinal records for the genus. The type species, *H. formosus*, is distributed across the Caribbean-lowland area of Sierra Nevada de Santa Marta in the Guajira biogeographical province (*sensu* Morrone *et al.* 2022); *H. guerreroi* is distributed in the northeastern lowlands of Sierra Nevada de Santa Marta in the Guajira biogeographical province (*sensu* Morrone *et al.* 2022); *H. guerreroi* **sp. nov.** and *H. platnicki* **sp. nov.** are distributed in the Cesar Rancherías basin between the southeastern lowlands of Sierra Nevada de Santa Marta and northwestern lowlands of Serranía del Perijá, part of the Cordillera Oriental of Colombia, in the Guajira biogeographical province (*sensu* Morrone *et al.* 2022); *H. vangoghi* **sp. nov.** is distributed in the montane region of Serranía del Perijá, part of the Cordillera Oriental of Colombia, in the Paramo biogeographical province (*sensu* Morrone, 2022).

Although the type locality of *H. coloratus* seems to be ambiguous, additional records (Valerio, 1982; Gabriel & Sherwood, 2022) showed that this species is distributed in the lowlands of Cordillera del Baudó, close to the international border of Panama and Colombia in the Chocó-Darién biogeographical province (*sensu* Morrone *et al.* 2022) as well as the northwestern region of the Gulf of San Miguel in the Guatuso-Talamanca biogeographical province (*sensu* Morrone *et al.* 2022) of Panama. *Hapalopus triseriatus* is distributed within the valley of Lagunillas, part of the Cordillera de Mérida (Venezuela) in the Guajira biogeographical province (*sensu* Morrone *et al.* 2022). *Hapalopus variegatus* is distributed in the Península de Paraguaná, situated in the Venezuelan biogeographical province (*sensu* Morrone *et al.* 2022). In the case of *H. nigriventris*, the exact collection site of the type specimen remains unknown and Mello-Leitão (1939) only indicated that the specimen was collected somewhere in the State of Falcón [i.e. between the Guajira and Venezuelan biogeographical provinces] (*sensu* Morrone *et al.* 2022). Nevertheless, as we also suggested above in the remarks for the genus, it is possible that *H. variegatus* may or may not be a junior synonym of *H. nigriventris*; in any case, only fresh material from different localities of the region as well as revision of the type material of *H. variegatus* will conclusively resolve this matter.

Additionally, after considering those records identified to the species level, López-Aguilar & Bedoya-Roqueme (2022) reported the presence of an undescribed species “*Hapalopus* sp.” from the northern lowlands of Sierra Madre in the Pacific lowlands biogeographical province in Honduras (Fig. 19). Although we have not examined the reported specimen, the dorsal pattern seems to be congruent to the rest of the species of *Hapalopus*. This record represents the most northern distribution for this genus. Further studies are required in order to strictly confirm the species-level identification of this lineage based on genital characters and molecular analysis. The same applies to a population of *Hapalopus* sp. recently discovered in Bocas del Toro, Panama (Gabriel & Sherwood, 2022; Fig. 19) based on photographic records on the citizen science website iNaturalist (see iNaturalist, 2024). This population is found in the Guatuso-Talamanca biogeographical province (*sensu* Morrone *et al.*, 2022). A lack of infrastructure on the Caribbean coast of Panama may explain the lack of further records from further along its coastline (Gabriel & Sherwood, 2022). Future fieldwork is required, as is examination of preserved specimens to ascertain its species-level identity. Based only on photographs, it cannot be assumed that it is conspecific to *H. coloratus*.

Interestingly, *Hapalopus* is one of the few examples of high speciation in Caribbean theraphosids. The discovery of new species across short geographical distances and, furthermore, the discovery of parapatric populations of *H. platnicki* **sp. nov.** and *H. guerreroi* **sp. nov.** may indicate that not only pure geomorphologic variables should take part in the evolution of these species, but also that niche variables may influence short-distance speciation. In the case of the montane *Hapalopus* species of the Cordillera Oriental of Colombia and Cordillera de Mérida of Venezuela (i.e. *H. platnicki* **sp. nov.** and *H. triseriatus*, respectively), the presence of these species might be linked by geographical incursions that allow low montane and lowland taxa access through each Cordillera into less pronounced gradients. We hypothesise that geographical incursions, as biogeophysical drivers, created small and large valleys (e.g. *H. triseriatus* in the valley of Lagunillas) on these Cordilleras and promoted isolated ecosystems, in this case xeric ecosystems (Anderson & Soriano, 1999; Barrio-Amoros, 2006; Aranguren *et al.* 2015), and encouraged the divergence and speciation of this genus.

A similar case is observed in the recently described genus *Urupelma* Kaderka, Lüddecke, Řezáč, Řezáčová & Hüusser, 2023, in which according to the recovered phylogeny (Kaderka *et al.* 2023), three clades are recognised but the most notable is that each basal species of each clade belongs to a high montane species and the divergent species to a low montane or Amazonian species. A further example of this pattern within mygalomorphs is that of the ischnotheline genera *Andethele* Coyle, 1995 and *Ischnothele* Ausserer, 1875 (Coyle, 1995). It is important to note that this biogeographical pattern was entirely overlooked by Kaderka *et al.* (2023) when describing *Urupelma* and is newly discussed herein, despite their claims to have advanced the knowledge of ‘montane’ theraphosids. In *Urupelma*, it is likely that the Vilcanota-Urubamba basin, acted as a bridge for genetic and speciation fluxes of high montane groups down to the Amazonian region. Nonetheless, the continuing output of taxonomic (including redescription of historical material) and phylogenetic works gradually brings clarity and stability to neotropical theraphosids and new opportunities for the understanding of theraphosid diversification.

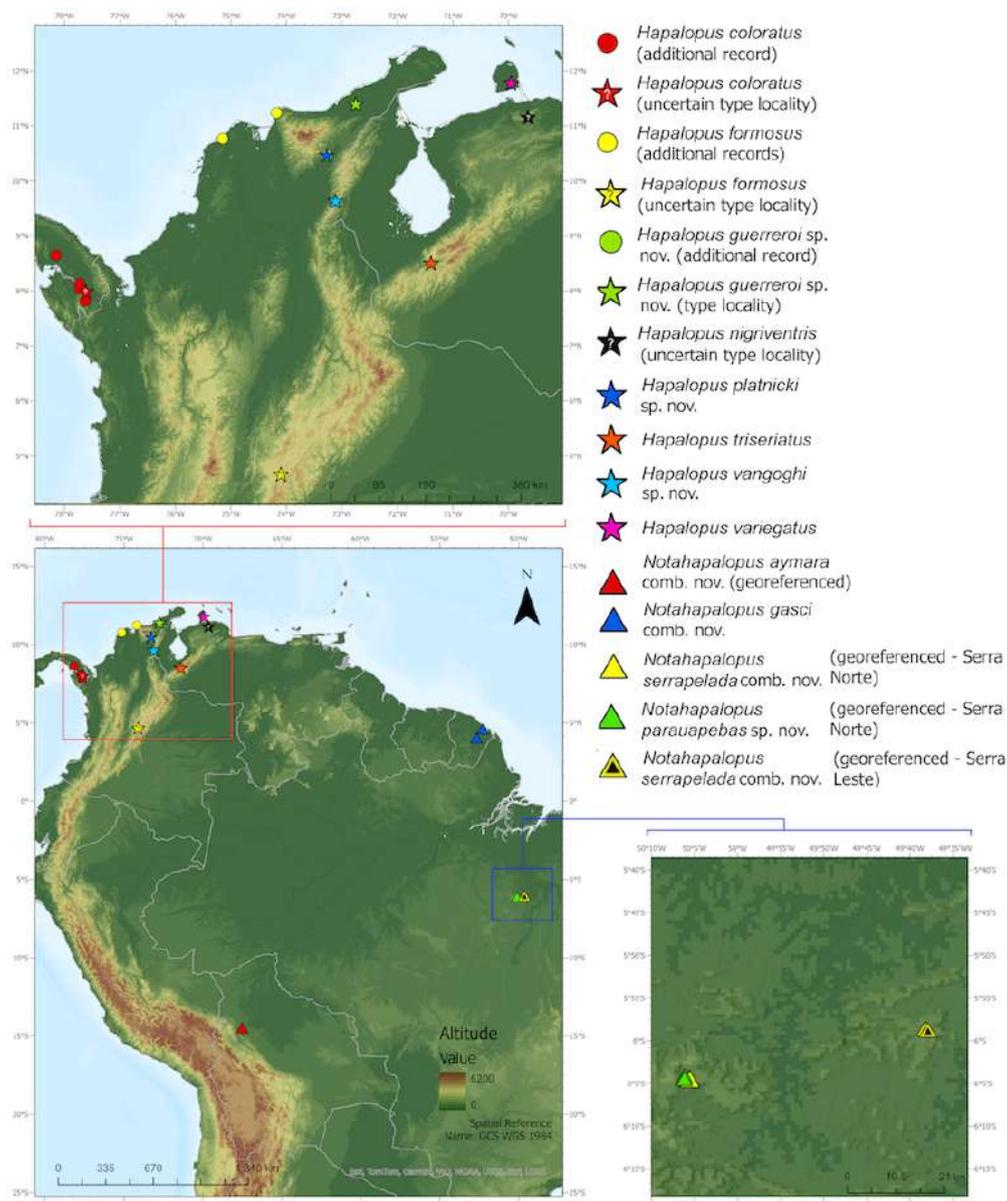


Fig. 17: Distribution map of the genera *Hapalopus* Ausserer, 1875 and *Notahapalopus* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **gen. nov.**

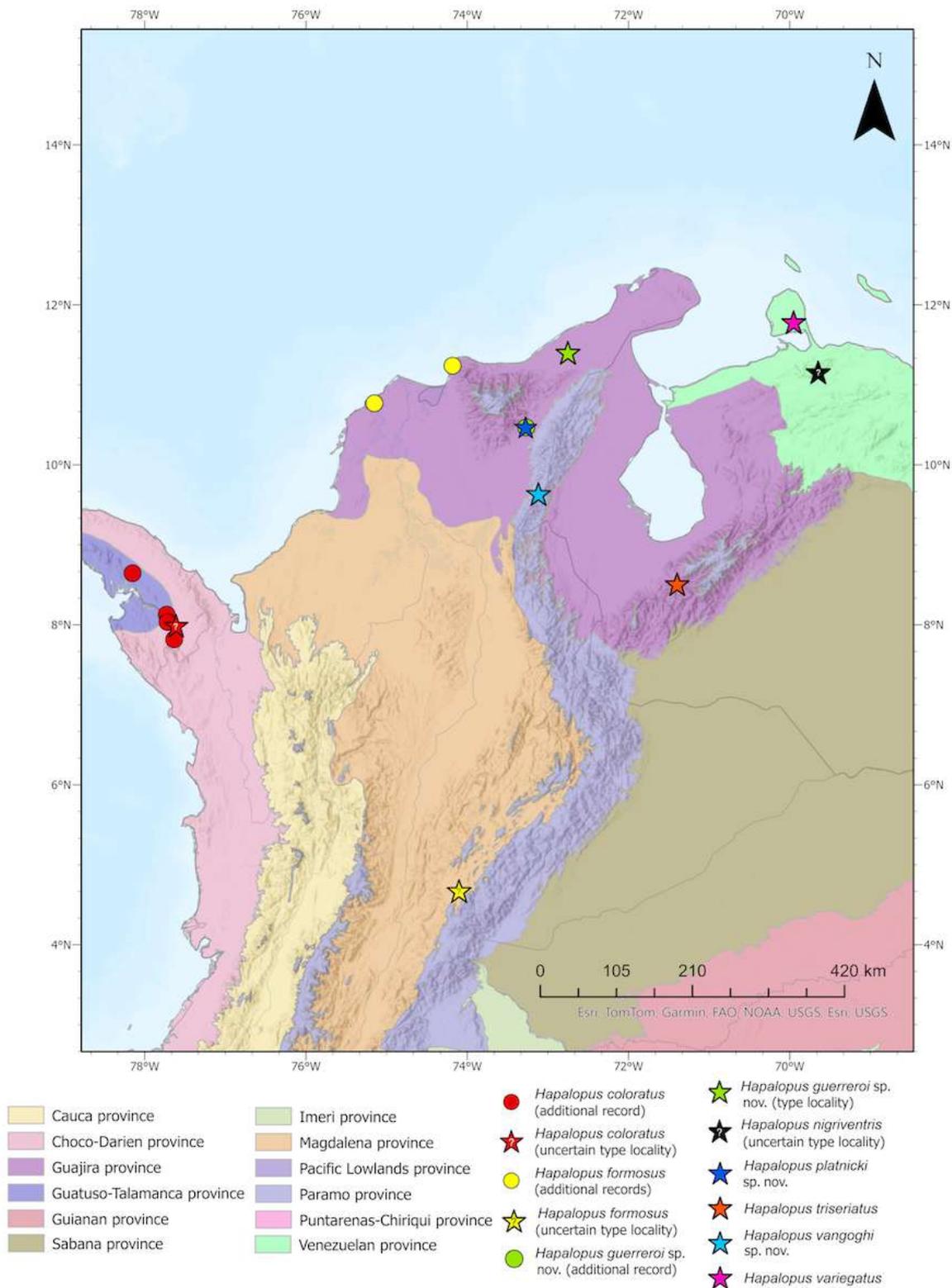


Fig. 18: Biogeographical distribution of the valid species of *Hapalopus* Ausserer, 1875 according to the biogeographic regionalisation of Morrone *et al.* (2022).

Conversely, *Notahapalopus* **gen. nov.** is distributed (Figs. 17, 20) across the Amazon and Parnaiba basins and altitudinally restricted by the Guiana, Central Brazil, and Atlantic shields, with an altitudinal range of approximately 20–610 m a.s.l; *N. serrapelada* **comb. nov.** has the highest altitudinal record for the genus, yet *N. aymara* **comb. nov.** is the geographically-closest species to the Andes. The type species, *N aymara* **comb. nov.**, is

distributed across the lower montane area of the Cordillera Oriental of Bolivia in the Yungas biogeographical province (*sensu* Morrone *et al.* 2022); *N. gasci* **comb. nov.** is distributed across the Atlantic-lowland area of the Guyana Shield in the Guianan Lowlands biogeographical province (*sensu* Morrone *et al.* 2022), and the sympatric species *N. parauapebas* **sp. nov.** and *N. serrapelada* **comb. nov.** are distributed in the montane area of the Parnaíba basin, near the Central Brazil shield, in the Xingu-Tapajos biogeographical province (*sensu* Morrone *et al.* 2022).

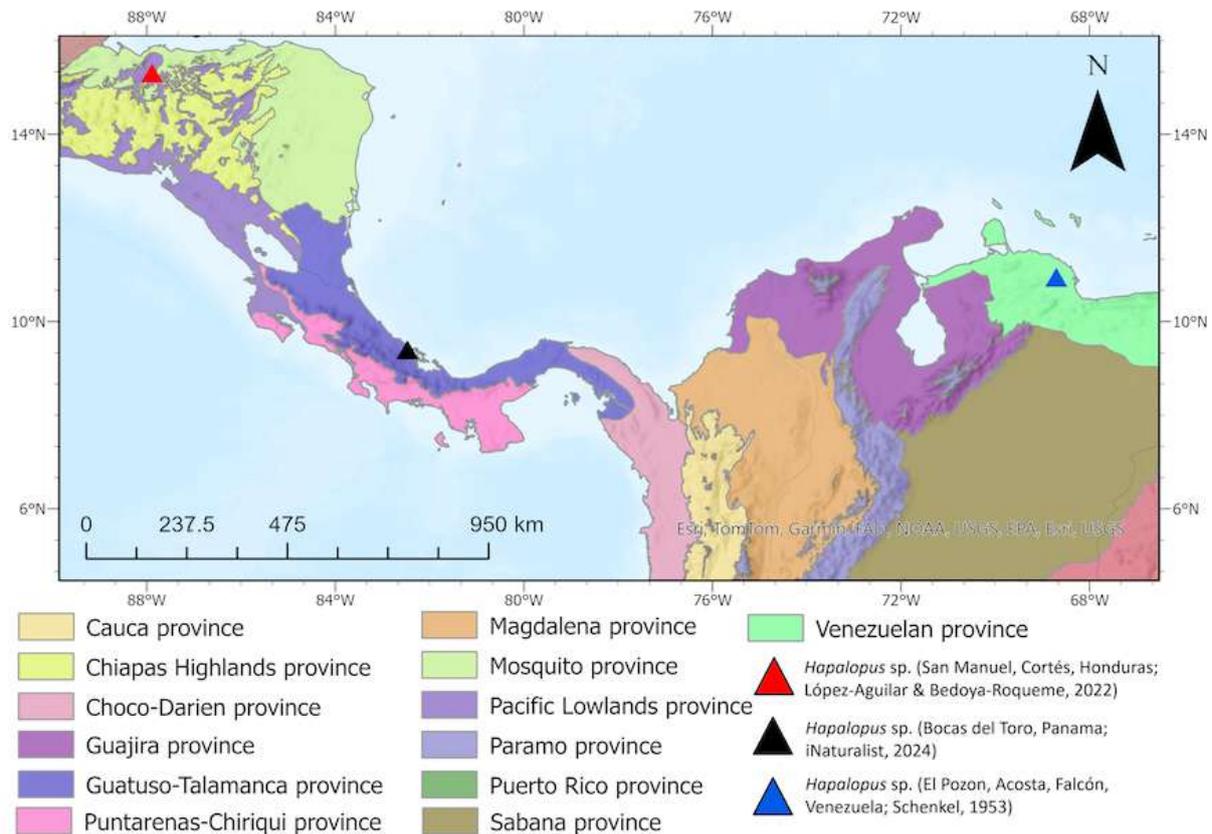


Fig. 19: Additional records of *Hapalopus* spp. which require further taxonomic investigation. Biogeographic regionalisation *sensu* Morrone *et al.* (2022).

Due to the sparse distribution that *Notahapalopus* **gen. nov.** currently shows, we cannot infer at this moment whether major geographical mechanisms might occur within speciation. The presence of sympatric species could be explained by niche variables (see above), microecosystem specialisation, and cave isolation. In a more generic biogeographic approach to this new genus, considering that *Notahapalopus* **gen. nov.** is phylogenetically close to *Hapalopus* (see above), we hypothesise that the separation of *Notahapalopus* **gen. nov.** could have been triggered by the Miocene Amazonian wetland of the Acre system (see Wesselingh & Hoorn, 2011: fig. 3.3). Nevertheless, this hypothesis should be tested through molecular studies as well as the reconstruction of the ancestral distribution.

Misplaced taxon

Jambu Miglio, Perafán & Pérez-Miles, 2024

Jambu Miglio, Perafán & Pérez-Miles, 2024: 232.

Type species: *Jambu paru* Miglio, Perafán & Pérez-Miles, 2024 by original designation.

Diagnosis: See Remarks.

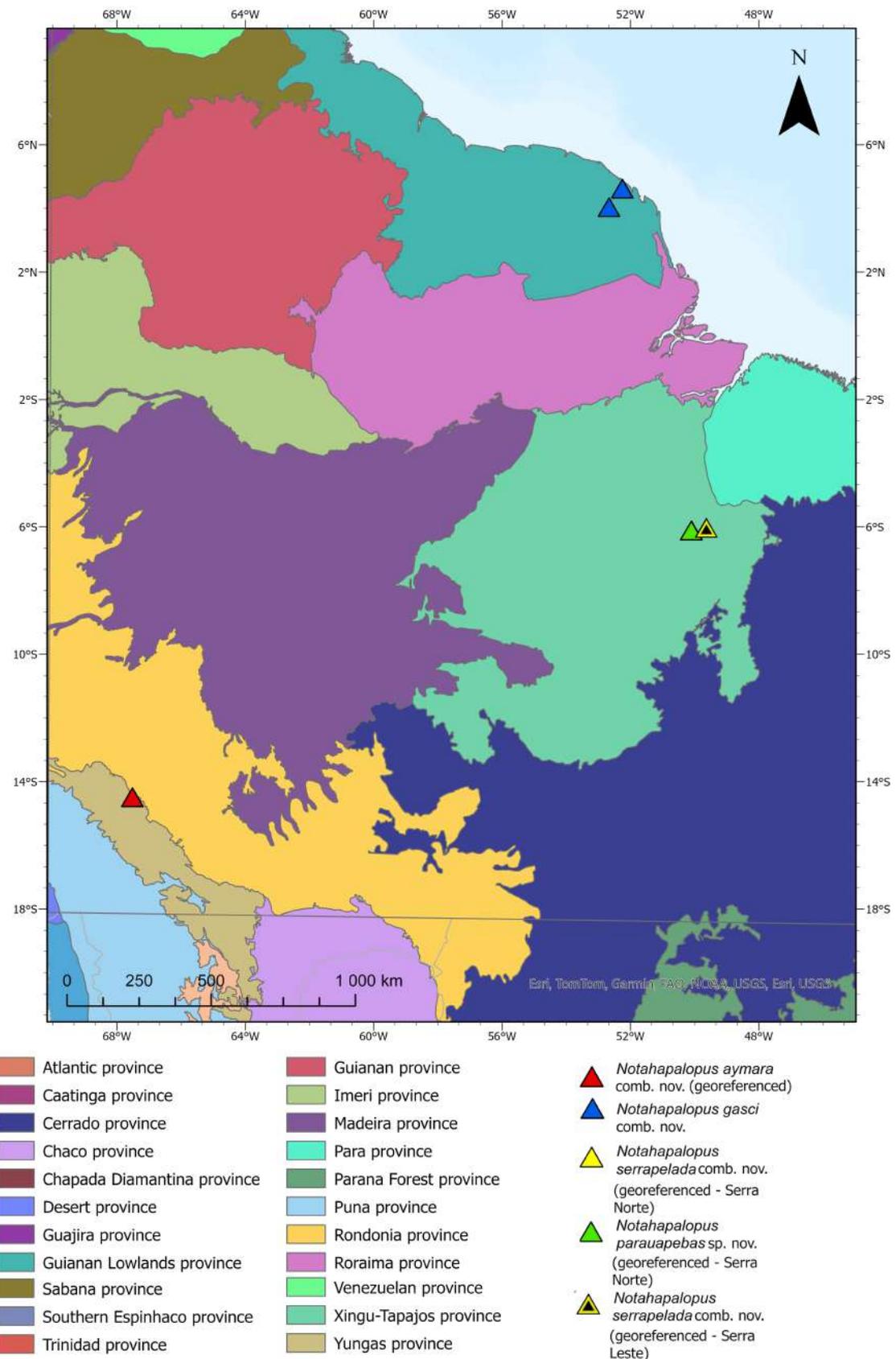


Fig. 20: Biogeographical distribution of the known *Notahapalopus* Sherwood, Gabriel, Osorio, Benavides, Peñaherrera-R., Hörweg, Brescovit & Lucas **gen. nov.** according to the biogeographic regionalisation of Morrone *et al.* (2022).

Description: See Miglio *et al.* (2024).

Distribution: Bolivia, Brazil, and Guyana (new record).

Remarks: During the completion of the present work over more than half a decade, we concluded *Hapalopus butantan* (Pérez-Miles, 1998) (holotype male and three paratype males in IBSP, examined) and *H. lesleyae* Gabriel, 2011 (holotype male in OUMNH, examined) were clearly not congeneric with *Hapalopus sensu stricto*. These species can be distinguished from *Hapalopus* by the thin and elongate embolus which is free from the base of the palpal bulb (embolus and base of palpal bulb contiguous, embolus not detached from base of palpal bulb in *Hapalopus*), the paired patches of urticating setae on the lateral abdomen (urticating setae in a single dorsal patch in *Hapalopus*), and by the extremely protruding spermathecal receptacle (not protruded, domed and rounded in *Hapalopus*). They somewhat resemble *Cyriocosmus* Simon, 1903 based on the general shape of the male palpal bulb. However, Fukushima *et al.* (2005) and Miglio *et al.* (2024) were confused, referring to [in *Cyriocosmis*] what is now the keelar apophysis as a paraembolic apophysis (see Discussion). Recently, just before submitting our work, Miglio *et al.* (2024) described a new genus, *Jambu*, to house *J. butantan* and two new species, negating the need for us to deal with that species. However they did not examine or mention *H. lesleyae* which has similar morphology. We deal with this overlooked species below. Notably, both aforementioned species also possess Type IV urticating setae (pers. obs.). *Jambu* can be differentiated from *Cyriocosmus* by the ventrally-positioned paraembolic apophysis (versus keelar apophysis, situated dorsally, in *Cyriocosmus*). Indeed, *Jambu* is notable as being one of the only theraphosine genera with a true paraembolic apophysis.

Species included: *J. butantan* (Pérez-Miles, 1998), *J. lesleyae* (Gabriel, 2011) **comb. nov.**, *J. paru* Miglio, Perafán & Pérez-Miles, 2024, *J. manoa* Miglio, Perafán & Pérez-Miles, 2024.

***Jambu lesleyae* (Gabriel, 2011) comb. nov. (Fig. 21)**

Hapalopus lesleyae Gabriel, 2011: 77, figs. 1–6.

Type material: Holotype ♂ (OUMNH), Kanaima Mountain, Amatuk, Guyana, 13/03/1960, coll. Lampel, examined.

Diagnosis: Males of *Jambu lesleyae* **comb. nov.** (Figs. 21A–K) can be distinguished from those of *J. butantan* by the absence of carapace markings (present in *J. butantan*, cf. Fukushima *et al.*, 2005: fig. 55), and the different abdominal patterning (cf. Fukushima *et al.*, 2005: fig. 55), from those of *J. paru* by the absence of a palpal tibial apophysis (present in *J. paru*, cf. Miglio *et al.*, 2024: fig. 1E) and absence of a PI keel (present in *J. paru*, cf. Miglio *et al.*, 2024: fig. 3A–D), and from those of *J. manoa* by the triangular apex of the paraembolic apophysis (almost quadrate in *J. manoa*, cf. Miglio *et al.*, 2024: fig. 7A–D).

Etymology: This species was named after its author's late partner, Lesley Hedicker (1955–2011), who died from cancer shortly after publication.

Distribution: Guyana (Gabriel, 2011; World Spider Catalog, 2024).

Remarks: The paraembolic apophysis on the palpal bulb and presence of Type IV urticating setae, in addition to the similar opisthosomal patterning and tibial apophysis morphology, indicates this species belongs to *Jambu* as defined by Miglio *et al.* (2024). Therefore, based

on the above characters, we transfer *H. lesleyae*, creating the new combination *Jambu lesleyae* **comb. nov.**

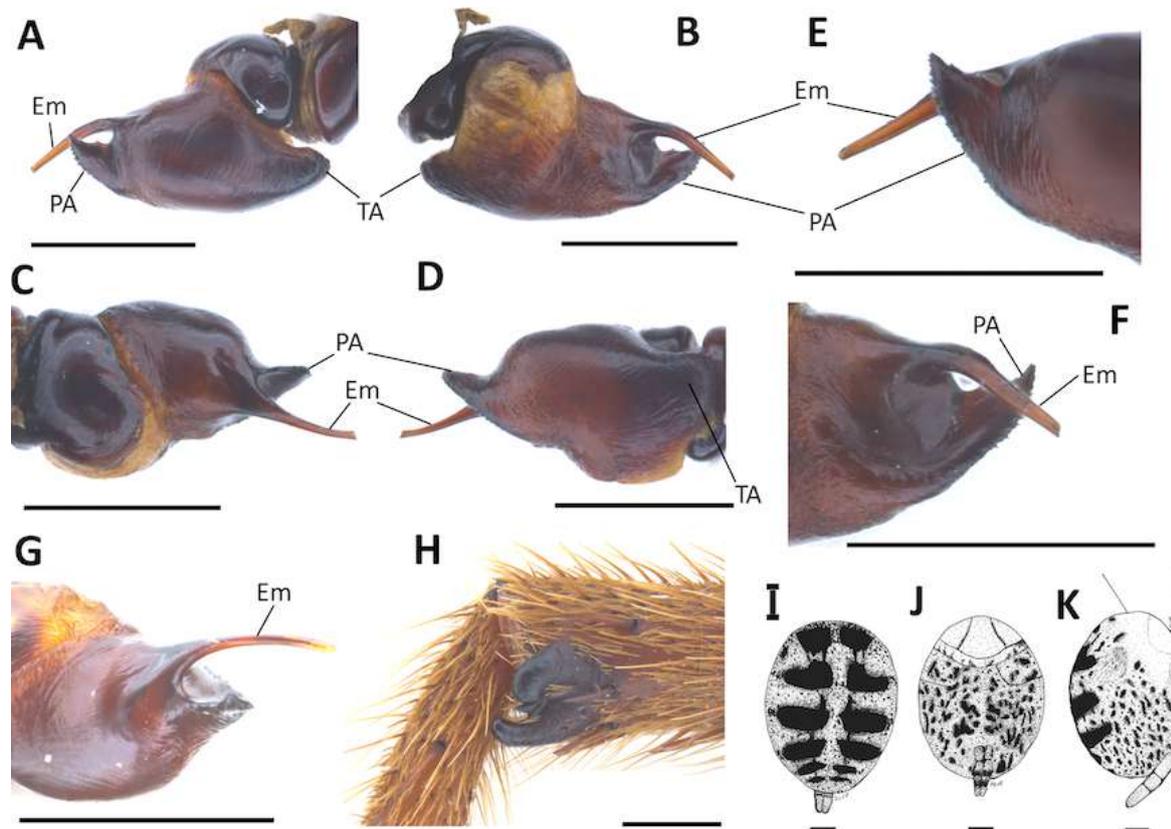


Fig. 21: *Jambu lesleyae* (Gabriel, 2011) **comb. nov.** holotype male (OUMNH). **A–F** palpal bulb (right hand side, note: tip of embolus is snapped off), **A** prolateral view, **B** retrolateral view, **C** dorsal view, **D** ventral view, **E** close-up of embolus, prolateral view, **F** close-up of embolus, retrolateral view, **G** left-hand palpal bulb, still attached to cymbium, showing an intact tip of the embolus, **H** tibial apophysis (right-hand side), prolateral view, **I–K** illustrations of abdominal pattern, **I** dorsal view, **J** ventral view, **K** lateral view (right-hand side). Scale bars = 1mm. Figures I–K modified from Gabriel (2011). Abbreviations: Em = embolus, PA = paraembolic apophysis, TA = tegular apophysis.

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REFERENCES

- Anderson, R. P. & Soriano, P. J. 1999.** The occurrence and biogeographic significance of the southern spiny pocket mouse *Heteromys australis* in Venezuela. *Zeitschrift für Säugetierkunde*, 64(2): 121–125.
- Aranguren B, A., Costa, M., Guevara, J. & Carrero, O. 2015.** Phytobiogeography of the species associated with dry intermountain valleys in the Chama river middle basin, Mérida, Venezuela. *Acta Botanica Venezuelica*, 38(1): 63–86.
- Ausserer, A. 1875.** Zweiter Beitrag zur Kenntniss der Arachniden-Familie der Territelariae Thorell (Mygalidae Autor). *Verhandlungen der Kaiserlich-Königlichen Zoologisch-Botanischen Gesellschaft in Wien*, 25: 125–206, pl. 5–7.
- Barrio-Amoros, C. L. 2006.** A new species of *Phyllomedusa* (Anura: Hylidae: Phyllomedusinae) from northwestern Venezuela. *Zootaxa*, 1309(1): 55–68.
- Berdondini, I. & Whitman, S. 2003.** Catalogs of the Natural History Museum of Florence University, Zoology Section "La Specola". XVI. Arachnida Araneae: types. *Atti della Società Toscana di Scienze Naturali Memoranda*, B109(2002): 119–156.
- Bertani, R. 2000.** Male palpal bulbs and homologous features in Theraphosinae (Araneae, Theraphosidae). *Journal of Arachnology*, 28: 29–42.
- Bertani, R. 2001.** Revision, cladistic analysis, and zoogeography of *Vitalius*, *Nhandu*, and *Proshapalopus*; with notes on other theraphosine genera (Araneae, Theraphosidae). *Archivos de Zoología*, 36(3): 265–356.
- Bertani, R. 2012.** Revision, cladistic analysis and biogeography of *Typhochlaena* C. L. Koch, 1850, *Pachistopelma* Pocock, 1901 and *Iridopelma* Pocock, 1901 (Araneae, Theraphosidae, Aviculariinae). *ZooKeys*, 230: 1–94.
- Caporiacco, L. di 1955.** Estudios sobre los arácnidos de Venezuela. 2a parte: Araneae. *Acta Biologica Venezuelica*, 1: 265–448.
- Corro-Chang, P.E. & Cambra, R.A. 2011.** Diversidad de avispas (Hymenoptera: Pompilidae) cazadoras de arañas del Parque Nacional Darien, Republica de Panama. *Tecnociencia*, 13(1): 77–90.
- Cooke, J. A. L., Roth, V. D. & Miller, F. H. 1972.** The urticating hairs of theraphosid spiders. *American Museum Novitates*, 2498: 1–43.
- Coyle, F. A. 1995.** A revision of the funnelweb mygalomorph spider subfamily Ischnothelinae (Araneae, Dipluridae). *Bulletin of the American Museum of Natural History*, 226: 1–133.
- Ferretti, N., Chaparro, J. C., Ochoa, J. A. & West, R. 2023.** A new tarantula (Mygalomorphae: Theraphosidae) genus endemic from Peru with a novel genitalic morphology among theraphosinae and its phylogenetic placement. *Zoologischer Anzeiger*, 302: 102–112.
- Fonseca-Ferreira, R., Zampaulo, R. de A. & Guadanucci, J. P. L. 2017.** Diversity of iron cave-dwelling mygalomorph spiders from Pará, Brazil, with description of three new species (Araneae). *Tropical Zoology*, 30(4): 178–199.
- Fukushima, C. S., Bertani, R. & Silva Jr., P. I. da 2005.** Revision of *Cyriocosmus* Simon, 1903, with notes on the genus *Hapalopus* Ausserer, 1875 (Araneae: Theraphosidae). *Zootaxa*, 846: 1–31.
- Gabriel, R. 2011.** A new species of *Hapalopus* Ausserer, 1875 from Guyana (Araneae: Theraphosidae). *Journal of the British Tarantula Society*, 26(2): 76–80.
- Gabriel, R. 2016.** Revised taxonomic placement of the species in the Central American genera *Davus* O. Pickard-Cambridge, 1892, *Metriopelma* Becker, 1878, and *Schizopelma* F. O. Pickard-Cambridge, 1897, with comments on species in related genera (Araneae: Theraphosidae). *Arachnology*, 17(2): 61–92.

- Gabriel, R. 2020.** Some notes and observations on the variation in abdominal pattern, colour and other features in species of the genus *Davus* O. Pickard-Cambridge, 1892 (Araneae: Theraphosidae). *Journal of the British Tarantula Society*, 35(2): 30–48.
- Gabriel, R. & Sherwood, D. 2019.** Ontogenetic colour change in the Venezuelan theraphosine *Chromatopelma cyaneopubescens* (Strand, 1907) (Araneae: Theraphosidae). *Newsletter of the British Arachnological Society*, 146: 8–10.
- Gabriel, R. & Sherwood, D. 2020.** Revised taxonomic placement of *Pseudhapalopus* Strand, 1907, with notes on some related taxa (Araneae: Theraphosidae). *Arachnology*, 18(4): 301–316.
- Gabriel, R. & Sherwood, D. 2022.** Taxonomy, biogeography, and ecology of some theraphosid spiders of the Darién region with description of five new species (Araneae: Theraphosidae). *Revista Ibérica de Aracnología*, 40: 5–18.
- Gerschman de P., B. S. & Schiapelli, R. D. 1973.** La subfamilia Ischnocolinae (Araneae: Theraphosidae). *Revista del Museo Argentino de Ciencias Naturales Bernardino Rivadavia (Ent.)*, 4: 43–77.
- Huber, S., Salm, R. & Schmidt, G. 1996.** *Theraphosidae der Welt*. Arachnologisches Magazin, 64 pp.
- iNaturalist. 2024.** *iNaturalist*, records of *Hapalopus* spiders from Bocas del Toro, Panama, online at: <https://inaturalist.org>
- Kaderka, R., Lüddecke, T., Řezáč, M., Řezáčová, V. & Hüßler, M. 2023.** Revision of the Peruvian tarantula *Homoeomma peruvianum* (Chamberlin, 1916): description of a new genus with eleven new species and insights to the evolution of montane tarantulas (Araneae: Theraphosidae: Theraphosinae). *Journal of Natural History*, 57(41–44): 1710–1824.
- Karsch, F. 1879.** Sieben neue Arachniden von St. Martha. *Entomologische Zeitschrift, Stettin*, 40: 106–109.
- Koch, C. L. 1850.** *Übersicht des Arachnidensystems*. Heft 5. J. L. Lotzbeck, Nürnberg, 77 pp.
- Lamarck, J. B. de 1818.** *Histoire naturelle des animaux sans vertèbres*. Paris, 5, 1–612.
- López Aguilar, T. P. & Bedoya Roqueme, E. 2022.** Presence of the genus *Hapalopus* Ausserer, 1875 (Araneae: Theraphosidae) in Honduras, and field observations on cannibalism. *Revista Ibérica de Aracnología* 41: 170–173.
- Maréchal, P. 1996.** *Psalistops gasci* n.sp., première Barychelidae de Guyane française (Araneae, Mygalomorphae). *Bulletin du Muséum national d'histoire naturelle, Paris*, (4A), 18: 589–594.
- Mello-Leitão, C. F. de 1939.** Araignées américaines du Musée d'histoire naturelle de Bâle. *Revue Suisse de Zoologie*, 46(2): 43–93.
- Mendoza, J. I., Loch, A., Kaderka, R., Medina, F. & Pérez-Miles, F. 2016.** A new genus of theraphosid spider from Mexico, with a particular palpal bulb structure (Araneae, Theraphosidae, Theraphosinae). *European Journal of Taxonomy*, 232: 1–28.
- Miglio, L. T., Perafán, C. & Pérez-Miles, F. 2024.** *Jambu*, a new genus of tarantula from Brazil (Araneae, Theraphosidae, Theraphosinae). *European Journal of Taxonomy*, 930: 229–248.
- Mori, A. & Bertani, R. 2020.** Revision and cladistic analysis of *Psalistops* Simon, 1889, *Trichopelma* Simon, 1888 and *Cyrtogrammomma* Pocock, 1895 (Araneae: Theraphosidae) based on a cladistic analysis of relationships of Theraphosidae, Barychelidae and Paratropididae. *Zootaxa*, 4873(1): 1–132.
- Morrone, J. J., Escalante, T., Rodríguez-Tapia, G., Carmona, A., Arana, M. & Mercado-Gómez, J. D. 2022.** Biogeographic regionalization of the Neotropical region: New map and shapefile. *Anais da Academia Brasileira de Ciências*, 94(1): e20211167.

- Ortiz, D., Francke, O. F. & Bond, J. E. 2018.** A tangle of forms and phylogeny: Extensive morphological homoplasy and molecular clock heterogeneity in *Bonnetina* and related tarantulas. *Molecular Phylogenetics and Evolution*, 127: 55–73.
- Passanha, V. & Brescovit, A. D. 2018.** On the Neotropical spider subfamily Masteriinae (Araneae, Dipluridae). *Zootaxa*, 4463(1): 1–73.
- Peñaherrera-R., P., Ghia, T., Sherwood, D. & Gabriel, R. 2024.** New insights on male palpal bulb morphology in *Cymbiapophysa* Gabriel & Sherwood, 2020, with four new species from Ecuador (Araneae: Theraphosidae). *Arachnology* 19(7): 1003–1017.
- Perdomo, C., Panzera, A. & Pérez-Miles, F. 2009.** *Hapalopus aymara* a new species of tarantula from Bolivia (Araneae, Theraphosidae, Theraphosinae). *Iheringia, Série Zoologia*, 99: 53–55.
- Pickard-Cambridge, F. O. 1897.** Arachnida - Araneida and Opiliones. In: *Biologia Centrali-Americana, Zoology*. London 2, 1–40, pl. 1–3.
- Pickard-Cambridge, O. 1892.** Arachnida. Araneida. In: *Biologia Centrali-Americana, Zoology*. London 1, 89–104, pl. 11–14.
- Pérez-Miles, F. 1998.** Revision and phylogenetic analysis of the neotropical genus *Cyriocosmus* Simon, 1903 (Araneae, Theraphosidae). *Bulletin of the British Arachnological Society*, 11(3): 95–103.
- Pérez-Miles, F. 2020.** Introduction to the Theraphosidae. In: Pérez-Miles, F. (ed.) *New World Tarantulas*. Zoological Monographs, 6, pp. 1–23.
- Pérez-Miles, F., Lucas, S. M., Silva Jr., P. I. da & Bertani, R. 1996.** Systematic revision and cladistic analysis of Theraphosinae (Araneae: Theraphosidae). *Mygalomorph*, 1: 33–68.
- Petrunkévitch, A. 1925.** Arachnida from Panama. *Transactions of the Connecticut Academy of Arts and Sciences*, 27: 51–248.
- Pocock, R. I. 1897.** On the spiders of the suborder Mygalomorphae from the Ethiopian Region, contained in the collection of the British Museum. *Proceedings of the Zoological Society of London*, 65(3): 724–774, pl. 46–48.
- Raven, R. J. 1980.** The evolution and biogeography of the mygalomorph spider family Hexathelidae (Araneae, Chelicerata). *Journal of Arachnology*, 8: 251–266.
- Raven, R. J. 1985.** The spider infraorder Mygalomorphae (Araneae): cladistics and systematics. *Bulletin of the American Museum of Natural History*, 182: 1–180.
- Rudloff, J.-P. 1997.** Revision der Gattung *Holothele* Karsch, 1879 nebst Aufstellung einer neuen Gattung *Stichoplastoris* gen. nov. (Araneae, Theraphosidae) und Wiedereinsetzung einiger weiterer Gattungen der Mygalomorphae. *Arachnologisches Magazin*, 5(2): 1–19.
- Schenkel, E. 1953.** Bericht über einige Spinnentiere aus Venezuela. *Verhandlungen der Naturforschenden Gesellschaft in Basel*, 64: 1–57.
- Schmidt, G. 1986.** *Vogelspinnen: Lebensweise, Bestimmungsschlüssel, Haltung und Zucht*. Albrecht Philler, Minden, 126 pp.
- Schmidt, G. 1993.** *Vogelspinnen: Vorkommen, Lebensweise, Haltung und Zucht, mit Bestimmungsschlüsseln für alle Gattungen, Vierte Auflage*. Landbuch, Hannover, 151 pp.
- Schmidt, G. 1995.** Ist *Typhlochlaena magdalena* Karsch, 1879 wirklich eine *Avicularia*?. *Arachnologisches Magazin*, 3(2): 10–13.
- Schmidt, G. 1997.** Bestimmungsschlüssel für die Gattungen der Unterfamilie Theraphosinae (Araneae: Theraphosidae). *Arachnologisches Magazin*, 3(Sonderausgabe): 1–27.
- Schmidt, G. 2003.** *Die Vogelspinnen: Eine weltweite Übersicht*. Neue Brehm-Bücherei, Hohenwarsleben, 383 pp.
- Schmidt, G. 2015.** Notes on the nomenclature of theraphosids (Araneae, Mygalomorphae). *Tarantulas of the World*, 143: 13–22.
- Schwendinger, P. J. 1995.** New *Liphistius* species (Araneae, Mesothelae) from southern Thailand and northern Malaysia. *Zoologica Scripta*, 24(2): 143–156.

- Sehna, C. 2000.** Typenkatalog der Reduviidae des Naturhistorischen Museums in Wien (Insecta: Heteroptera). *Kataloge der wissenschaftlichen Sammlungen des Naturhistorischen Museums in Wien, Band 14, Entomologie*, Heft 6, 126 pp.
- Sherwood, D. & Gabriel, R. 2023.** First distribution record of *Cyriocosmus elegans* (Simon, 1889) from Guyana (Araneae: Theraphosidae). *Revista Ibérica de Aracnología*, 43: 59–62.
- Sherwood, D., Fabiano-Da-Silva, W., Gabriel, R. & Lucas, S. M. 2020.** Redescription of *Nesipelma insulare* Schmidt & Kovařík, 1996 with a revised generic diagnosis for *Nesipelma* Schmidt & Kovařík, 1996 and a transfer from *Cyrtopholis* Simon, 1892 (Araneae: Theraphosidae). *Arachnology*, 18(5): 462–467.
- Sherwood, D., Gabriel, R., Lucas, S. M. & Brescovit, A. D. 2021.** An anomalous spermathecae resolved after moulting events in a female of *Hapalopus* Ausserer, 1875 with a review of spermathecal anomalies in theraphosid spiders (Araneae: Theraphosidae). *Revista Ibérica de Aracnología*, 39: 139–143.
- Sherwood, D., Gabriel, R., Brescovit, A. D. & Lucas, S. M. 2022.** On the species of *Pamphobeteus* Pocock, 1901 deposited in the Natural History Museum, London, with redescriptions of type material, the first record of *P. grandis* Bertani, Fukushima & Silva, 2008 from Peru, and the description of four new species. *Arachnology*, 19(3): 650–674.
- Shorthouse, D. P. 2010.** *SimpleMappr*, an online tool to produce publication-quality point maps, online at: <https://www.simplemappr.net>
- Simon, E. 1887.** Etudes arachnologiques. 19e Mémoire. XXVII. Arachnides recueillis à Assinie (Afrique occidentale) par MM. Chaper et Alluaud. *Annales de la Société Entomologique de France*, (6) 7: 261–276.
- Simon, E. 1888.** Etudes arachnologiques. 21e Mémoire. XXIX. Descriptions d'espèces et de genres nouveaux de l'Amérique centrale et des Antilles. *Annales de la Société Entomologique de France*, (6) 8: 203–216.
- Simon, E. 1889.** Voyage de M. E. Simon au Venezuela (Décembre 1887–Avril 1888). 4e Mémoire. Arachnides. *Annales de la Société Entomologique de France*, (6) 9: 169–220, pl. 12–13.
- Simon, E. 1892.** *Histoire naturelle des araignées. Deuxième édition, tome premier.* Roret, Paris, pp. 1–256.
- Simon, E. 1903.** *Histoire naturelle des araignées. Deuxième édition, tome second.* Roret, Paris, pp. 669–1080.
- Smith, A. M. 1986.** *The tarantula: classification and identification guide.* Fitzgerald Publishing London, 179 pp.
- Smith, A. M. 1987.** *The tarantula: classification and identification guide (second ed.).* Fitzgerald Publishing, London, 179 pp.
- Tesmoingt, M. & Schmidt, G. 2002.** *Stenotarsus scissistylus* gen. et sp. n. (Theraphosidae: Theraphosinae), eine Vogelspinne aus Französisch Guyana. *Tarantulas of the World*, 76: 3–12.
- Turner, S. P., Longhorn, S. J., Hamilton, C. A., Gabriel, R., Pérez-Miles, F. & Vogler, A. P. 2018.** Re-evaluating conservation priorities of New World tarantulas (Araneae: Theraphosidae) in a molecular framework indicates nonmonophyly of the genera, *Aphonopelma* and *Brachypelma*. *Systematics and Biodiversity*, 16(1): 89–107.
- Valerio, C. E. 1982.** Arañas terafosidas de Costa Rica (Araneae, Theraphosidae). IV. Generos *Metriopelma* y *Cyclosternum*, incluyendo especies de Panama. *Brenesia*, 19/20: 407–423.
- Vol, F. 1999.** A propos d'une spermatheque inhabituelle. *Arachnides*, 42: 1–13.
- Vol, F. 2001.** Description d'une deuxième espèce de *Bonnetina* Vol, 2000 du Mexique, *B. rudloffii* sp. n. (Araneae, Theraphosidae, Theraphosinae) et comparaison avec *B. cyaneifemur*. *Arachnides*, 48: 7–16.

Wesseingh, F. & Hoorn, C. 2011. Geological Development of Amazon and Orinoco Basins. *In: James Albert (ed.) Historical Biogeography of Neotropical Freshwater Fishes.* University of California Press, pp. 58–67.

World Spider Catalog. 2024. *World Spider Catalog, version 25.0.* Natural History Museum Bern, online at: <http://wsc.nmbe.ch> (accessed 04/04/2024).

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