

## *Linothele agelenoides* sp.n., a new species of *Linothele* KARSCH, 1879 (Araneae, Dipluridae) from central Colombia

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### Abstract

A new species of *Linothele* KARSCH, 1879 from Colombia is described, *Linothele agelenoides* sp.n., and its affinities to all known congeners are discussed. Another character distinguishing the recently described *Linothele mubii* NICOLETTA, OCHOA, CHAPARRO & FERRETTI, 2022 from other species of *Linothele* is presented and discussed.

### Zusammenfassung

Eine neue Art der Gattung *Linothele* KARSCH, 1879 aus Kolumbien, *Linothele agelenoides* sp.n., wird beschrieben und ihre Verwandtschaft zu anderen bekannten Arten wird diskutiert. Ein weiteres Merkmal um die kürzlich beschriebene Art *Linothele mubii* NICOLETTA, OCHOA, CHAPARRO & FERRETTI, 2022 von allen anderen Arten der Gattung *Linothele* zu unterscheiden wird präsentiert und diskutiert.

**Key words:** funnel-web spiders, taxonomy, morphology, neotropics, Departamento del Meta, Mygalomorphae, Dipluridae, Diplurinae, *Linothele*, new species.

### Introduction

The diplurid genus *Linothele* KARSCH, 1879 is known from the Americas and was recently reviewed by DROLSHAGEN & BÄCKSTAM (2021). Spiders of the genus *Linothele* are alyrate, a character that distinguishes them from all other diplurine genera, i.e. *Diplura* C. L. KOCH, 1850, *Harmonicon* F. O. PICKARD-CAMBRIDGE, 1896, and *Trechona* C. L. KOCH, 1850, which all possess a distinct lyra on the prolateral maxillae. Until now, three species of *Linothele* have been known from Colombia. During a recent field work in Colombia, the third author (MS) was able to collect several arachnids in an area usually not accessible to the public. In this study, we provide the description of a new species of *Linothele* from Colombia, raising the number of species known from Colombia to four and the overall number of species to 23. The rather low occurrence of males of *Linothele* in collected samples probably underlies seasonal patterns and their behavioural aspects, i.e. wandering around in search of females, making them harder to collect than juveniles and females, (which are more abundant independently of the season and usually reside at a given location for longer time). During the period the third author visited the area, no males could be found and, thus, the new species, *Linothele agelenoides* sp.n., is represented by two adult female specimens, collected near the river Caño Cristales in the Serranía de la Macarena.

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## Material and methods

The material was examined using a stereo-zoom microscope. Illustrations of relevant structures were obtained as vectors, drawn using Adobe Illustrator. Photomicrographs were taken with a digital camera mounted on a stereo-zoom microscope and stacked in Helicon Focus 8.1, using calculation method A. Spermathecae were removed and cleaned in lactic acid. Carapace length was measured from its anterior to its posterior margin in a perpendicular line through the fovea. Pedipalp measurements are given as: total length (femur, patella, tibia, tarsus). Leg measurements are given as: total length (femur, patella, tibia, metatarsus, tarsus). Spinneret measurements are given as: total length (basal, medial, apical). All measurements are given in millimetres (mm). The term pseudoscopula follows the definition by PÉREZ-MILES et al. (2017). The definition of a wide clypeus follows GERTSCH & PLATNICK (1979: 28) and is as follows: “[...] the distance from the anterior margin of the eye tubercle to the anterior margin of the carapace; it is considered wide if it is at least “equal in width to long diameter of anterior lateral eye”. The definition of maculae follows DECAE et al. (2007: 2) and is as follows: “[...] dark pigmented blotches [...] on the external leg segments and/or on the external basal segment of the PLS [...]”. Definition of vesicles follows DUPÉRRÉ & TAPIA (2015: fig. 26). The term “preening combs” refers to a field on the ventrodistal posterior metatarsi that is densely covered with short spines (see DROLSHAGEN & BACKSTAM 2021: fig. 11A, B).

Abbreviations: CL – carapace length; CB – clypeal bristles (bristles at the clypeal edge in front of the eye tubercle); CT – number of cheliceral teeth; D – dorsal; MC – number of maxillary cuspules; P – prolateral; PLS – posterior lateral spinnerets; PMS – posterior median spinnerets; R – retrolateral; V – ventral.

Museum and depository abbreviations: MPUJ – Museo de la Pontificia Universidad Javeriana (Bogotá, Colombia); NHMW – Naturhistorisches Museum Wien (Vienna, Austria).

## Results

### *Linothele agelenoides* sp.n.

(Figs 1–3)

**Type material. Holotype.** ♀, Colombia, Departamento del Meta, Quebrada Honda, near San Juan de Arama, 3°22'54.8"N, 73°55'23.6"W; 484 m a.s.l.; I.2014; M. Seiter, O. Lucanus and J. Maldonado Ocampo leg. (MPUJ\_ENT 0074278). **Paratype.** ♀, Colombia, same collecting data as for holotype (NHMW 29617).

**Diagnosis.** Females of *Linothele agelenoides* sp.n. resemble those of *Linothele zaia* DUPÉRRÉ & TAPIA, 2015, *Linothele yanachanka* DUPÉRRÉ & TAPIA, 2015 and *Linothele tsachilas* DUPÉRRÉ & TAPIA, 2015, but can be distinguished from them by the spermathecal morphology, with the closely-positioned spermathecae stalks having much wider bases, not gradually tapering distally, and bearing several vesicles distally. Furthermore, females of *Linothele agelenoides* sp.n. can be distinguished from those of all other species of *Linothele* by the combined absence of undivided pseudoscopula, preening combs, maculae, pseudo-segmented apical PLS segments and a dorsal chevron pattern, and, conversely, the combined presence of a mid-dorsal pattern consisting of quadrate spots

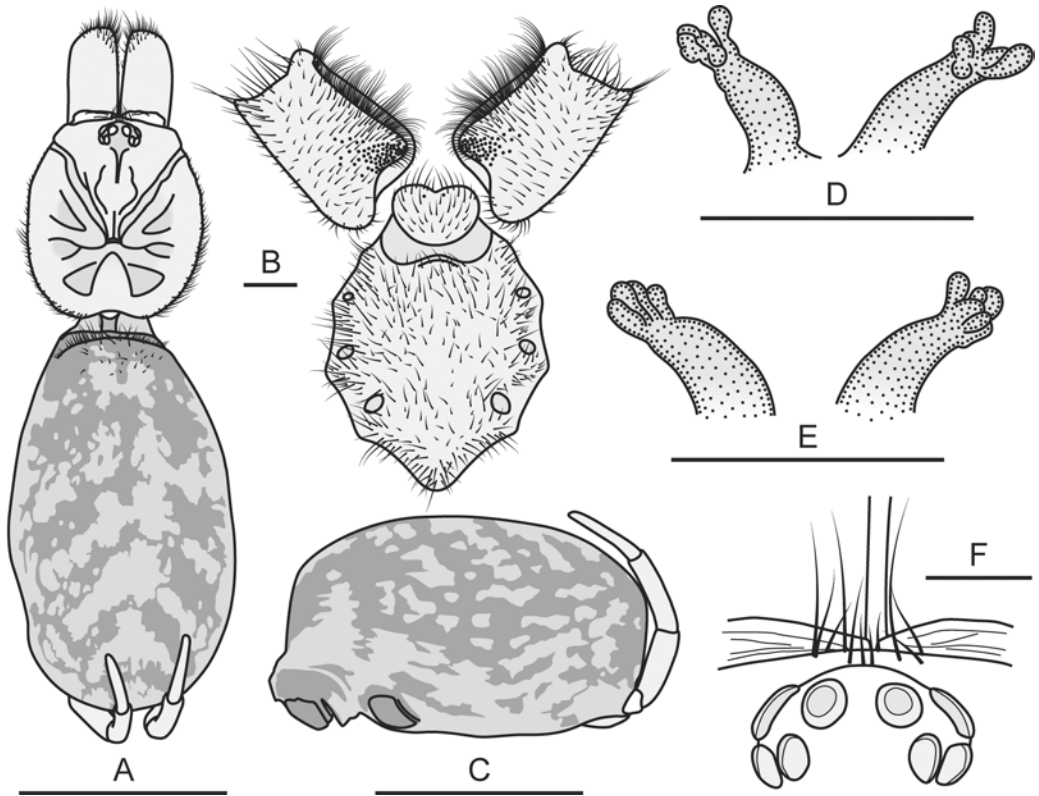


Fig. 1: *Linothele agelenoides* sp.n.: (A–D, F) holotype female (MPUJ\_ENT 0074278); (E) paratype female (NHMW 29617). (A) prosoma and opisthosoma, dorsal view; (B) maxillae, labium and sternum, ventral view; (C) opisthosoma and PLS, lateral view; (D, E) spermathecae, dorsal view; (F) eyes, dorsal view. Scale bars: 10 mm (A, C), 1 mm (B, D–F).

anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines, as well as their pseudo-segmented leg tarsi.

**Description.** Female (holotype). CL = 9.8; CT = 11; MC = 59–69; CB = 12. Habitus in life: see Fig. 3C, D. Coloration in alcohol: prosoma, chelicerae, legs and pedipalps brown; opisthosoma (length: 17.0) with a distinct pattern dorsally, mid-dorsally consisting of quadrate spots anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines (Fig. 1A); laterally with several spots (Fig. 1C); ventrally bright with slight mottling; maculae absent. Eyes (Fig. 1F): present, on a common tubercle; clypeus narrow. Chelicerae: with a single row of teeth prolaterally, mesobasally with several denticles. Carapace (Fig. 1A): fovea transverse, recurved; foveal bristles absent. Sternum (Fig. 1B): chordate with three pairs of submarginal sigilla increasing in diameter posteriorly. Labium (Fig. 1B): subquadrate, bearing two cusps. Maxillae (Fig. 1B): longer than wide with a short anterior lobe and bearing several cusps; serrula present; prolateral lyra absent. Palp measurements: 14.6 (4.3, 2.8, 3.9, 3.6). Palp spination: Fe D6, Pa P1, Ti P2V6, Ta V2. Palpal claw: with a single row of

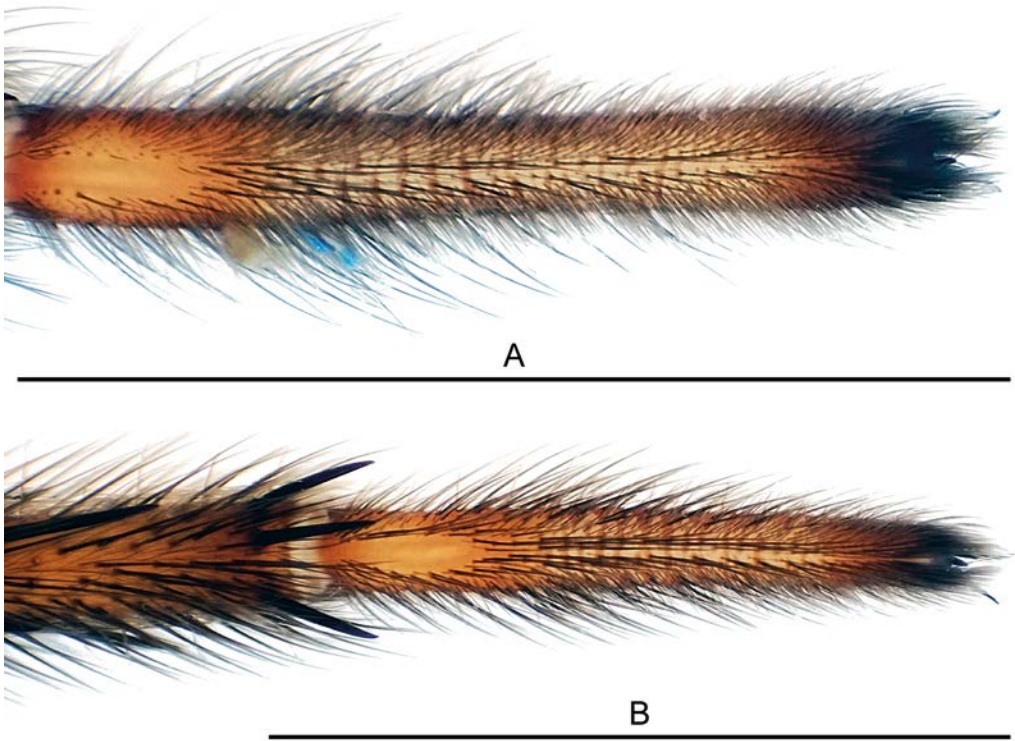


Fig. 2: *Linothele agelenoides* sp.n. holotype female (MPUJ\_ENT 0074278): (A) Ta, leg I, ventral view; (B) Mt and Ta, leg III, ventral view. Scale bars: 5 mm.

teeth. Leg measurements: I: 27.9 (7.7, 4.2, 5.8, 6.0, 4.2); II: 26.2 (7.1, 4.0, 5.2, 5.8, 4.1); III: 25.1 (6.3, 3.6, 4.5, 6.5, 4.2); IV: 32.3 (8.2, 4.1, 6.2, 9.3, 4.5). Leg formula: 4123. Leg spination: I: Fe D6P1, Ti P2V3, Mt P1V2; II: Fe D3, Pa P1, Ti P2V3, Mt P1V7; III: Fe D5, Pa P1R1, Ti P2R2V4, Mt D3P3V6; IV: Fe D9, Pa R1, Ti P3R3V3, Mt D4P3R3V6. Scopula: pseudoscopula present on anterior tarsi and metatarsi; divided by two parallel rows of spiniform setae on tarsi (Fig. 2A). Preening combs: absent (Fig. 2B). Leg tarsi: aspinose; pseudo-segmented; dorsally with a zig-zag row of trichobothria. Pedipalp claw: with single row of teeth. Superior tarsal claws: with two rows of teeth. Inferior tarsal claw: teeth absent. Spinnerets: PMS: 1.9; PLS (Fig. 1C): 11.7 (3.7, 4.0, 4.0); apical segments rigid. Spermatheca (Fig. 1D): consisting of two slightly v-shaped stalks with broad bases, narrowing abruptly at apex and bearing several distal vesicles.

Female (paratype). As for holotype, except for: CL = 9.4; CT = 10; MC = 37–44; CB = 11. Opisthosoma (length: 15.8). Palp measurements: 15 (4.9, 2.8, 3.9, 3.4). Palp spination: Fe D5, Pa P1, Ti P2R1V5, Ta V2. Leg measurements: I: 26.9 (7.3, 4.1, 5.6, 5.9, 4.0); II: 25.8 (6.9, 4.0, 5.1, 5.7, 4.1); III: 25.5 (6.6, 3.5, 4.6, 6.8, 4.0); IV: 33.3 (8.6, 4.0, 6.2, 9.6, 4.9). Leg spination: I: Fe D5P1, Pa P1, Ti P1V2, Mt V6; II: Fe D4P1, Pa P1, Ti P2V3, Mt P2V5; III: Fe D6, Pa P1R1, Ti D1P2R2V4, Mt D3P3R2V7; IV: Fe D5, Pa P1R1, Ti P2R3V4, Mt D3P3R2V7. Spinnerets: PMS: 2.1; PLS: 12.3 (3.8, 4.2, 4.3). Spermatheca: see Fig. 1E.

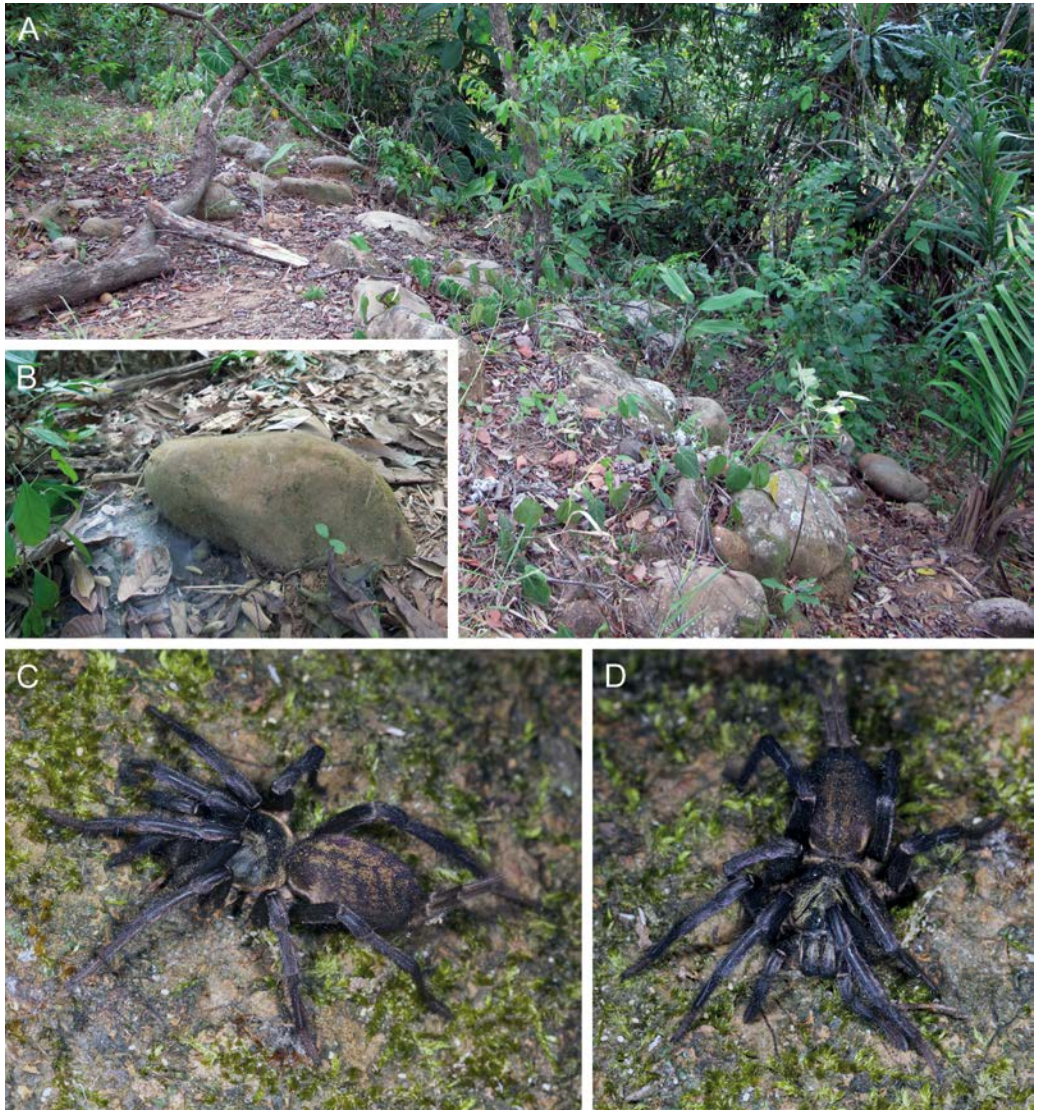


Fig. 3: *Linothele agelenoides* sp.n.: (A) macro-habitat; (B) micro-habitat and web extending from beneath a stone; (C, D) Specimen in life. Photos by Oliver Lucanus (McGill University, Montreal, Canada).

Male. Unknown.

**Etymology.** The specific epithet derives from the generic name *Agelena* WALCKENAER, 1805, the type genus of the araneomorph family Agelenidae C. L. KOCH, 1837, and the Greek suffix “-oides” (εἶδος = likeness), referring to the similarities of the webs of *L. agelenoides* sp.n. with the characteristic web constructions found in agelenids.

**Distribution.** Known only from the type locality.

**Ecology.** The specimens were collected during daytime, under large stones on a shady riverbank (Fig. 3A, B). No male specimens were found in the area. It seems like this area is flooded during heavy rains and increasing stream gauge. Bushes and various trees shade the ground, which is covered by fallen leaves. The species build their dense webs in close proximity to large stones. Only one specimen per spot was found. The species occurs in sympatry with other arachnid predators, such as *Cyriocosmus leetzi* VOL, 1999 (Theraphosidae THORELL, 1869), an unidentified species of the genus *Fufius* SIMON, 1888 (Rhytidicolidae SIMON, 1903) and the family Paratropididae SIMON, 1889, as well as the whip spider *Heterophrynus javieri* SEITER & GREDLER, 2020 and the whip scorpion *Mastigoproctus butleri* POCOCK, 1894.

### Update to the key to females of *Linothele*

Note: The key presented here is an update to the key provided by DROLSHAGEN & BÄCKSTAM (2021). For 1. and 3.–15. refer to the original key.

2. Pseudoscopula on anterior tarsi divided, see DROLSHAGEN & BÄCKSTAM (2021: fig. 5A, B), Fig. 2A ..... 3
- Pseudoscopula on anterior tarsi undivided, see DROLSHAGEN & BÄCKSTAM (2021: fig. 5C, D) ..... 19
16. Spermathecae stalks slightly v-shaped, with broad bases, narrowing abruptly at apex and bearing several distal vesicles, see Fig. 1D, E ..... *Linothele agelenoides* sp.n.
- Spermathecae stalks not v-shaped, with thinner bases, narrowing gradually towards apex, or vesicles more medially, see DUPÉRRÉ & TAPIA (2015: figs 26, 27, 36, 39, 40) .... 17
17. Spermathecae stalks closely positioned, see DUPÉRRÉ & TAPIA (2015: figs 39, 40) ..... *Linothele tsachilas* DUPÉRRÉ & TAPIA, 2015
- Spermathecae stalks widely separated, see DUPÉRRÉ & TAPIA (2015: figs 26, 27, 36) ..... 18
18. Opisthosoma brown with black median band, see DUPÉRRÉ & TAPIA (2015: fig. 34); spermathecae as DUPÉRRÉ & TAPIA (2015: fig. 36) ... *Linothele zaia* DUPÉRRÉ & TAPIA, 2015
- Opisthosoma with mid-dorsal golden band, see Dupérré & Tapia (2015: fig. 23); spermathecae as DUPÉRRÉ & TAPIA (2015: figs 26, 27) ..... *Linothele yanachanka* DUPÉRRÉ & TAPIA, 2015
19. PLS shorter than carapace ..... *Linothele mubii* NICOLETTA, OCHOA, CHAPARRO & FERRETTI, 2022
- PLS at least as long as carapace, or longer ..... 20
20. Clypeus wide, see DROLSHAGEN & BÄCKSTAM (2021: fig. 8D); dorsal pattern on opisthosoma consisting of several dots forming incomplete chevrons and ventral pattern on opisthosoma present and distinct, see DROLSHAGEN & BÄCKSTAM (2021: figs 18D, E; 19G); spermatheca with long, tube-shaped stalks bearing few vesicles distally, see DROLSHAGEN & BÄCKSTAM (2021: fig. 8B, C); Paramó regions of Ecuador ..... *Linothele gaujoni* (SIMON, 1889)

- Clypeus narrow, see DROLSHAGEN & BÄCKSTAM (2021: fig. 7H); dorsal pattern on opisthosoma consisting of complete chevrons, see DROLSHAGEN & BÄCKSTAM (2021: fig. 18B), or absent; ventral pattern on opisthosoma absent, or indistinct, see DROLSHAGEN & BÄCKSTAM (2021: fig. 18C); spermatheca stalks shorter and without vesicles only distally; Peru, or Brazil ..... 21
- 21. More than 30 maxillary cuspules, see DROLSHAGEN & BÄCKSTAM (2021: fig. 7F); dorsal pattern on opisthosoma consisting of complete chevrons, see DROLSHAGEN & BÄCKSTAM (2021: figs 18B; 19H, J); spermatheca with single retrolateral lobe, see DROLSHAGEN & BÄCKSTAM (2021: fig. 7G) ..... *Linothele fallax* (MELLO-LEITÃO, 1926)
- Less than 15 maxillary cuspules, see DROLSHAGEN & BÄCKSTAM (2021: fig. 16A); patterns absent on opisthosoma; spermatheca with several vesicles and lobe, see DROLSHAGEN & BÄCKSTAM (2021: fig. 16D) .....  
..... *Linothele uniformis* DROLSHAGEN & BÄCKSTAM, 2021

### Discussion

*Linothele agelenoides* sp.n. is diagnosed here based on a unique combination of characters, as opposed to possessing a singular unique character to itself. A taxonomic review of the genus *Linothele* by DROLSHAGEN & BÄCKSTAM (2021) revealed significant intraspecific variability and overlap in regards to counts of structures such as maxillary cuspules and cheliceral teeth, as well as variability from one side to the other within single specimen(s), rendering these structures useless for identification purposes. From its Colombian congeners *L. agelenoides* sp.n. may easily be distinguished by the lack of distinct characters, such as its integral apical segments of the PLS versus flexible in *Linothele sericata* (KARSCH, 1879), no preening combs versus preening combs in *Linothele macrothelifera* STRAND, 1908 and unicolor appendages versus maculae in *Linothele melloleitaoi* (BRIGNOLI, 1983). Considering the descriptions of species of *Linothele* by DUPÉRRÉ & TAPIA (2015), *L. agelenoides* sp.n. seems to be more related to some of the species known from Ecuador (save *Linothele quori* DUPÉRRÉ & TAPIA, 2015), from which it differs by the morphology of the reproduction organs, alongside its occurrence east of the Andes.

Since that review of the genus, one new species has been described: *Linothele mubii* NICOLETTA, OCHOA, CHAPARRO & FERRETTI, 2022. Following NICOLETTA et al. (2022), the female of *L. mubii* bears undivided pseudoscopula and a spermatheca with stalks bearing a single retrolateral lobe, while the male has an elevated and apically v-shaped metatarsal protuberance, which in conjunction indicate a possible relationship to *Linothele fallax* (MELLO-LEITÃO, 1926). The PLS of the female holotype of *L. mubii* are overall a lot shorter than in other species of *Linothele* (CL/PLS = 1.46 versus 0.8/0.76 in the female holotype/paratype of *L. agelenoides* sp.n., 0.66 in the female holotype of *Linothele septentrionalis* DROLSHAGEN & BÄCKSTAM, 2021 and 0.97 in the female holotype of *Linothele uniformis* DROLSHAGEN & BÄCKSTAM, 2021). While the short PLS of *L. mubii* might indicate the species is misplaced and actually belongs in *Acanthogonatus* KARSCH, 1880 (Pycnothelidae CHAMBERLIN, 1917), of which individual species exhibit similar characters, such as the recurved fovea, or flexible leg tarsi (see GOLOBOFF 1995), the combination of characters, alongside the subquadrate labium clearly speak in favour of its correct placement in *Linothele*. Thus, the PLS being much shorter than the

carapace is a character not mentioned by NICOLETTA et al. (2022) which can be used to distinguish females of *L. mubii* from those of other species of *Linothele*.

### Acknowledgements

We are most grateful to Javier Alejandro Maldonado-Ocampo (MPUJ) and Oliver Lucanus (McGill University, Montreal, Canada) for their logistical support, and help with paper work during the field trip in Colombia, and O. Lucanus as well for the permission to use the photographs used in Figure 3. Furthermore, we are thankful to Igor Dimitri Forero Fuentes (MPUJ) and Christoph Hörweg (NHMW) for their admission and arrangement to deposit the type specimens in their respective collection. We also want to thank the peer-reviewers for their useful comments and suggestions on the manuscript.

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Autor(en)/Author(s): Bäckstam Christian M., Drolshagen Bastian, Seiter Michael

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