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TAXONOMY, BIOGEOGRAPHY, AND ECOLOGY OF SOME THERAPHOSID SPIDERS OF THE DARIÉN REGION WITH DESCRIPTION OF FIVE NEW SPECIES (ARANEAE: THERAPHOSIDAE)

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Abstract: A summary of the present knowledge on the biogeography and ecology of the known theraphosid spiders in the Darién region, Panama is presented. *Hapalopus coloratus* (Valerio, 1982) is redescribed, *Holothele longipes* (L. Koch, 1875), *Neischnocolus panamanus* (Petrunkevitch, 1925) and *Psalmopoeus pulcher* Pretunkevitch, 1925 are briefly discussed. Five new species of theraphosid spider are described from the Darién region: *Cyclosternum darienensis* **sp. nov.**, *Euthycaelus quinteroi* **sp. nov.**, *Pamphobeteus sucreorum* **sp. nov.**, *Spinosatibiapalpus cambrai* **sp. nov.** and *Tapinauchenius herrerai* **sp. nov.** The supposed distribution of the taxa *Pamphobeteus ornatus* Pocock, 1903 and *Xenesthis immanis* (Ausserer, 1875) in Panama are rejected. The synonymy of *Xenesthis colombiana* Simon, 1891 with *X. immanis* is rejected based on incompatible leg morphometrics and no textual justification thereby restoring *X. colombiana* **comb. rest.**
Key words: morphology, ecology, biogeography, Panama, Colombia, tarantula.

Taxonomía, biogeografía y ecología de algunas arañas terafosidas de la región de Darién con descripción de cinco nuevas especies (Araneae: Theraphosidae)
Resumen: Se presenta un resumen del conocimiento actual sobre la biogeografía y ecología de las arañas terafosidas en la región de Darién. Se redescribe *Hapalopus coloratus* (Valerio, 1982), *Holothele longipes* (L. Koch, 1875), *Neischnocolus panamanus* (Petrunkevitch, 1925) y *Psalmopoeus pulcher* Petrunkevitch, 1925 se descuten brevemente. Se describen cinco nuevas especies de araña terafosida de la región de Darién: *Cyclosternum darienensis* **sp. nov.**, *Euthycaelus quinteroi* **sp. nov.**, *Pamphobeteus sucreorum* **sp. nov.**, *Spinosatibiapalpus cambrai* **sp. nov.** y *Tapinauchenius herrerai* **sp. nov.** Se rechaza la supuesta distribución de los taxones *Pamphobeteus ornatus* Pocock, 1903 y *Xenesthis immanis* (Ausserer, 1875) en Panamá. Se rechaza la sinonimia de *Xenesthis colombiana* Simon, 1891 con *X. immanis* por incompatibilidad de medidas de piernas y sin justificación de textual, por lo que se *X. colombiana* **comb. rest.**
Palabras clave: morfología, ecología, biogeografía, Panamá, Colombia, tarántula.

Taxonomy / Taxonomía: *Cyclosternum darienensis* **sp. nov.**, *Euthycaelus quinteroi* **sp. nov.**, *Pamphobeteus sucreorum* **sp. nov.**, *Spinosatibiapalpus cambrai* **sp. nov.** and *Tapinauchenius herrerai* **sp. nov.**

Introduction

The remaining jungles of the Darién Province, Panama are one of the last mostly unexplored regions of the world (ANAM, 2014; McCarthy & Fallon, 2016), bordered by the Caribbean Sea in the North, the Pacific Ocean in the, and Colombia in the East. This area is approximately 11, 900km^2 and comprised mostly of pastureland, some forestry and inaccessible lowland jungle, rising to cloud forest on the highest peaks at around 2,200m (National Geographic, 2007, ANAM, 2014; McCarthy & Fallon, 2016). The area is known primarily for the famous Darién Gap but also as it encompasses the Parque Nacional Darién, a UNESCO world heritage site around 5, 800 km^2 in the West of the province, which is one of the most important world heritage sites in Central America (Healey, 2001; Heckadon-Moreno, 2004; Anonymous, 2005; National Geographic, 2007, ANAM, 2014; McCarthy & Fallon, 2016). The Darién varies in seasons, with a distinct dry season in January to April and a wet season May to December. Temperatures vary based on altitude, with lowland areas averaging over 30°C air temperature during the day, contrasting with 17°C in some high-altitude habitats (Anonymous, 2005; National Geographic, 2007, ANAM, 2014; McCarthy & Fallon, 2016). Even during dryer months, the average rainfall can be over 300mm (Anonymous, 2005; National Geographic, 2007, ANAM, 2014; McCarthy & Fallon, 2016). The Pan-American Highway (known as the interamericana in some Latin American countries including Panama) is a road starting from Prudhoe Bay, Alaska in the northern hemisphere ending in Puerto Montt and Quellón in Chile or Ushuaia in Argentina depending on the route taken in the Southern hemisphere. The Darién Gap is the area between Yaviza where the highway stops in the Darién Province, Panama and then continues from Turbo, Columbia, demonstrating there is a "gap" in the highway.

For the adventurous, travel through the Darién was once possible with the aid of local guides leaving Yaviza in Panama and traversing the jungle, about 100km, mostly on foot (or occasionally by off road motorcycles). However, more recently, since the nineteen eighties, onwards passage through the Darién has become increasingly dangerous with numerous people being kidnapped, held to ransom, and often murdered, by various guerrilla groups such as FARC (Fuerzas Armadas Revolucionarias de Colombia) (Hart-Dyke & Winder, 2003) which has resulted in the cessation of attempts to cross the region from country to country by the inland route. Even as recent as 2021, some hostilities remain with the leader of FARC being recently killed. In the past few years people, mostly backpackers who want to say they have crossed the Darién, now use a coastal route often with the help of the indigenous Kuna Yala leaving from the San Blass archipelago on the Caribbean side of Panama crossing along the Caribbean coast of Colombia (various backpackers pers. comm. to RG).

Species lists for all flora and fauna in the area are incomplete with many specimens collected more than 50 years ago. In Panama, however, there is an ANAM biological research station near El Real, namely Rancho Frío Research Station close to the Parque Nacional Darién (Healey, 2001; Heckadon-Moreno, 2004; Anonymous, 2005; National Geographic, 2007, ANAM, 2014; McCarthy & Fallon, 2016). The specimens discussed in this paper were mostly collected in this area by faculty and students of the Universidad de Panama and loaned to RG from the Museo de Invertebrados G.B. Fairchild for study and identification, additionally with further historical specimens examined from the Natural History Museum, London, the Museum of Comparative Zoology, Harvard University, and the Museo de Insectos, Universidad de Costa Rica. It is important to state that many of the new species herein are known only from the area around the research station but are likely distributed more widely in the Darién region.

The diversity of the Theraphosidae of Panama is almost certainly under recorded. Currently, (World Spider Catalog, 2021) recognises nineteen taxa from Panama: *Aphonopelma belindae* Gabriel, 2011, *Avicularia glauca* Simon, 1891, *Davus fasciatus* O. Pickard, Cambridge, 1892, *Davus santos* Gabriel, 2016, *Hapalopus coloratus* (Valerio, 1982), *Holothele longipes* (L. Koch, 1875), *Neischnocolus panamanus* Petrunkevitch, 1925, *Pamphobeteus ornatus* Pocock, 1903, *Psalmopoeus intermedius* Chamberlin, 1940, *Psalmopoeus pulcher* Petrunkevitch, 1925, *Psalmopoeus reduncus* (Karsch, 1880), *Sericopelma commune* F. O. Pickard-Cambridge, 1897, *Sericopelma embrithes* (Chamberlin & Ivie, 1936), *Sericopelma panamanum* (Karsch, 1880), *Sericopelma panamense* (Simon, 1891), *Sericopelma rubronitens* Ausserer, 1875, *Sphaerobothria hoffmanni* Karsch, 1879, *Stichoplastoris stylipus* (Valerio, 1982) and *Xenesthis immanis* (Ausserer, 1875). *P. ornatus* and *X. immanis* are considered at present to have a distribution in both Panama and neighbouring Colombia, though the status of these two species in Panama is questioned and discussed herein.

In this work, we describe five new species of theraphosid spider from the Darién region, redescribe the species *H. coloratus*, discuss three species currently known from the Darién region and clarify the contended distributions of two other species previously considered as being found in Panama.

Materials and methods

Specimens were examined under a binocular microscope, photographs of spermathecae and palpal bulbs were made using Leica M125C auto-montage. Description style follows Sherwood *et al*. (2020). Abbreviations, Institutes: AMNH = American Museum of Natural History, New York; ANAM = Autoridad Nacional del Ambiente, República de Panamá; BMNH = Natural History Museum, London; MCZ = Museum of Comparative Zoology, Harvard University, Cambridge; MIUCR = Museo de Insectos, Universidad de Costa Rica, San Jose; MIUP = Museo de Invertebrados G.B. Fairchild, Universidad de Panama, Panama City; MNHN = Muséum National d'Histoire Naturelle, Paris; OUMNH = Oxford University Museum of Natural History, Oxford; PMY = Peabody Museum of Natural History, Yale, United States; SMF = Senckenberg Forschungsinstitut und Naturmuseum, Frankfurt-am-Main, Germany. Structures: ALE = anterior lateral eyes; AME = anterior median eyes; GP = guard plates (of spermathecae *sensu* Gabriel & Sherwood, 2020); PLE = posterior lateral eyes; PME = posterior median eyes; PB = prolateral branch (of tibial apophysis); RB = retrolateral branch (of tibial apophysis). Others: a.s.l. = above sea level; imm = immature; coll. = collector; colln. = collection. Leg spine terminology follows Petrunkevitch (1925) with the modifications proposed by Bertani (2001): d = dorsal, v = ventral, r = retrolateral, p = prolateral. Palpal bulb keel terminology follows Bertani (2000) and Gabriel (2016): A = apical, PI = prolateral inferior, PS = prolateral superior, RI = retrolateral inferior, RS = retrolateral superior, SA = subapical, TH = tegular heel, with additions proposed by Gabriel & Sherwood (2020a): ER = embolic ridge; PC = prolateral crease; PR = prolateral ridge; PAR = prolateral apical ridge. Urticating setae terminology follows Cooke, Roth & Miller (1972) and Kaderka *et al*. (2019). Leg formulae starts with the longest leg to the shortest in order of decreasing size, e.g., 4,1,2,3. All measurements in mm. All labels are written verbatim. The map was made using SimpleMappr (Shorthouse, 2010).

Results

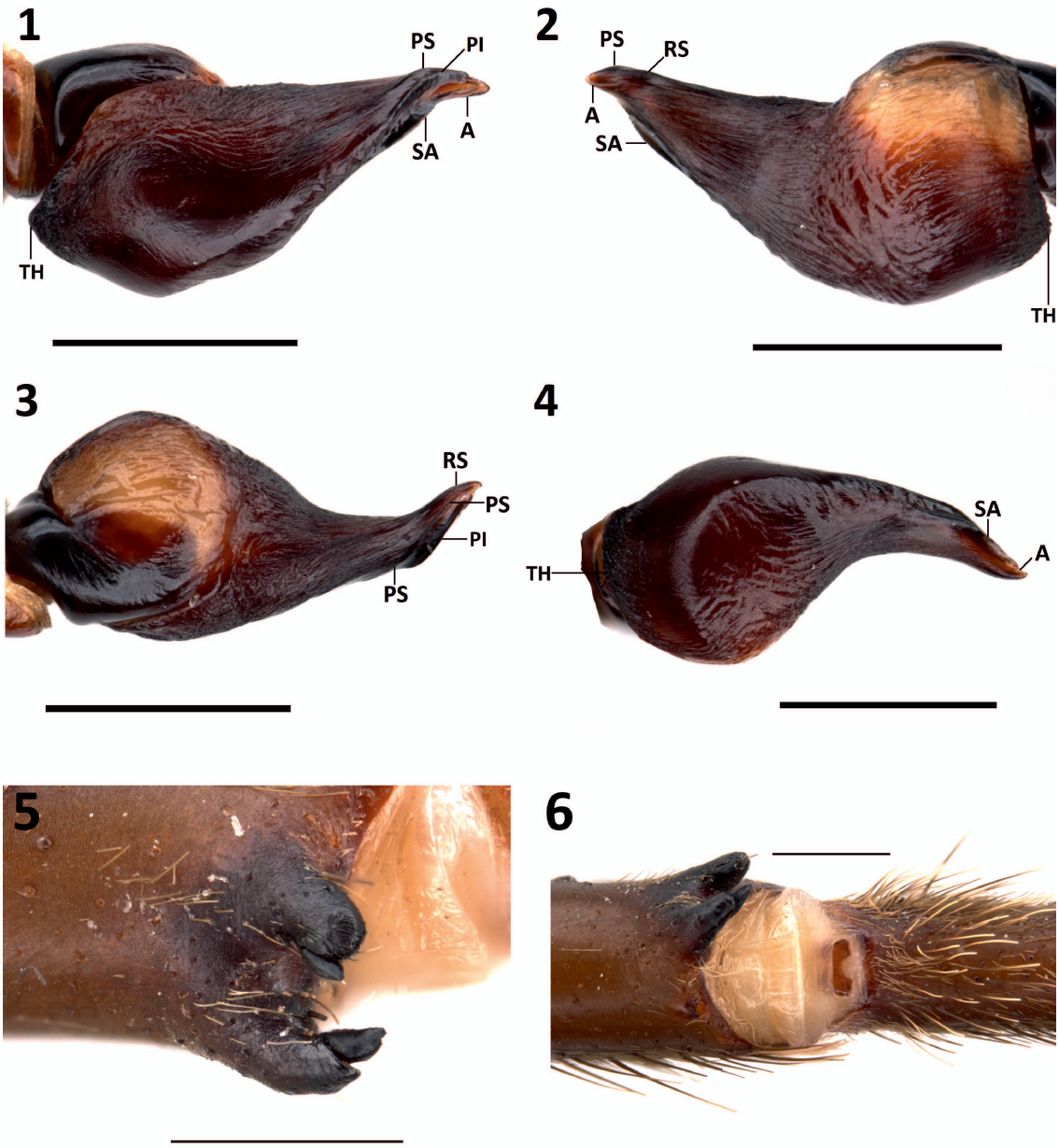
***Cyclosternum darienensis* sp. nov.**

TYPE MATERIAL: Holotype ♂ (MIUP), Panama: Prov. Darién, P.N. Darién, Est. Rancho Frío Pierre, 30 julio–19 augusto 2002, coll. A. Santos and R. Miranda, examined.

DIAGNOSIS: *C. darienensis* **sp. nov.** can be differentiated from congeners by palpal bulb morphology with by a combination of the moderately thick embolus, elongate SA and weakly developed RS (Figs. 1–4) and by its disjunct biogeography.

ETYMOLOGY: The specific epithet is in reference to the Parque Nacional Darién, where this species was collected.

DESCRIPTION: Holotype male (MIUP). Total length including chelicerae: 19.8. Carapace: length 9.6, width 7.7. Caput: slightly raised. Ocular tubercle: raised, length 1.0, width 1.6. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior eye row procurved, posterior row slightly recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, recurved. Chelicera: length 4.0, width 2.8. Abdomen: length 7.6, width 4.9. Maxilla with 40–50 cuspules covering approximately 75% of the proximal edge. Labium: length 1.4, width 1.9, with 35–40 cuspules mostly separated by 0.5–1.0 times the width of a cuspule. Labio-sternal mounds: separate. Sternum: length 3.9, width 3.8, with three pairs of sigilla. Tarsi I–IV divided by band of setae. Metatarsal scopulae: I 50%; II 40%; III 17%; IV 10%. Lengths of legs and palpal segments: see table I, legs 4,1,2,3. Spination: femur I d 0–0–1, II d 0–0–1, III d 0–0–2, palp d 0–0–1, tibia I d 0–1–0, v 0–1–1 (apical), II d 0–0–1, v 12 (apical), III d 2–2–2, v 0–2–3 (apical), IV d 2–4–1, v 0–2–3 (apical), palp p 1–2–4, metatarsus I d 0–1–0, v 1–0–3 (apical), II d 0–1–1, v 0–3–3 (apical), III d 2–2–3, v 2–0–5 (3 apical), IV d 1–2–2, v 3–3–5 (3 apical). Tibia I with paired tibial apophysis, RB almost equal to PB; PB with one short and developed megaspine with a pointed apex, RB with one short and developed megaspine with a pointed apex (Figs. 5–6). Femur III: slightly incrassate. Palpal tibia: unmodified. Palpal cymbium: unmodified. Metatarsus I: straight, unmodified. Posterior lateral spinnerets with three segments, basal



Figs. 1–6: *Cyclosternum darienensis* **sp. nov.** holotype male MIUP, **1-4:** palpal bulb (left hand side), **1** prolateral view, **2** retrolateral view, **3** dorsal view, **4** ventral view. **5–6:** tibial apophysis (left hand side), **5** prolateral view, **6** ventral view. Scale bars = 1mm.

Table I: *Cyclosternum darienensis* **sp. nov.** holotype male MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	8.4	7.3	6.8	8.7	4.6
Patella	4.2	3.9	3.4	4.0	2.9
Tibia	7.0	5.3	4.7	7.2	3.8
Metatarsus	6.2	6.2	7.3	10.5	–
Tarsus	4.3	4.1	4.0	4.9	2.8
Total	30.1	26.8	26.2	35.3	14.1

1.4, median 0.7, digitiform apical 1.3. Lateral median spinnerets with one segment. Palpal bulb with TH; embolus of moderate length, straight and tapering; PS, PI and SA developed, A and RS weakly developed, ER, PR and PAR absent, PC present, constricted almost its entire length (Figs. 1–4). Urticating setae: Type I present dorsally. Colour: alcohol preserved brown.

FEMALE: Unknown.

DISTRIBUTION: Rancho Frío, Parque Nacional Darién, Panama.

Euthycaelus quinteroi sp. nov.

TYPE MATERIAL: Holotype ♂, allotype ♀ MIUP, Panama: Prov. Darién, P. N. Darién, Est. Rancho Frio Pierre, 8–19 abril 2002, coll. R.J. Miranda, R. Cambra, A. Santos, examined; paratype ♀ MIUP, Panama: Prov. Darién, P. N. Darién, Est. Rancho Frio Pierre, 8–19 abril 2002, coll. R.J. Miranda, R. Cambra, A. Santos, examined.

DIAGNOSIS: *E. quinteroi* **sp. nov.** can be distinguished from *E. colonicus* by the absence of a prominent denticulation on the SA and the elongate tegulum (prominent denticulation present and tegulum non-elongate in *E. colonicus*), from *E. norae* by the elongate embolus tip (not elongate in *E. norae*), from *E. amandae* by the absence of a denticulation on the SA and less developed PS (presence of a denticulation to SA and well-developed PS in *E. amandae*) and from *E. guane* by the

non-bifid embolus (bifid in *E. guane*) (Figs. 7–10). Females can be distinguished from *E. amandae*, *E. colonicus* and *E. norae* by the morphology of the spermathecae with more rounded apical lobes (more triangular in the other taxa) (Fig. 15).

ETYMOLOGY: The species epithet is a patronym in honour of Professor Diomedes Quintero (MIUP) in recognition of his contributions to Panamanian science, arachnology, and his guidance and friendship to RG when RG was living in Panama.

DESCRIPTION: Holotype male (MIUP): Total length including chelicerae: 21.4. Carapace: length 9.0, width 7.1. Caput: slightly raised. Ocular tubercle: raised, length 0.9, width 1.7. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior eye row procurved, posterior row slightly recurved. Clypeus: narrow; clypeal fringe: medium. Fovea: deep, recurved. Chelicera: length 4.9, width 2,2. Abdomen: length 8.2, width 4.8. Maxilla with 100–150 cuspules covering approximately 70% of the proximal edge. Labium: length 1.0, width 1.5, with 150–200 cuspules mostly separated by 0.5–1.0 times the width of a cuspule. Labio-sternal mounds: separate. Sternum: length 3.8, width 3.6, with three pairs of sigilla. Tarsi I–II divided by line of setae, tarsi III–IV divided by band of setae. Metatarsal scopulae: I 76%; II 73%; III 56%; IV 45%. Lengths of legs and palpal segments: see table II, 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, patella III d 0–0–1, tibia I v 0–0–1, II v 0–0–2 (apical), III d 2–0–2, v 0–2–3 (apical), IV d 2–1–2, v 0–2–3 (apical), palp r 0–1–8 (short and stout, arranged in two rows), metatarsus I v 1–0–3 (apical), II v 1–0–3 (apical), III d 2–1–2, v 0–2–5 (3 apical), IV d 0–3–2 (apical), v 3–1–6 (5 apical). Tibia I with paired tibial apophysis, RB longer than PB; PB with one short and developed megaspine with a pointed apex, RB with one short and developed megaspine with a pointed apex (Figs. 11–13). Femur III: slightly incrassate. Palpal tibia: heavily incrassate with 8 spines arranged in two rows (Fig. 14). Palpal cymbium: two asymmetric lobes, the retrolateral larger and the prolateral elongated and laterally flattened. Metatarsus I: straight, otherwise unmodified, flexes on the retrolateral side on the RB. Posterior lateral spinnerets with three segments, basal 1.5, median 0.8, digitiform apical 1.2. Lateral median spinnerets with one segment. Palpal bulb with TH; embolus elongate and strongly curved; PS, PI and A developed, one well-developed PAc present, ER, PR and PAR absent, PC present, extremely wide its entire length (Figs. 7–10). Colour: alcohol preserved brown; however, when removed from spirit for examination, the slightly dried specimen shows a distinct silver iridescence to the setae of the carapace, dorsal legs, and palp.

Table II: *Euthycaelus quinteroi* **sp. nov.** holotype male MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	6.5	5.8	5.2	6.8	4.6
Patella	3.4	2.9	3.0	3.2	2.6
Tibia	5.0	4.2	3.0	5.2	3.6
Metatarsus	4.8	4.0	4.1	6.5	–
Tarsus	3.9	3.3	3.1	3.6	1.0
Total	23.6	20.2	18.4	25.3	11.8

Paratype female (MIUP): Total length including chelicerae: 26.1. Carapace: length 9.4, width 7.5. Caput: raised. Ocular tubercle: slightly raised, length 1.0, width 1.9. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: medium. Fovea: deep, recurved. Chelicera: length 6.0, width 5.2. Abdomen: length 11.0, width 7.3. Maxilla with 100–150 cuspules, covering approximately 70% of proximal edge. Labium: length 1.4, width 2.0, with 150–200 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: length 4.4, width 4.6, with three pairs of sigilla. Tarsi I–II divided by line of setae, tarsi III–IV divided by band of setae. Metatarsal scopulae: I 92%; II 77%; III 30%; IV 54%. Lengths of leg and palpal segments: see table III, legs 4,1,2,3. Spination: femur I d 0–0–1 (apical), palp d 0–0–1, patella III d 0–1–0, tibia II d 0–0–1, v 0–0–2 (apical), III d 0–0–2, v 0–1–2 (apical), IV d 1–1–0, v 0–0–2 (apical), palp v 0–0–3 (apical), metatarsus I v 1–0–3 (apical), II v 1–0–3 (apical), III d 2–2–1, v 1–3–5 (3 apical), IV d 0–2–2 (apical), v 0–2–5 (4 apical) Posterior lateral spinnerets with three segments: basal 1.7, medial 1.1, digitiform apical 1.3. Lateral median spinnerets with one segment. Spermathecae with two receptacles, fused at base, lobes apically rounded (Fig. 15). Colour: alcohol preserved brown.

Table III: *Euthycaelus quinteroi* **sp. nov.** paratype female MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	6.7	5.4	4.7	6.4	4.8
Patella	4.4	3.6	3.1	3.8	2.9
Tibia	4.9	3.7	2.6	4.6	3.1
Metatarsus	4.1	2.5	3.8	6.2	–
Tarsus	3.4	2.9	2.8	3.3	3.5
Total	23.5	18.1	17.0	24.3	14.3

DISTRIBUTION: Known only from the type locality, Rancho Frio, Darién National Park, Panama.

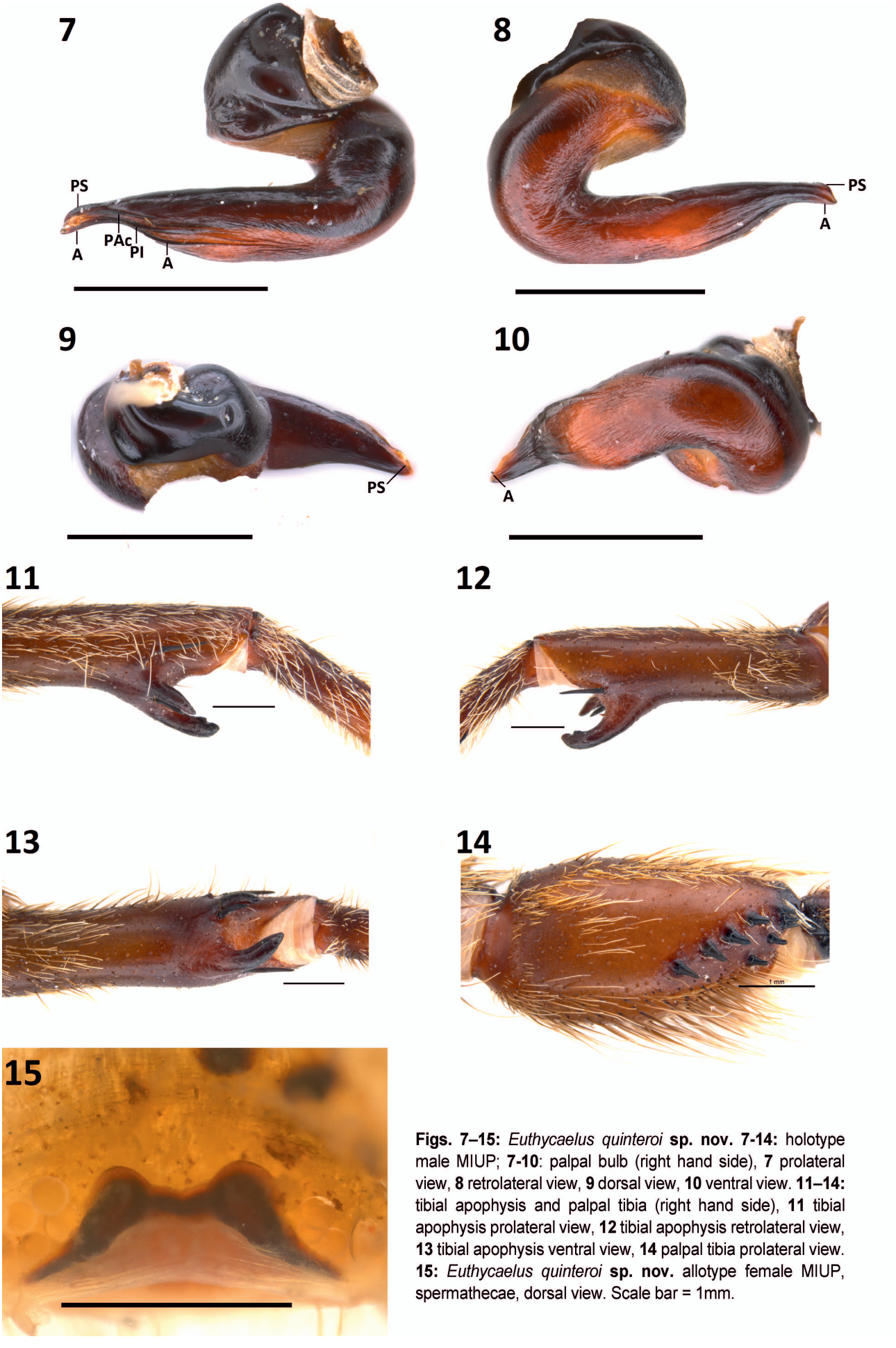
REMARKS**:** *E. quinteroi* **sp. nov.** represents the first published record of the genus *Euthycaelus* Simon, 1889 in Panama, extending the known range of the genus northwards into Mesoamerica.

Hapalopus coloratus **(Valerio, 1982)**

Metriopelma colorata Valerio, 1982: 410, f. 3, 6.
Metriopelma colorata: Pérez-Miles *et al*. (1996): 53.
Neischnocolus coloratus: Schmidt (2003): 177, f. 439.
Hapalopus coloratus: Gabriel (2016): 86.

TYPE MATERIAL: Holotype ♀ *Metriopelma colorata* (MIUCR 567), Panama: Darién: Rio Cupe circa 12 km. ssw Boca de Cupe, 90m, coll. Charles W. Myers, 29 May 1965, examined.

DIAGNOSIS: *H. coloratus* can be distinguished from congeners by the abdominal pattern consisting of nineteen distinct orange spots (Fig. 18) on dorsal and lateral faces of the opisthosoma (other known congeners have either a different number spots (and/or spots in a different colour), i.e. *H. formosus* Ausserer, 1875, *H. nigriventris* (Mello-Leitão, 1939), *H. triseriatus* Caporiacco, 1955 and *H. variegatus* (Caporiacco, 1955), a divergent abdominal pattern i.e. *H. lesleyae* Gabriel, 2011 or lack any abdominal patterning i.e. *H. aymara* Perdomo, Panzera & Pérez-Miles, *H. gasci* (Maréchal, 1996) and *H. serrapelada* Fonseca-Ferreira, Zampaulo & Guadanucci, 2017) and further from *H. aymara*, *H. serrapelada* and *H. gasci* by the spermathecae being a single rounded receptacle (Figs. 16–17).



Figs. 7–15: *Euthycaelus quinteroi* **sp. nov. 7-14:** holotype male MIUP; **7-10**: palpal bulb (right hand side), **7** prolateral view, **8** retrolateral view, **9** dorsal view, **10** ventral view. **11–14:** tibial apophysis and palpal tibia (right hand side), **11** tibial apophysis prolateral view, **12** tibial apophysis retrolateral view, **13** tibial apophysis ventral view, **14** palpal tibia prolateral view. **15:** *Euthycaelus quinteroi* **sp. nov.** allotype female MIUP, spermathecae, dorsal view. Scale bar = 1mm.

REDESCRIPTION: Holotype female (MIUCR 567). Total length including chelicerae: 30.6. Carapace: length 10.6, width 9.3. Caput: raised. Ocular tubercle: slightly raised, length 1.2, width 1.8. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, slightly recurved. Chelicera: length 5.6, width 2.4. Abdomen: length 14.7, width 11.3. Maxilla with 80–100 cuspules, covering approximately 40% of proximal edge. Labium: length 1.1, width 1.4, with 40–50 labial cuspules most separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: length 4.6, width 4.6, with three pairs of sigilla. Tarsi I–III divided by line of setae tarsus IV divided by band of setae. Metatarsal scopulae: I 65%; II 52%; III 33%; IV 19%. Lengths of leg and palpal segments: see table IV, legs 4,1,2,3. Spination: femur I d 0–0–1, II d 0–0–1, III d 0–0–1, IV d 0–0–1, tibia II d 0–0–1, v 0–1–1 (apical), III d 0–2–0, v 0–2–2 (apical), IV d 0–2–2, v 0–2–3 (2 apical), palp p 0–2–3 (apical), metatarsus I v 0–1–2 (apical), II v 0–2–2 (apical), III 1–2–2, v 2–1–3 (apical), IV d 2–1–2, v 3–1–5 (4 apical). Posterior lateral spinnerets with three segments: basal 2.2, medial 1.4, digitiform apical 1.8. Lateral median spinnerets with one segment. Spermathecae with singular receptacle, oval with partial sclerotisation of the apical edges (Figs. 16–17). Urticating setae: Type III present dorsally. Colour: (specimen has been immersed in spirit for many decades) nineteen distinct orange-red spots, three dorso-medial, eight dorso-lateral and eight ventro-lateral; carapace light brown, legs without patterning.

Table IV: *Hapalopus coloratus* holotype female MIUCR, podomere lengths.

	I	II	III	IV	Palp
Femur	7.0	6.5	5.7	7.7	5.5
Patella	4.8	4.2	3.7	4.1	3.6
Tibia	5.4	4.2	3.9	6.0	3.6
Metatarsus	4.0	4.1	4.9	7.2	–
Tarsus	3.2	3.1	3.0	3.8	3.6
Total	24.4	22.1	21.2	28.8	16.3

MALE: Unknown.

OTHER MATERIAL EXAMINED: 1 ♀, 1 Imm. ♀ (MIUP), El Real, Darién, Panama, 26 May 1987, confescado a estud. Unv. Princeton por Julieto Samudia; 1 Imm. (MIUP) Darién Province: Parque Nacional Darién, Cruce de Mono, Malaise trap, 6 February–4 March 1993, coll. R. Cambra, J. Coronado; 1 ♀ (MIUP), Darién Province, Parque Nacional Darién, Estación Rancho Frío 80 m a.s.l., Cerro Pirre, 20 March–5 April 2000, coll. R. Cambra, A. Santos, S. Bermúdez; 1 ♀, 2 Imm. (MIUP), Darién Province, Parque Nacional Darién, Estación Rancho Frío 80 m a.s.l., Cerro Pirre, 9–18 April 2002, coll. R. Cambra, A. Santos, R. Miranda; 1 Imm. ♂ (MIUP), Darién Province, Parque Nacional Darién, Estación Rancho Frío, Cerro Pirre, 2–18 October 2002, coll. R. J. Miranda, 4 moults preserved - 21 January 2003, 1–5 June 2003, 17 October 2003, 21 April 2004, died 29 April 2004 in LAV, (possibly immature palps missing); 1 ♀ (MIUP), Darién Province, Entre Río Topalisa y R. Pucuro, 25 February 1979, coll. Ken Reading; 1 Imm. ♂ (MIUP), Darién Province, Villa Darién, 12–18 February 1984, coll. Milton N. García; 3 Imm. PMY, Panama, A. & W. Petrunkevitch, "*Hapalopus pentaloris*", *Metriopelma colorata*, det. R. Gabriel 2011.

DISTRIBUTION: Darién Province, Panama.

REMARKS: The holotype (Fig. 18) is from Rio Cupe, Darién but recently similar-looking specimens have also been seen by citizen scientists in Bocas del Toro (see below), almost 600km West of Rio Cupe, on the Caribbean coast of Panama. Valerio (1982) describes specimens with red spots whereas Gabriel (2016) states: "The holotype in UCR and other specimens, including exuvia in MIUP and PMY, from the Darién province of Panama, all have 19 very distinct, orange/yellow spots on the abdomen. … The more distinct orange spots are the three dorsomedial, while the eight dorsolateral and eight ventrolateral spots are more yellow than orange. It may be suggested that the red coloration has faded to orange/yellow after preservation, but this would not explain the yellow colour of the markings on the dried exuvia of *M. colorata* specimens housed in MUIP." Panamanian records on the website iNaturalist show both yellow spotted and orange spotted spiders and it is unknown if this is ontogeny within a single species, intraspecific variation (e.g. in different stages of the ecdysial cycle) or two overlapping and sympatric species. At the time of publication of Gabriel (2016) most iNaturalist records of *H. coloratus* were not yet uploaded and were thus unknown to RG. *Hapalopus* species from neighbouring Colombia can also have either orange spots or yellow spots (pers. obs.).

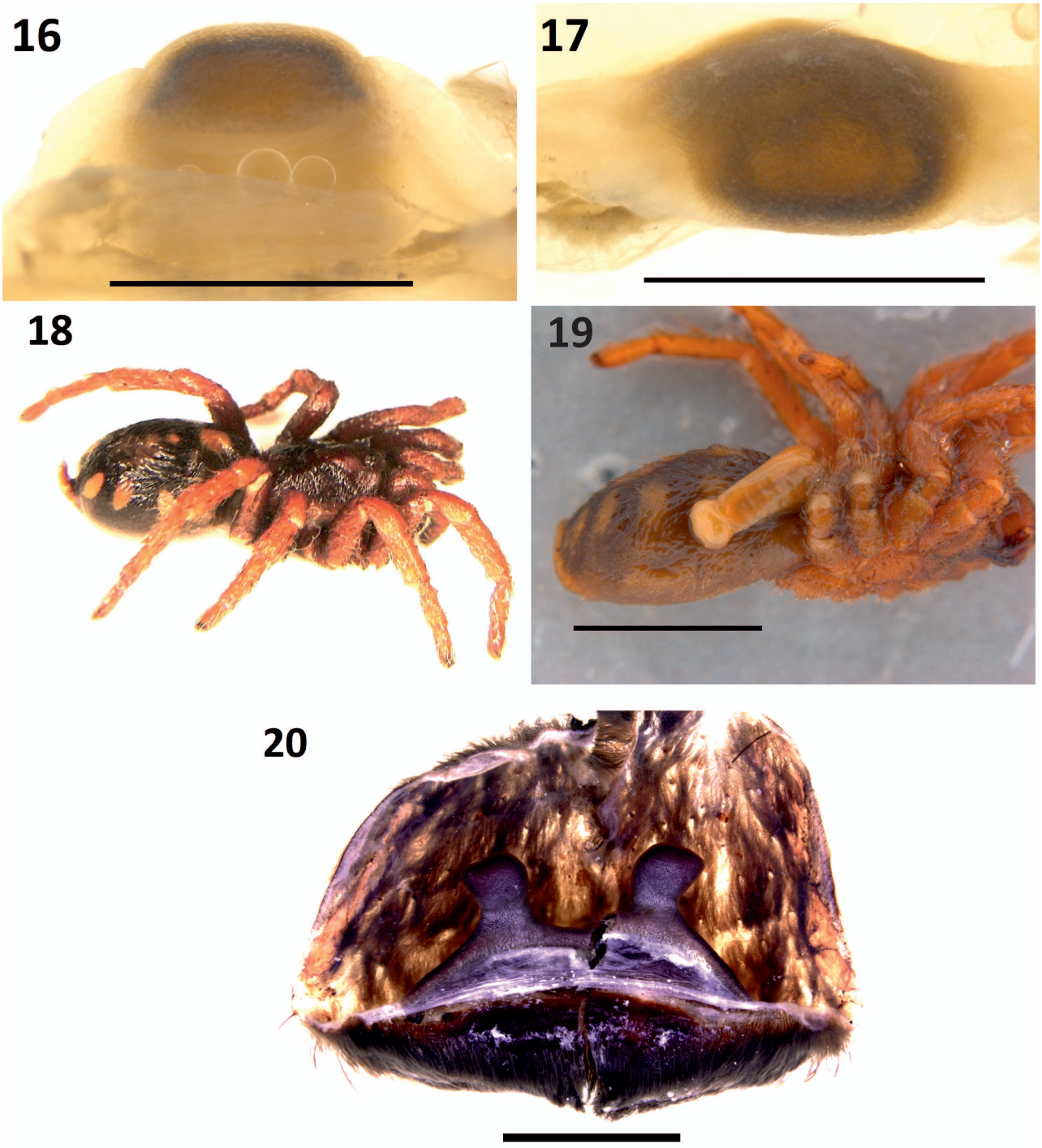
We provisionally exclude the Bocas del Toro specimens from the distribution of *H. coloratus sensu stricto* until such time as we can examine preserved material from this area (together with the unknown male of *H. coloratus*) to establish whether or not it is the same taxon as the holotype. The disjunct distribution of records of *Hapalopus* specimens in Panama could be a result of under sampling due to a lack of infrastructure along the Caribbean coast of the country. If possible, future workers should raise juveniles from both localities to assess ontogenetic colour change that may occur. A non-type female specimen also examined for this work (see other material examined) has a dipteran larva still attached on the external right-hand side of the abdomen (Fig. 19). Parasitisation by dipteran larvae has not been recorded before in *Hapalopus* to our knowledge.

Holothele longipes (L. Koch, 1875)

Chatetopelma longipes L. Koch ,1875: 174.
Stichoplastus ravidus Simon, 1889: 208.
Stichoplastus sanguiniceps F. O. Pickard-Cambridge, 1899: 895. G did.
Dryptopelmides ludwigi Strand, 1907: 19.
Dryptopelmides rondoni Lucas & Bücherl, 1972: 234, f. 1–4.
For a complete list of the taxonomical references of this species, see the full synonymy list given in Sherwood & Gabriel (2019).

NON-TYPE MATERIAL EXAMINED: (from Darién region only) 1 ♂, 1 ♀, 1 imm. (MIUP), P. N. Darién, Estación Rancho Pirre, 3–17 October 2002, coll. R. Cambra, A. Santos, R. Miranda, P. Gonzales, *Holothele longipes* det. D. Sherwood & R. Gabriel 16/11/2018. For a complete list of all other material examined from areas outside of Panama, see Sherwood & Gabriel (2019).

REMARKS: We have examined three specimens of *H. longipes* from the Darién, these constituted the first records for Panama and were published in Sherwood & Gabriel (2019).



Figs. 16–19: *Hapalopus coloratus* **16-18:** holotype female MIUCR, **16-17:** spermathecae, **16** dorsal view, **17** apical view. **18:** habitus, dorso-lateral view. **19:** non-type female MCZ, habitus, lateral view, showing parasitic larva. **Fig. 20:** *Pamphobeteus sucreorum* **sp. nov.** holotype female BMNH, spermathecae, dorsal view. Scale bar = 1mm.

***Neischnocolus panamanus* Petrunkevitch, 1925**

Neischnocolus panamanus Petrunkevitch, 1925: 85.
Eurypelma parvior Chamberlin & Ivie, 1936: 7.
Barropelma parvior: Chamberlin (1940): 39.
Ami bladesi Pérez-Miles, Gabriel & Gallon, in Pérez-Miles *et al*., 2008: 59, f. 2, 16–18, 40.
Barropelma parvior: Gabriel (2016): 85.
Neischnocolus panamanus: Gabriel (2016): 87.
Ami bladesi: Lapinski, Gabriel & Pérez-Miles (2018): 420, f. 3–16.
Neischnocolus panamanus: Pérez-Miles, Gabriel & Sherwood (2019): 152, f. 1, 3–4, 5A–B, 7A–B, 8.

TYPE MATERIAL: Holotype ♀ *Neischnocolus panamanus* (PMY), Cerro Iglesia 900ft, Remedios, R.P., 29 February 1924, examined; holotype ♀ *Eurypelma parvior* (AMNH), Barro Colorado Island, Panama, coll. A.M. Chickering, August 1928, examined; holotype ♂ *Ami bladesi* (MIUP), Isla Colón, Panama, 9°20′N 82°15′W, coll. R. Gabriel, 13 April 2004, examined.

OTHER MATERIAL EXAMINED: (from Darién region only) 2♂ (MIUP), Prov. Darién, P.N. Darién, Est. Rancho Frío. 8/19 April 2002, coll. R. Miranda, A. Santos, and R. Cambra. For a complete list of specimens examined from other areas of Panama, see Pérez-Miles, Gabriel & Sherwood (2019).

REMARKS: Pérez-Miles, Gabriel & Sherwood (2019) reported

two specimens of *N. panamanus* from the Darién housed in MIUP in their revision of the genus *Neischnocolus* Petrunkevitch, 1925. At present, these represent the only specimens we have examined from this region.

***Pamphobeteus sucreorum* sp. nov.**

TYPE MATERIAL: Holotype ♀, paratype 2 ♀♀ (BMNH 1908.9.28.1-3), Colombia (State of Darién), Harold Hodge (p.), examined.

DIAGNOSIS: *P. sucreorum* **sp. nov.** can be distinguished from congeners by its disjunct distribution and can provisionally be distinguished morphologically by the comparatively squatter profile of the spermathecal receptacles (Fig. 20) in combination with quadrate-shaped lobes.

ETYMOLOGY: The species epithet is a combined patronym in honour of Dr Rimsky Sucre, Panamanian doctor, pioneer of maritime medicine and student revolutionary, along with his son Samuel Sucre, a Panamanian herpetologist, and conservationist. Dr Rimsky Sucre carried the first wounded martyr to medical assistance during the Día de los Mártires on 9th January 1964 which is generally regarded as the start of the liberation of Panama. Sam Sucre has provided us with much assistance with Panamanian theraphosids, especially when accompanying RG during field work.

DESCRIPTION: Holotype female (BMNH 1908.9.28.1). Total length including chelicerae: 62.0. Carapace: length 26.7, width 24.2. Caput: slightly raised. Ocular tubercle: raised, length 2.4, width 3.1. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, transverse. Chelicera: length 13.3, width 8.4. Abdomen: length 28.0, width 16.7. Maxilla with 120–150 cuspules, covering approximately 40% of proximal edge. Labium: length 2.5, width 4.8, with 80–100 labial cuspules most separated by 0.5–2.0 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: (uninterpretable due to damage). Tarsi I–IV fully scopulate. Metatarsal scopulae: I 92%; II 72%; III 58%; IV 11%. Lengths of leg and palpal segments: see table V, legs 4,1,3,2. Spination: femur II d 0–0–1, II d 0–0–1, palp d 0–0–1, tibia I d 0–1–0 v 1–0–3 (apical), II d 1–1–1, v 0–1–2 (apical), III d 2–2–2, v 0–2–3 (apical), IV d 0–0–2, v 0–1–3 (2 apical), palp p 1–2–2, metatarsus I v 0–0–3 (apical), II d 1–0–0, v 1–0–3 (apical), d 0–2–3, v 2–3–3 (apical), IV d 0–2–2, v 4–6–11 (5 apical). Posterior lateral spinnerets with three segments: basal 4.7, medial 2.4, digitiform apical 4.7. Lateral median spinnerets with one segment. Spermathecae with two receptacles, fused at base, receptacle lobes quadrate (Fig. 20). Urticating setae: Type I present dorsally. Stridulation organ consisting of a pad of plumose setae on retrolateral femur IV and stout setae on the lateral opisthosoma. Colour: Alcohol preserved brown.

Table V: *Pamphobeteus sucreorum* **sp. nov.** holotype female BMNH, podomere lengths.

	I	II	III	IV	Palp
Femur	18.8	16.2	17.5	20.8	13.6
Patella	10.1	8.7	9.7	9.6	7.8
Tibia	13.3	11.4	12.3	14.8	9.7
Metatarsus	12.8	14.3	12.3	19.5	–
Tarsus	9.4	8.8	9.0	10.3	10.3
Total	64.4	59.4	60.8	75.0	41.4

MALE: Unknown.

DISTRIBUTION: Darién Province, Panama

REMARKS: The original data label with the specimens simply states "Colombia (State of Darién)" but this refers to modern day Panama (Vaurie, 1967: 34). Unfortunately, these ex-dried specimens are fragmented now that they are in spirit. *Pamphobeteus* Pocock, 1903 currently contains thirteen species (World Spider Catalog, 2021) distributed in Brazil, Colombia, Ecuador, Venezuela, and Peru.

***Pamphobeteus ornatus* Pocock, 1903**

Pamphobeteus ornatus Pocock, 1903: 92.

REMARKS: Pocock (1903) described *P. ornatus* from a single male (holotype examined) with the type locality of the River Dagua in the Cauca Valley of Colombia, more than 400km East of the Darién. We believe it is extremely improbable that this species has a wide occurrence from the River Dagua to the Darién region.

Bullmer *et al*. (2007) reported a *Pamphobeteus* species based on a single juvenile from the State of Darién, Panama giving it the clumsy moniker "*Pamphobeteus* sp. ex. Panama cf. *P. ornatus*" [*sic*] and illustrating a poorly dissected spermathecae. In the same year, Schmidt (2007) remarked that the spermathecae of (pet trade) *P. ornatus* was similar that of the *Pamphobeteus* species illustrated in Bullmer *et al*. (2007) (a paper on which Schmidt was an also author). Often, tarantulas are exported commercially under a scientific name which may not be correct because exporters must fulfil paperwork requirements (RG pers. obs.). This often results in misidentified material filtering their way into museums and being used in publications as exemplar material to compare against other species (see Gabriel, 2020). Earlier editions of the Platnick catalog would often regard the illustration of the genitalia of a specimen as a description (Norman Platnick pers. comm. to RG). This explains why the drawing of the spermathecae in Schmidt (2007) was regarded as a description of the female even though there is no actual textual description or even a physical specimen itself to examine.

The drawing of the spermathecae used by Schmidt of an alleged *P. ornatus* comes from a specimen from the European pet trade with no precise collection location, and it appears that no male (from the same source as Schmidt's female) was ever compared by Schmidt (or anyone else) against the holotype in BMNH to confirm the identity of the specimens, we thus cannot accept Schmidt's identification as being unequivocally accurate. Interestingly, there is also a specimen labelled as *P. ornatus* in the Simon collection at MNHN, but there is no evidence that Schmidt (2007) nor Bullmer *et al*. (2007) examined this specimen, nor is there enough evidence to be sure it is conspecific to the holotype. The data label only reads "22619 Pamphobeteus ornatus Pocock. Colombia" with no more exacting location. Much like the specimen "described" by Schmidt (2007) we cannot at present regard the MNHN specimen as being definitively conspecific with *P. ornatus sensu stricto*.

Schmidt attempted to describe the missing sexes of many theraphosid species without examining holotypes and by using pet trade specimens of dubious provenance. One such example is *Pterinochilus mamillatus* Strand, 1906 from Tanzania (see Schmidt, Peters & Samm, 2000), a species described based only on text by Strand and whose male holotype was destroyed during World War Two (Gallon, 2002).

Schmidt, Peters & Samm (2000) supposedly described the female of this species. *P. mamillatus* was later considered synonymous with *Pterinochilus murinus* Pocock, 1897 by Gallon (2002). In the instances of many theraphosines, we suspect Schmidt likely assigned many non-conspecific specimens to species without examining any holotype material and all descriptions of missing sexes obtained from the commercial pet trade by this worker should be re-evaluated in future works. In many instances where Schmidt did compare against holotype material that holotype was never compared against actual holotype material in Museums. The peril of data relating to many Schmidt specimens which originate from the pet trade has been well demonstrated by previous workers (Gallon 2002; Bertani & Fukushima, 2004; Gabriel, 2020; Sherwood & Gabriel, 2020).

Therefore, we reject the possibility of *P. ornatus* being distributed in the State of Darién, Panama and consider its distribution to be limited to Colombia. The material from the Darien studied by Schmidt may possibly be conspecific with *P. sucreorum* **sp. nov.** although this will need to be investigated more comprehensively by future workers.

***Psalmopoeus pulcher* Petrunkevitch, 1925**

Psalmopoeus pulcher Petrunkevitch, 1925: 87, f. 2.
Psalmopoeus rufus Petrunkevitch, 1925: 89.
Psalmopoeus pulcher: Gabriel (2014): 135.
Psalmopoeus pulcher: Gabriel & Sherwood (2018): 11, f. 1–12.

TYPE MATERIAL: Holotype ♂ *Psalmopoeus pulcher* (AMNH), Mount Hope, Canal Zone, Panama, coll. W. J. Baerg 1924, examined; holotype ♂ *Psalmopoeus rufus* (PMY), Panama, Mount Hope, Canal Zone 1924, coll. W. J. Baerg, examined.

OTHER MATERIAL EXAMINED: (from Darién region only) 2 Imm. ♀ (MIUP), Darién Province, P.N. Darién, Estancia Rancho Frío Pirre, coll. R. Canberra, A. Santos, R. Miranda, P. Gonzales, 3–17 October 2002 det. R. Gabriel; 1 ♂ (MIUP), Darién Province, P.N. Darién, Estancia Rancho Frío Pirre, coll. R. Canberra, A. Santos. For complete list of specimens examined from other provinces see Gabriel & Sherwood (2018).

REMARKS: Gabriel & Sherwood (2018) gave the Darién province of Panama as an area of distribution for *P. pulcher* based on examination of two immature females housed in MIUP. We have since also located a male specimen from this area in MIUP which is conspecific with the holotype in AMNH, solidifying the presence of this species in the region. The genus *Psalmopoeus* Pocock, 1895 currently contains several taxa distributed across Central and northern South America and further undescribed species may be found (Gabriel & Sherwood, 2020b).

***Spinosatibiapalpus cambrai* sp. nov.**

TYPE MATERIAL: Holotype ♂ (MIUP), Panama: Prov. Darién, Cerro Pierre, Parque Nacional Darién, Estascion Rancho Frío, 29 marzo–2 abril 2004, coll. A. Santos, O. Lopez, examined; paratype 1 ♀, 3 Imm. (MIUP), Panamá: Prov. Darién, P. N. Darién, Estacion Rancho Frío Pirre, 3-17 Octobo 2002, coll. A. Cambra, A. Santos, R. Miranda, and P. Gonzalez, examined.

DIAGNOSIS: *S. cambrai* **sp. nov.** can be distinguished from all known congeners by palpal bulb morphology with the significantly developed PAR which raises above most other embolic structures, giving the overall palpal bulb a significantly squatter profile (Figs. 21–25) in comparison to the palpal bulbs of *S. bora*, *S. spinulopalpus*, *S. tansleyi* and *S. trinitatis* (see Sherwood & Gabriel, 2021). Further distinguished from *S. bora* by the much higher number of spines on the prolateral face of the palpal tibia (Fig. 26). Females can be distinguished from *S. spinulopalpus* by the comparatively less sclerotised guard plates (Fig. 27) (see Gabriel & Sherwood, 2020a: 310, figs. 25–26).

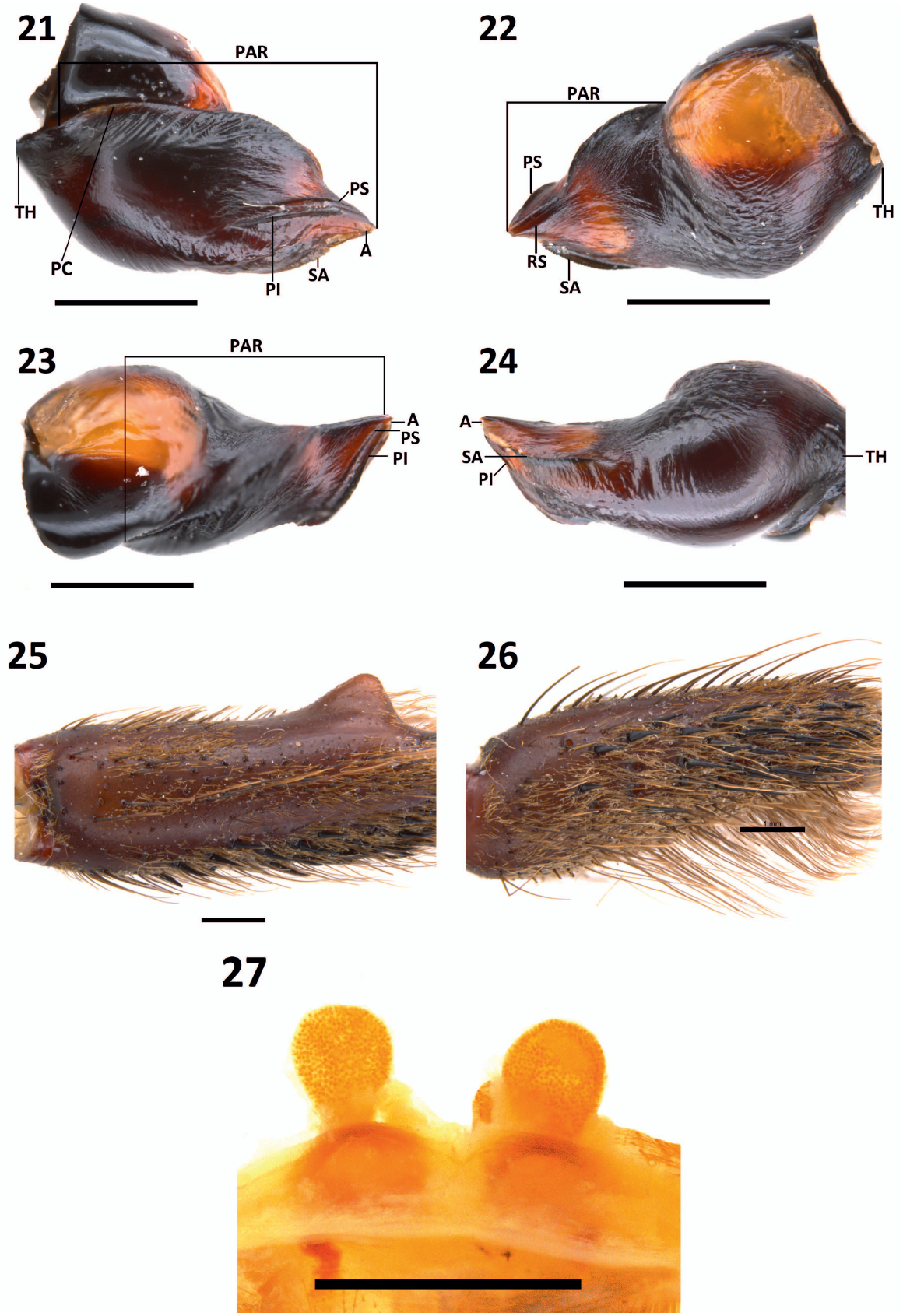
ETYMOLOGY: The species epithet is a patronym in honour of Professor Roberto Cambra (MIUP) for his contributions to the understanding of invertebrate biodiversity in Panama and his guidance and friendship to RG.

DESCRIPTION: Holotype male (MIUP): Total length including chelicerae: 30.8. Carapace: length 14.2, width 12.3. Caput: slightly raised. Ocular tubercle: raised, length 1.2, width 1.9. Eyes: ALE > AME, AME > PLE, PLE > PME, anterior eye row procurved, posterior row slightly recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, transverse. Chelicera: length 7.0, width 4.6. Abdomen: length 13.7, width 8.3. Maxilla with 80–100 cuspules covering approximately 75% of the proximal edge. Labium: length 1.4, width 2.2, with 40–60 cuspules mostly separated by 0.5–1.0 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: length 6.0, width 5.1, with three pairs of sigilla. Tarsi I–III fully scopulate, tarsus IV divided by band of setae. Metatarsal scopulae: I 80%; II 63%; III 39%; IV 14%. Lengths of legs and palpal segments: see table VI, legs 4,1,2,3. Spination: femur I d 0–0–5, II d 0–0–2, III d 0–0–2, palp d 0–0–7, patella I d 0–1–0, II d 0–1–0, palp d 3–2–0, tibia I d 1–0–0, v 1–3–3 (apical), II d 1–1–1, v 2–2–3 (apical), III d 2–2–2, v 0–2–3 (apical), IV d 1–1–1, v 0–3–5 (3 apical) palp p 8–15–9, (Fig. 26) metatarsus I v 0–1–3 (apical), II d 0–1–1, v 2–1–3 (apical), III d 1–2–3 (2 apical), v 1–2–4 (apical), IV d 2–2–2, v 4–6–9 (5 apical). Tibia I unmodified, tibial apophysis absent. Femur III: incrassate. Palpal tibia: with prominent triangular-shaped retrolateral apophysis (Fig. 25). Palpal cymbium: unmodified. Metatarsus I: straight, unmodified. Posterior lateral spinnerets with three segments, basal 3.2 median 1.2, digitiform apical 2.8. Lateral median spinnerets with one segment. Palpal bulb with TH; embolus short and squat; PS, PI, and SA developed, A and RS weakly developed, RI absent, PS and PI of approximately equal length, PI running almost half the length of the embolus PAR present and very distinct, PC present, constricted in anterior third (Figs. 21–24). Urticating setae: Type I present dorsally. Colour: alcohol preserved brown.

Table VI: *Spinosatibiapalpus cambrai* **sp. nov.** holotype male MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	13.5	12.5	10.9	14.1	7.1
Patella	6.4	5.8	5.3	5.8	4.0
Tibia	11.8	10.2	8.3	12.8	5.3
Metatarsus	10.9	11.0	11.2	16.7	–
Tarsus	5.8	6.0	5.9	6.8	3.2
Total	48.4	45.5	41.6	56.2	19.6

Paratype female (MIUP): Total length including chelicerae: 46.3. Carapace: length 17.5, width 14.7. Caput: raised. Ocular tubercle: slightly raised, length 1.5, width 2.5. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row pro-



Figs. 21–27: *Spinosatibiapalpus cambrai* **sp. nov. 21-26:** holotype male MIUP, palpal bulb (left hand side), **21** prolateral view, **22** retrolateral view, **23** dorsal view, **24** ventral view. **25–26:** holotype male MIUP, palpal tibia (left hand side), **25** dorsal view, **26** prolateral view. **27:** paratype female MIUP, spermathecae, dorsal view. Scale bar = 1mm.

curved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, recurved. Chelicera: length 7.5, width 5.0. Abdomen: length 21.6, width 16.4. Maxilla with 100–120 cuspules, covering approximately 45% of proximal edge. Labium: length 1.9, width 2.4, with 70–80 labial cuspules most separated by 0.5–1.0 times the width of a sin-

gle cuspule. Labio-sternal mounds: joined. Sternum: length 6.9, width 6.3, with three pairs of sigilla. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 100%; II 100%; III 62%; IV 48%. Lengths of leg and palpal segments: see table VII, legs 4,1,3,2. Spination: tibia I v 0–0–3 (apical), II d 1–0–0, v 0–0–2 (apical), III d 1–2–0, v 0–1–3 (apical), IV d 1–0–2, v 1–1–4 (apical), palp p 0–0–1 v, 0–2–0, metatarsus I v 0–0–2 (apical), II d 0–1–0, v 1–0–3 (apical), III d 0–2–0, v 2–0–3 (apical), IV d 2–3–2, v 5–2–4 (3 apical). Posterior lateral spinnerets (uninterpretable as not attached to specimen nor located in jar). Lateral median spinnerets with one segment. Spermathecae with two receptacles emerging from a single wide base, GP ovate, partially sclerotized (Fig. 27). Urticating setae: Type I present dorsally. Colour: alcohol preserved brown.

Table VII: *Spinosatibiapalpus cambrai* **sp. nov.** paratype female MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	12.8	12.3	11.3	14.2	9.8
Patella	7.5	7.4	6.5	7.6	5.8
Tibia	10.6	9.7	8.5	12.7	8.1
Metatarsus	9.2	8.4	11.5	18.6	–
Tarsus	6.8	6.6	6.7	7.2	7.1
Total	46.9	44.4	44.5	60.3	30.8

DISTRIBUTION: Currently known only from the type locality, Rancho Frío Research Station, Darién National Park, Panama

REMARKS: The description of *S. cambrai* **sp. nov.** represents the first record of the genus from Panama and indeed Central America, adding a fifth species to the genus, previously known only from species distributed in Colombia, Peru and Trinidad (Sherwood & Gabriel, 2021).

***Tapinauchenius herrerai* sp. nov.**

TYPE MATERIAL: Holotype ♀, paratype 2♀♀ (MIUP), Prov. Darién, Cerro Pierre, Parque Nacional Darién, Estascion Rancho Frío, 3–17 octobre 2002, coll. R. Cambra, A. Santos, R. Miranda, P. Gonzales, examined.

DIAGNOSIS: *T. herrerai* **sp. nov.** can be distinguished from congeners by spermathecal morphology (Fig. 28) with the receptacles more than 3 times longer than wide and by its biogeographical location, disjunct from other known species.

ETYMOLOGY: The species epithet is a noun in apposition, in honour of General Tomás de Herrera (1804–1854) who fought for the independence of Panama in the 1830s and 40s.

DESCRIPTION: Holotype female (MIUP): Total length including chelicerae: 31.0. Carapace: length 13.3, width 11.9. Caput: slightly raised. Ocular tubercle: raised, length 1.9, width 3.1. Eyes: ALE > PLE, PLE > AME, AME > PME, anterior row procurved, posterior row recurved. Clypeus: narrow; clypeal fringe: long. Fovea: deep, recurved. Chelicera: length 6.3, width 3.4. Abdomen: length 14.8, width 10.2. Maxilla with 80–100 cuspules, covering approximately 50% of proximal edge. Labium: length 1.8 width 2.4, with 80–100 labial cuspules most separated by 0.5–1.5 times the width of a single cuspule. Labio-sternal mounds: separate. Sternum: length 5.9, width 4.9, with three pairs of sigilla. Tarsi I–IV fully scopulate. Metatarsal scopulae: I 100%; II 100%; III 82%; IV 40%. Lengths of leg and palpal segments: see table VIII, legs 4,1,2,3. Spination: tibia I v 0–0–2 (apical), II v 0–0–2 (apical), III v 0–0–2 (apical), IV v 0–0–2 (apical), metatarsus IV v 0–0–2 (apical). Posterior lateral spinnerets with three segments: basal 3.1, medial 2.1, digitiform apical 2.5. Lateral median spinnerets with one segment. Spermathecae with two receptacles, each with a subapical constriction and single rounded lobe at the apex; receptacle more than 3 times longer than wide (Fig. 28). Colour: alcohol preserved brown.

Table VIII8: *Tapinauchenius herrerai* **sp. nov.** holotype female MIUP, podomere lengths.

	I	II	III	IV	Palp
Femur	10.2	9.4	8.5	10.8	7.0
Patella	6.4	5.8	5.0	5.6	4.0
Tibia	8.2	7.2	6.3	9.8	4.8
Metatarsus	7.2	7.0	7.2	10.4	–
Tarsus	5.0	5.0	4.7	4.9	6.0
Total	37.0	34.4	31.7	41.5	21.8

MALE: Unknown.

DISTRIBUTION: Currently known only from the type locality, Rancho Frío Research Station, Darién National Park, Panama.

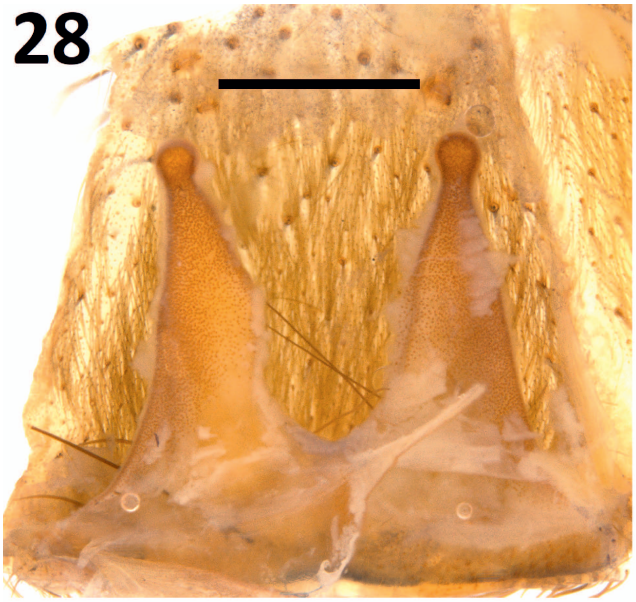
REMARKS: The description of *T. herrerai* **sp. nov.** represents the first formal record of the genus *Tapinauchenius* within Panama (and mesoamerica as a whole) and indicates the genus could also possibly be distributed in Northern Colombia. As *Tapinauchenius* species are known from some Caribbean islands, it is possible that they may also be found up to a similar parallel on the mainland, but this needs to be confirmed by future fieldwork efforts.

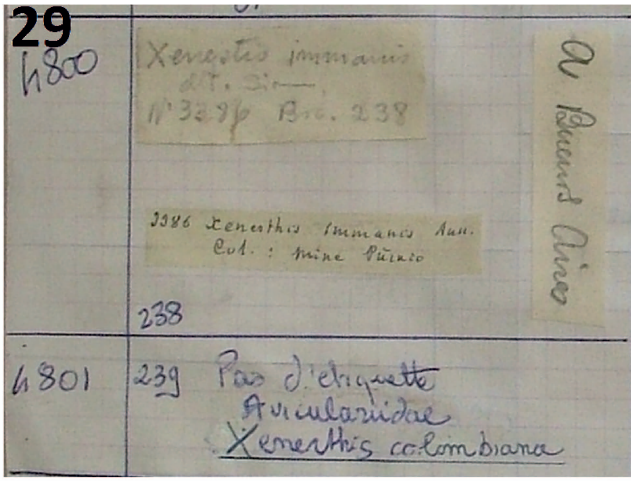
***Xenesthis immanis* (Ausserer, 1875)**

Lasiodora immanis Ausserer, 1875: 194–195.
Xenesthis immanis: Pocock (1901): 546.
Xenesthis immanis: Schiapelli & Gerschman (1979): 298, f. 32–38.
Xenesthis immanis: Smith (1987): 164, pl. 4, f. 90h.
Xenesthis immanis: Smith (1989): 15, f. 1–3.
Xenesthis immanis: Pérez-Miles *et al*. (1996): 60, f. 51–52.
Xenesthis immanis: Schmidt (1997): 20, f. 215–216.
Xenesthis immanis: Bertani (2001): 337, f. 149–152.
Xenesthis immanis: Piepho (2001): 3, f. 1.
Xenesthis immanis: Schmidt (2003): 138, f. 215–216.

REMARKS: Ausserer (1875) described *Lasiodora immanis* Ausserer, 1875 based on a female specimen from an unspecified locality, this species was then included in the new genus *Xenesthis* by Simon (1891) who also included another new species which was established as the generotype: *Xenesthis colombiana* Simon, 1891. *X. colombiana* is allegedly distributed in Panama (Simon, 1891: 333) and was based on a single mature male specimen. Simon (1891) defined the genus *Xenesthis* based on the scopulae of metatarsus IV covering nearly the entire length and circumference of the segment, a unique feature not found in other known New World theraphosid spiders at the time. However, Simon (1892: 160) later appears to correct the distribution of *Xenesthis* stating "America meridionalis: Colombia." for a distribution of the genus, not Panama. Pickard-Cambridge (1897) refers to Simon's species, once again reiterating the location to be Panama. Pocock (1901) considered *Xenesthis colombiana* synonymous with *Xenesthis immanis* (Ausserer, 1875) but fails to say why simply stating "Type *Xenesthis immanis*, Auss. (= *colombiana*, Simon).".

In MNHN there are three Simon *Xenesthis* specimens, but only two with their original data labels (Figs. 29–30). In the museum's Arachnida collection, original labels are curated





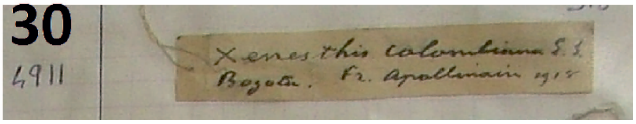


Fig. 28: *Tapinauchenius herrerai* **sp. nov.** holotype female MIUP, spermathecae dorsal view. Scale bar = 1mm. **Figs. 29–30:** Data labels relating to *Xenesthis immanis* specimens in MNHN.

onto sheets of paper in a loose-leaf binder for ease of reference and preservation with corresponding modern print labels being replaced in the jar with the specimen (see Gabriel, 2020, Sherwood & Gabriel, 2020; Sherwood *et al*., 2021). The entry for label AR–4800 reads "Xenesthis immanis det, Simon Nº 33 86 Bog. 238" Two additional labels are found for the same accession number, one reads "3386 Xenesthis immanis Auss. Col.: Mine Mine Purnio" and the other reads "a Buenos Aires", which is likely a reference to the village in Colombia and not the capital of Argentina, the former is curiously situated south of the village of San Francisco and North of the village of Honduras. The entry AR–4801 reads "X. colombiana Pas d' etiquette Avicularidae", which is written directly onto the paper page of the binder and "Pas d' etiquette" indicates this specimen has no label, but the entry does have the specimen number 239 written onto the page. A later entry AR–4911 states: "X. colombiana Bogota Fr. [illegible word] 1918, 318" giving the Colombian capital of Bogota as the locality.

We can deduce that the specimen accessioned as AR–4801 is the holotype of *X. colombiana* as the specimen with the later accession number AR–4911 has the location "Bogota" and a date of 1918, which clearly eliminates the possibility of the latter specimen being contemporary with that of AR–4801. Meanwhile, AR–4800 reads "Xenesthis immansis det, Simon Nº 33 86 Bog. 238" (see above). Panama is not written on any of the data labels associated with the three *Xenesthis* specimens in MNHN. We suspect the reference to this country in Simon (1891) may simply be a typographical error because Simon (1891) named this species as *X. colombiana*, a species epithet which clearly derives from Colombia.

It should be noted that Bogota can often be found on labels of Colombian theraphosids (and other fauna and flora) later found to be from other areas and shows that frequently only the city of export was recorded on labels (see Pérez-Miles, Gabriel & Sherwood, 2019). This type of labelling is not specific to Colombia as the capital city or port of export is often found on labels of older specimens from all around the world (pers. obs.). This may also be indicative of specimens purchased from a dealer with no actual collection information known.

Pocock (1903) described another species in the genus, *Xenesthis monstrosa* Pocock, 1903 from New Granada (today´s territory of the countries Colombia, Panama and parts of Venezuela, and Ecuador), separating the female holotype of *X. monstrosa* from the female holotype of *X. immanis* based on the comparative measurements: "… of the carapace equal in length to the sum of the patella and tibia of leg I or leg IV, also a little longer than metatarsus of leg IV" in *X. immanis* and "… the carapace exceeding the length of the patella and tibia of leg I or leg IV, but the carapace as long as the fourth metatarsus and more than half the tarsus" in *X. monstrosus*. Pocock (1903) also uses comparative leg measurements to split the two species "Legs much longer, the fourth rather more than three times as long as the carapace, the first about twice and two thirds as long" in *X. immanis* and "Legs much shorter, the fourth considerably less than three times, the first less than twice and a half as long as the carapace" in *X. monstrosus*.

The relevant measurements Simon (1891) gives for *X. colombiana* are 32.2mm long for the carapace and 103.3mm, 99.5mm, 89.5mm and 119.4mm for legs I, II, III and IV respectively. The comparative leg length of leg IV in comparison to the length of the carapace in *X. colombiana* thus do not justify the synonymy with *X. immanis* and it is unclear why Pocock (1901) decided these species were synonymous as they were based on opposite sexes, and he does not appear to have examined any other specimens. Therefore, based on this discrepancy and the lengths not matching Pocock's criteria for the separation or definition of species, we regard the synonymy of *X. colombiana* with *X. immanis* as erroneous. Consequently, we restore *X. colombiana* **comb rest.** and regard it as a Colombian species, as no data labels indicate this species comes from Panama. Redescription of this species and indeed other congeners is outside the scope of this work. We want to stress that under the current criteria that is published (i.e., Pocock's morphometrics) the synonymy is not supported, but it is entirely possible future workers may

find other morphological features which may support the synonymy of Pocock (1901) once again, especially as the morphometrics of Pocock (1901) do not account for sexual dimorphism.

In Hart Dyke & Winder (2003: 281) there is reference to a large black terrestrial spider which Tom Hart Dyke observed during his captivity in the Darién. It is likely, based on the description, that this was a theraphosid, possibly a species of *Pamphobeteus* or *Sericopelma* Ausserer, 1875. Given that we have not seen any *Xenesthis* material confirmed to be from the Darién we find it unlikely, that this could have been a *Xenesthis* species as they have a distinct pink colouration on the carapace (not mentioned by Hart Dyke & Winder (2003)). Without a voucher specimen (nor a locality in either country being mentioned in Hart Dyke & Winder, 2003), the identity of the black spider can only be speculated.

We unequivocally reject the occurrence of *X. immanis* in Panama, given that none of the labels of the specimens in the Simon collection at MNHN actually state this as a country of origin and furthermore, as we have not to date seen or examined any specimens matching this species (or genus) in morphology from the Darién (or any other) region of Panama in other natural history museums, such as AMNH, MCZ, MIUP, OUMNH, PMY and SMF.

It is possible that *Xenesthis monstrosa* Pocock, 1903 on the other hand, may range close to the Darién based on a specimen from Northwest Colombia in the BMNH (pers. obs.) which is conspecific with the holotype of *X. monstrosa* (based on the leg segment measurements against the length of the carapace). Thus, from biogeography alone if a *Xenesthis* species was to be found in the Darién Province, Panama it would be more likely to be *X. monstrosa* than *X. immanis*.

Therefore, we propose that *X. colombiana* **comb. rest.** be removed from the synonymy with *X. immanis* based on a lack of reason for the synonymy and that Pocock's criteria for species separation do not identify *X. colombiana* as *X. immanis*. We also propose that the distribution for *X. colombiana* be regarded as only Colombia not Colombia and Panama based on the 1918 Simon specimens' data labels and the distribution for *X. immanis* be regarded solely for Colombia. *Xenesthis* is another genus in need of a modern and comprehensive revision.

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