A new species of *Linothele* Karsch, 1879 (Araneae: Dipluridae) from south-eastern Ecuador

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Abstract

We describe a new species of *Linothele* Karsch, 1879 from the south-eastern slopes of the Andes in Ecuador. The new species can be distinguished from all congeners by the presence of abundant bright whitish-golden curly setae on the carapace; a patternless grey abdomen in adults, with short whitish-golden setae, short black setae and long and erected black setae, and lacking maculae; the elongate and apically tapered spermatheca with 3–5 elongated vesicles placed medially; the prominent metatarsal tubercle and tibial megaspine in leg I in the male, and the male palpal bulb longer than wide, with flattened apical part of the embolus. We comment on the bulb morphology and ontogenetic colour variation of *Linothele* and discuss the distribution of some *Linothele* from the eastern Andes and Amazonian lowlands.

Keywords: curtain-web spiders ● neotropics

Introduction

The genus *Linothele* Karsch, 1879 includes small to large diplurid spiders diagnosed from all other members of the family Dipluridae by the absence of maxillary lyra, cracked or pseudo-segmented leg tarsi, and medially and asymmetrically positioned vesicles on the spermathecae (Raven 1985; Dupérré & Tapia 2015; Drolshagen & Bäckstam 2021). This neotropical clade currently has 22 valid species distributed mainly in South America, with one species known from the Bahamas (Dupérré & Tapia 2015; Drolshagen & Bäckstam 2021; Nicoletta *et al*. 2022; World Spider Catalog 2022). In South America, *Linothele* is known across a broad altitudinal range, from near sea level (*L. sexfasciata* (Schiapelli & Gerschman, 1945) and *L. curvitarsis* Karsch, 1879 in Caracas, Venezuela), up to the Andean highlands (*L. longicauda* (Ausserer, 1871) at 2800 m, in Quito, Ecuador) (Karsch 1879; Simon 1889; Schiapelli & Gerschman 1945; Drolshagen & Bäckstam 2021).

Diplura longicauda Ausserer, 1871 (= *L. longicauda*) was the first species of *Linothele* described from Ecuador, based on specimens collected at Quito by Karl L. Schmarda. The names *Diplura aequatorialis* Ausserer, 1871 and *Diplura cousini* Simon, 1889 were recently placed in the synonymy of *L. longicauda* by Drolshagen & Bäckstam (2021), and *L. longicauda* is currently known from several localities in high mountain forests of the inter-Andean valley of Quito, province of Pichincha (Ausserer 1871; Simon 1889; Drolshagen & Bäckstam 2021; Sherwood 2022). Seven species have been subsequently described from Ecuador: *Linothele cavicola* Goloboff, 1994, known only from its type locality at the Jumandi caves, north-eastern slopes of the Andes, province of Napo; *L. gaujoni* (Simon, 1899), from several localities in dry forests on the inter-Andean valleys of Cuenca and Loja, provinces of Azuay and Loja; and *L. pukachumpi* Dupérré & Tapia, 2015, *L. quori* Dupérré & Tapia, 2015, *L. tsachilas* Dupérré & Tapia, 2015, *L. yanachanka* Dupérré & Tapia, 2015, and *L. zaia* Dupérré & Tapia, 2015 from their type localities in cloud forests on the northwestern slopes of the Andes, in the provinces of Santo Domingo de Los Tsáchilas and Cotopaxi (Ausserer 1871; Simon 1889; Goloboff 1994; Dupérré & Tapia 2015; Drolshagen & Bäckstam 2021; Sherwood 2022; World Spider Catalog 2022).

Recent expeditions by the Mygalomorphae Group of the Laboratory of Terrestrial Zoology of Universidad San Francisco de Quito USFQ resulted in the discovery of a new *Linothele* from the south-eastern Andean slopes of Ecuador. This paper aims to describe this new species based on its distinctive morphology and colouration, alongside comments on palpal bulb morphology and ontogenetic colour variation in *Linothele* and the distribution of some of its taxa from the eastern Andes and Amazonian lowlands.

Material and methods

We conducted fieldwork on the eastern slopes of Churuco hill, 3°11′06″S 78°47′46″W–3°12′21″S 78°46′31″W, Cordillera de Matanga, on the south-eastern slopes of the Cordillera Real Oriental of the Andes of Ecuador, between 16–19 June 2021. The area is part of the Sangay-Podocarpus conservation corridor in the provinces of Morona Santiago and Azuay. Local physiography is characterised by mountains with slopes ranging from 15–87°, giving shape to small steep heads and ravines surrounded by vertical walls with persistent cloud cover and forest fog (Coltorti & Ollier 2000).

We conducted active searches and opportunistic collections day and night on trails along an altitudinal gradient from paramo grasslands (3300 m elevation) to the low montane forest (2000 m elevation). Specimens were collected by hand, transported to the laboratory in plastic containers with leaf litter, photographed alive, and euthanised with a direct intra-cardiac delivery of KCl, following the protocols described by Bennie *et al*. (2012). Since species of *Linothele* are smaller than *Acanthoscuria cordubensis* used by Bennie *et al*. (2012), we used insulin syringes to cause minimum damage to the specimens. Specimens were preserved in 75% ethanol and examined and measured under an Olympus SZX16 stereomicroscope with an Olympus DP73 digital camera. We obtained compound images by stacking a series of photographs taken at different depths using an Olympus DP73 digital camera and processing them with

Fig. 1: *Linothele cornigera* sp. nov., male paratype (ZSFQ-i 8240), habitus. Photo: J. C. Sánchez-Nivicela.

Adobe Photoshop version 23.5. Measurements were recorded with the micro-imaging software for Olympus cellSens Dimension, version 1.16 (Evident™). All measurements are in millimetres. Total length includes chelicerae length. Female genitalia were excised using a syringe tip; soft tissue was digested with a solution of 15% KOH, washed in distilled water and 75% ethanol, and examined under an Olympus CX22 microscope with an OMAX A35180U3 digital camera.

Morphological descriptions and terminology follow standards proposed by Coyle (1995), Goloboff & Platnick (1987), and Dupérré & Tapia (2015). Female and male genitalia descriptions follow proposals by Coyle (1995) and Dupérré & Tapia (2015). Leg spination description follows definitions and terminology proposed by Petrunkevitch (1925). We follow Raven (1985) and Drolshagen & Bäckstam (2021) for the use of the terms divided and undivided scopulae, Gabriel (2016) for tegular heel, Gabriel & Sherwood (2020) for prolateral crease, and Sherwood *et al*. (2021) for ventral median depression. **New terminology**: We define a superior prolateral depression as the notorious indented area in the prolateral face that extends from the basal to median part of the palpal bulb, between the superior point of emergence of the embolus and the prolateral crease and tegular heel. We based colour descriptions on photographs of live specimens and notes taken in the field. Due to the importance of colouration for the taxonomy of *Linothele*, colour descriptions follow standards proposed by Köhler (2012), and specific colour codes are in brackets, stated at the first mention of the colour. We looked for the most similar tone in Köhler (2012) for metallic colours. Morphological abbreviations: Leg spination: d = dorsal, p = prolateral, r = retrolateral, v = ventral. Somatic: ALE = anterior lateral eyes, AME = anterior median eyes, PME = posterior median eyes, PLE = posterior lateral eyes, PLS = posterior lateral spinnerets, PMS = posterior median spinnerets. Female genitalia: br = branch, s = spermatheca, ve = vesicles. Male genitalia: BD = maximum diameter of palpal bulb, D = ventral median depression, E = embolus, PC = prolateral crease, PL = length of palpal bulb, R = retrolateral keel, SPD = superior prolateral depression, T = tegulum, TH = tegular hill.

Examined specimens are deposited at the Museo de Zoología, Universidad San Francisco de Quito (ZSFQ) and Museo de Zoología, Pontificia Universidad Católica del Ecuador (QCAZ-I). Information on species for comparative diagnoses was obtained from the literature (Ausserer 1871; Simon 1889; Goloboff 1994; Dupérré & Tapia 2015; Drolshagen & Bäckstam 2021; Sherwood 2022) and the following examined specimens: *Linothele longicauda*: ZSFQ-i8201, ZSFQ-i8203, ZSFQ-i8204, ZSFQ-i8245, ZSFQ-i8246, QCAZ-I 265157, QCAZ-I 265167, females, province of Pichincha: eastern slopes of Pichincha volcano, 3000 m; QCAZ-I 265051, female, province of Pichincha:

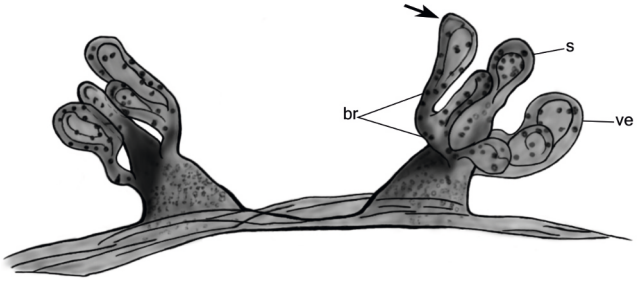

Fig. 2: Spermathecae of *Linothele cornigera* sp. nov., holotype female (ZSFQ-i 8241), in dorsal view. s = spermathecae, ve = vesicles, br = branch where two vesicles join. Arrow points to the long branch passing the length of the spermathecae.

Aloguincho, 2063 m; QCAZ-I 265062, female, province of Pichincha, Puembo, 2478 m; QCAZ-I 265162, female, province of Pichincha, Alangasí, 2572 m. *Linothele quori*: QCAZ I-262571, female, province of Santo Domingo de los Tsáchilas: Santo Domingo, 466 m.

***Linothele cornigera* sp. nov.** (Figs. 1–6)

Type specimens: Holotype ♀ collected on eastern slope of Churuco hill, 3°12′21″S 78°46′31″W, 2320 m, Cordillera de Matanga, parroquia Chigüinda, provincia de Morona Santiago, República del Ecuador, hand collected from web, 18 November 2021, leg. P. Peñaherrera-R and J. C. Sánchez-Nivicela (ZSFQ-i 8241, field number PJPR-CU0006). Paratype ♂, same data as holotype, hand collected on a dirt road, leg. P. Peñaherrera-R. and J. Sánchez-Nivicela (ZSFQ-i 8240).

Additional material: Seven juveniles, same data as holotype, ZSFQ-i8236, ZSFQ-i8237, ZSFQ-i8238, ZSFQ-i8239, ZSFQ-i8242, ZSFQ-i8243, ZSFQ-i8244.

Etymology: The specific epithet is a Latin adjective, meaning horned or having horns, referring to the remarkable size of the megaspine and tubercle on leg I of males of the new species.

Diagnosis: Both sexes of *Linothele cornigera* sp. nov. can be diagnosed from all known congeners by the patternless grey abdomen with short whitish-golden setae, short black setae and long and erected black setae (Fig. 1). *Linothele cornigera* sp. nov. further differs from *L. quori*, *L. septentrionalis*, and *L. tsachilas* by the absence of maculae. From other Ecuadorian species, *L. cornigera* sp. nov. differs by the presence of abundant bright whitish-golden curly setae on the carapace (Fig. 1) (*L. pukachumpi*, *L. yanachanka*, *L. zaia*, and *L. quori* with yellowish-golden setae, *L. gaujoni* with copper setae, *L. longicauda* with black setae). Males of *L. cornigera* sp. nov. are diagnosed by having a palpal bulb longer than wide, BD 0.42, PL 1.12, but smaller than other species (*L. curvitarsis* BD 0.7–0.8, PL 1.8–2.0; *L. fallax* BD 0.9, PL 2.9; *L. sericata* BD 1.1, PL 3.9; *L. spinosa* BD 0.5, PL 1.9; *L. mubii* BD 1.01, PL 3.05, Drolshagen & Bäckstam 2021; Nicoletta *et al*. 2022); shorter and more curved embolus (longer and slightly curved in *L. gaujoni*; Sherwood 2022); flattened appearance of the apical part of the embolus, like *L. quori* and *L. yanachanka* (see figs. 28, 44 in Dupérré & Tapia 2015) (thin apical part of embolus in *L. longicauda*: Sherwood 2022);

Species	Spermatheca description	Reference
L. cavicola Goloboff, 1994	Short spermathecae; apically tapering; bent outwards; single vesicle placed on each external lateral of spermatheca in distal part.	Goloboff (1994)
L. cornigera sp. nov.	Elongated spermathecae; apically tapering, bent outwards; 3-5 elongated vesicles placed in medial part; 2 vesicles joined in a single branch.	This work
L. curvitarsis Karsch, 1879	Elongated spermathecae; apically tapering; bent outward; distal and medial part more inclined; 4–5 vesicles or inconspicuous brain-shaped vesicles placed in distal part.	Dupérré & Tapia (2021); Drolshagen & Bäckstam (2021)
L. fallax (Mello-Leitão, 1926)	Elongated spermathecae; slightly bent outwards; distal and medial part more inclined; single, short, and twisted vesicle placed in median part.	Drolshagen & Bäckstam (2021)
L. gaujoni (Simon, 1889)	Elongated spermathecae; bent outwards; distal part of spermatheca slightly or strongly more bent; inconspicuous rosette-shaped vesicles placed in distal part.	Drolshagen & Bäckstam (2021)
L. longicauda (Ausserer, 1871)	Elongated spermathecae hand-shaped; apically tapering; bent outwards; 5–6 elongated and irregular vesicles placed in distal and medial part.	Drolshagen & Bäckstam (2021;) examined specimens
L. macrothelifera Strand, 1908	Very short spermathecae; 2 vesicles or inconspicuous rosette-shaped vesicles placed in distal part.	Drolshagen & Bäckstam (2021)
L. mubii Nicoletta, Ochoa, Chaparro & Ferreti, 2022	Elongated spermathecae; distally dilated; bent outwards; distal part of spermatheca slightly more bent; single short vesicle placed on each external lateral of spermatheca in distal part.	Nicoletta et al. (2022)
L. paulistana (Mello-Laitão, 1924)	Elongated spermathecae; distally dilated; slightly bent towards; single, elongated, twisted, and distally dilated vesicle placed in basal part.	Drolshagen & Bäckstam (2021)
L. pukachumpi Dupérré & Tapia, 2015	Elongated spermathecae; apically tapering; bent outwards; 4–5 elongated vesicles placed in medial inner lateral part.	Dupérré & Tapia (2015)
L. quori Dupérré & Tapia, 2015	Short spermathecae; distally dilated; bent outwards; dorsolateral group of short inconspicuous vesicles placed in medial part.	Dupérré & Tapia (2015)
L. septentrionalis Drolshagen & Bäckstam, 2021	Very short spermathecae; bent outwards almost horizontally; single, short, and twisted vesicle placed in basal part.	Drolshagen & Bäckstam (2021)
L. sericata (Karsch, 1879)	Long spermathecae; slightly bent outwards; distally dilated; shallow apical invagination; absence of vesicles.	Paz & Raven (1990)
L. sexfasciata (Schiapelli & Gerschman, 1945)	Very short spermathecae; apically tapering; bent outwards; 2 vesicles placed on each lateral of spermatheca in medial part.	Drolshagen & Bäckstam (2021)
L. spinosa Drolshagen & Bäckstam, 2021	Short spermathecae; apically tapering; bent outwards; 3 small vesicles and 1 or 2 elongated vesicles placed in medial part.	Drolshagen & Bäckstam (2021)
L. tsachilas Dupérré & Tapia, 2015	Closely positioned spermathecae; apically tapering; bent outwards; distal part more bent; 3-5 short vesicles in medial-apical part.	Dupérré & Tapia (2015)
L. uniformis Drolshagen & Bäckstam, 2021	Short spermathecae hand-shaped; bent outwards; 5 short vesicles placed in distal and medial part.	Drolshagen & Bäckstam (2021)
L. yanachanka Dupérré & Tapia, 2015	Elongated or short spermathecae; apically tapering; bent outwards; 5–9 elongated vesicles placed in medial inner lateral part.	Dupérré & Tapia (2015)
L. zaia Dupérré & Tapia, 2015	Widely separated short spermathecae; apically tapering; bent outwards; 4 short vesicles in medial part.	Dupérré & Tapia (2015)

Table 1: Comparative table of the spermathecae morphology of *Linothele* Karsch, 1879.

Fig. 3. *Linothele cornigera* sp. nov. male paratype (ZSFQ-i 8240), left side tibia–metatarsus I, megaspine, and tubercle, ventro-lateral view.

long but weakly developed retrolateral keel (absent in *L. quori* and *L. yanachanka*; strong prolateral keel in *L. sericata*, see fig. 8 in Paz & Raven 1990; well developed retrolateral keel in *L. mubii*, see figs. 23–28 in Nicoletta *et al*. 2022); presence of a small prolateral crease, like *L. fallax* and *L. jelskii*, and a superior prolateral depression, also present in *L. jelskii*, but differing from *L. fallax* by the palpal bulb shape (see above) and from *L. jelskii* by the leg formula (1423 in *L. jelskii v*. 4123 in *L. cornigera* sp. nov.). The metatarsal tubercle and tibial megaspine in leg I of males of *Linothele cornigera* sp. nov. are larger than in all other species. Females of *L. cornigera* sp. nov. are diagnosed by their elongate and apically tapered spermathecae bent outwards, with 3–5 elongated vesicles situated medially, with two arranged on a single branch (Fig. 2; Table 1).

Description of holotype female: Total length 21.43, cephalothorax length 9.17, width 8.05; abdomen length 8.14, width 4.80. Carapace slightly longer than wide, cephalic region elevated, fovea deep and straight; carapace black [300] without metallic reflection, abundantly covered by curly metallic pale pinkish buff [3] setae; metallic pale pinkish buff setae on carapace margin; absence of spiniform setae posterior to fovea. Chelicera promargin with 10 teeth, fang furrow with 35 denticles; chelicera black, covered with metallic pale pinkish buff setae. Labium without cuspules; base and apex hazel [26]. Maxilla with 44–49 cuspules; maxillary lyra absent; maxilla cinnamon-rufous [31] with

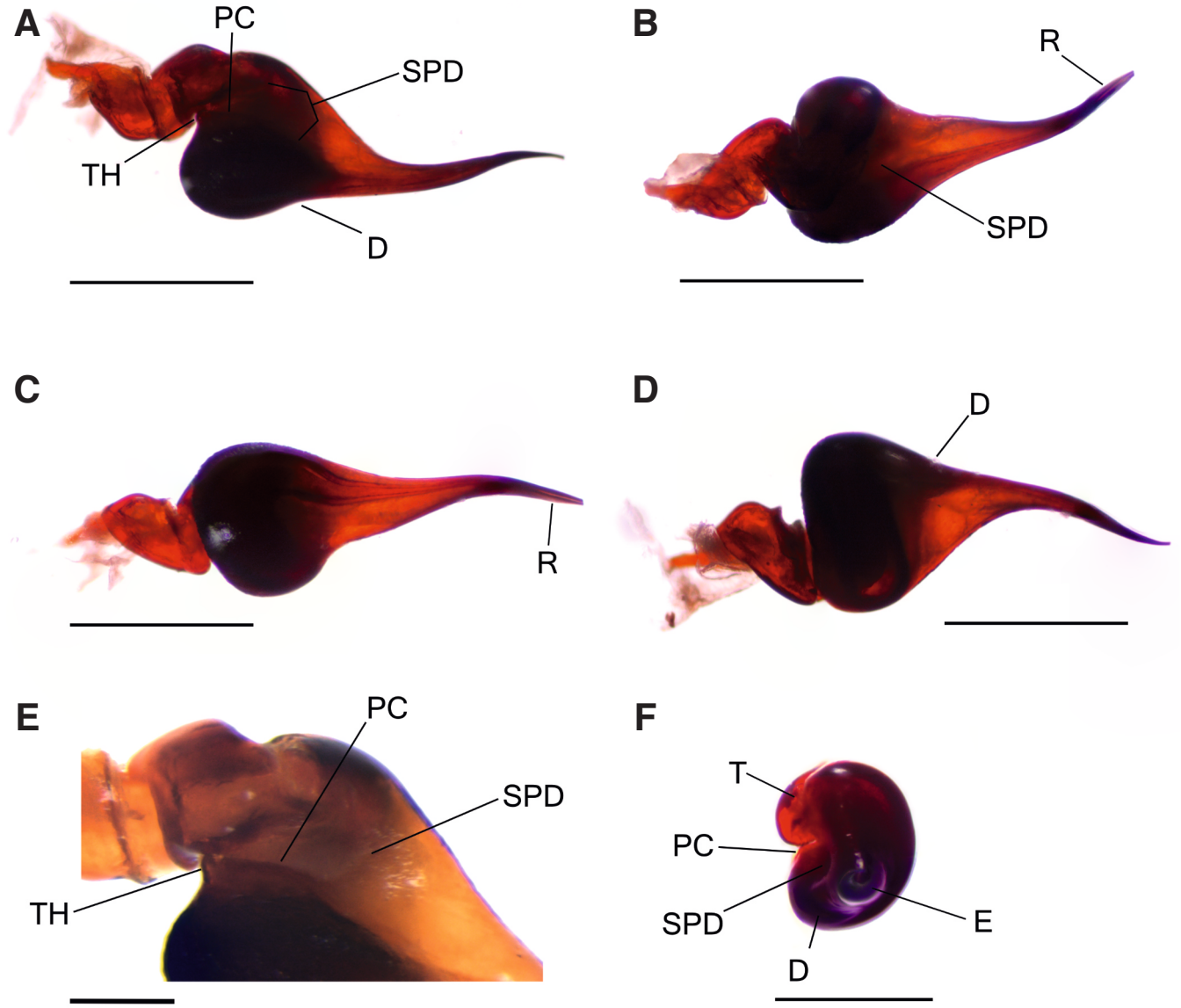

Fig. 4: *Linothele cornigera* sp. nov. paratype male (ZSFQ-i 8240), palp bulb (left). **A** prolateral view; **B** dorsal view; **C** retrolateral view; **D** ventral view; **E** closer view of superior prolateral face; **F** apical view. R = retrolateral keel, E = embolus, T = tegulum, PC = prolateral crease, TH = tegular heel, D = ventral median depression, SPD = prolateral superior depression. Scale bars = 0.5 mm (A–D, F), 0.2 mm (E).

pinkish flesh [253] setae and covered with long erected black setae. Sternum longer than wide, with three oval sigilla, rebordered; sternum uniformly chestnut [30], covered with long erect black setae and with amber [51] border. Eight eyes on tubercle: AME circular, separated by 1× AME diameter; PLE, PME, ALE oval, PLE, PME, ALE touching; ALE largest, followed by slightly smaller PLE, AME smallest; AME separated by 2.5× PME diameter. Clypeus height 0.64; anterior row procurved, posterior row recurved (Fig. 4B). Abdomen oval, elongated; dorsal, lateral, and ventral surfaces heterogeneously covered by short metallic pale pinkish buff setae, short black setae, and long, erect black setae. Spinnerets: PLS overall black, rigid; total length: 7.70, basal/median/apical: 2.54/2.22/2.95 respectively; PMS overall black, total length: 1.72. PLS and PMS covered with short metallic pale pinkish buff setae, and short erected black setae. Legs overall black, except tarsus peach red [70], covered with black setae and small heterogeneous patches of metallic drab grey [256] setae, except tarsus with only black setae; small maculae present over different segments on all legs; tarsus I–IV flexible, pseudosegmented, undivided scopulae leg I, divided scopulae legs II–IV; legs III and IV less scopulated than legs I and II. Leg formula 4123; total length: I 26.12 II 22.61 III 22.39 IV 28.18; leg articles length (femur/patella/tibia/metatarsus/tarsus): leg I 7.17/3.77/6.28/5.06/3.84; leg II 6.39/2.79/5.22/4.71/3.50; leg III 6.42/2.90/4.65/5.32/3.10; leg IV 7.91/2.80/6.17/7.69/3.62. Paired tarsal claws bipectinate, with rows of leg I: 6–7 teeth; leg II: 5–9 teeth; leg III: 4–6 teeth; leg IV: 5–7; leg I–IV: third claw with rows of 3–4 teeth. Leg spination: I: femur p 0-0-1, r 0, v 0, d 0; tibia p 1-1-1, r 0-0-1, v 1-0-1, d 0-1-0; metatarsus p 0-1-1, r 1-1-2, v 0-0-1, d 1-1-1. II: femur p 1-0-0, r 0, v 0, d 0; tibia p 1-1-0, r 0-1-0, v 0-1-1, d 1-1-1; metatarsus p 0, r 0-0-1, v 1-1-1, d 0-0-1. III: femur p 2-1-1-1, r 2-2-1, v 1-2-1-1, d 2-2-1; tibia p 0-1-1, r 0-1-0, v 1-1-1-1, d 1-1-1; metatarsus p 0, r 0-1-0, v 0, d 0. IV: femur p 1-1-1-1, r 1-1-1-1-1, v 2-1-1-1, d 1-2-1-1; tibia p 0-1-0, r 1-1-1, v 1-1-1-1, d 1-1-1; metatarsus p 0, r 0, v 0, d 0. Genitalia: asymmetrical spermatheca joined at the base, elongated and apically-tapered, bent outwards, three elongated vesicles joined in medial part of left side of spermatheca, five elongated vesicles joined in medial part of right side of spermatheca, where two vesicles joined in branch (on both sides of the structure, Fig. 2), one of which passes the length of spermatheca (Fig. 2).

Description of male paratype: Total length 16.25, cephalothorax length 7.51, width 6.95, abdomen length 6.78, width 3.42. Carapace slightly wider than long, cephalic region remarkably elevated, fovea recurved and deep; carapace black without metallic reflection, abundantly covered by curly metallic pale pinkish buff setae, V-shape mark around caput due to absence of setae; flesh ochre [57] setae covering carapace margin; small group of long spiniform setae posterior to fovea (Fig. 1). Chelicera promargin with 11 teeth, fang furrow without denticles; chelicera black covered with pale pinkish buff setae (Fig. 1). Labium without cuspules; base and apex hazel. Maxilla with 30–32 cuspules; maxillary lyra absent; colour and setae as in female.

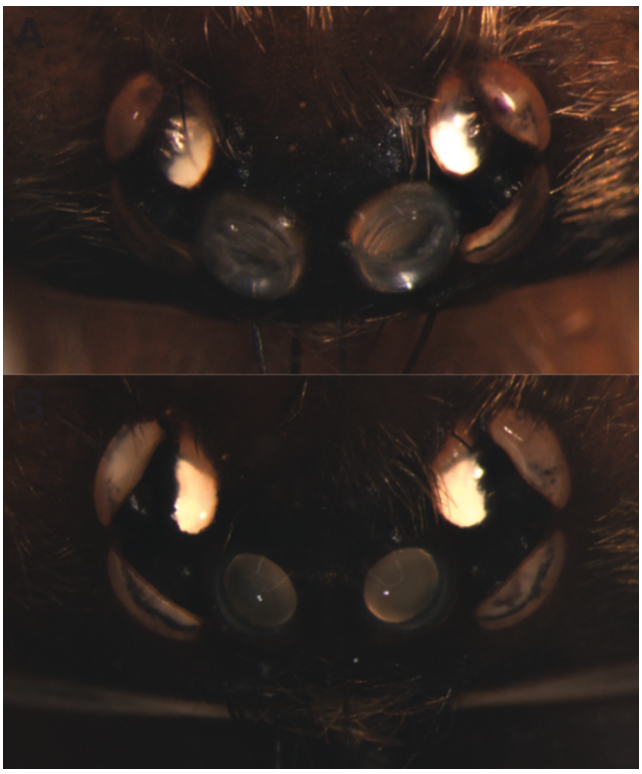

Fig. 5: *Linothele cornigera* sp. nov. eye tubercle, dorsal view. **A** male paratype male (ZSFQ-i 8240). **B** holotype female (ZSFQ-i 8241).

Sternum with three circular sigilla, otherwise as in female. Eight eyes on tubercle: AME circular with concave appearance, separated by 0.05× AME diameter; PLE, PME oval, PLE, PME, ALE touching, ALE largest; PME smallest; separated by 4× PME diameter, clypeus height 0.34; anterior row procurved, posterior row recurved (Fig. 4A). Abdomen as in female. Spinnerets: PLS rigid, overall black except apical segment salmon [58]; total length: 8.95, basal/median/apical: 2.91/2.68/3.36; PMS with cream white [52] borders and black at centre, total length: 1.32, PLS and PMS setae as in female. Leg colouration as in female, maculae absent (Fig. 1); leg I with coarse and long megaspine and metatarsus tubercle (Fig. 3); tarsus I–IV flexible and pseudosegmented, with weak scopulae, divided scopulae legs I–IV. Leg formula 4123; total length: I 28.30 II 27.05 III 26.20 IV 34.13; leg articles length (femur/patella/tibia/metatarsus/tarsus): leg I 6.27/2.99/7.06/6.14/5.84; leg II 6.31/2.26/6.83 6.50/5.14; leg III 6.30/1.85/6.11/7.18/54.76; leg IV 8.29/1.99/7.73/10.21/5.91. Paired tarsal claws bipectinate; leg I–II with rows of 7–8 teeth; leg III with 8–9 teeth; leg IV with 6–7 teeth; leg I third claw with one tooth; leg II and IV third claw with rows of two teeth; leg III third claw with rows of four teeth. Leg spination: I: femur p 0-0-1, r 0, v 0, d 1-2-2-1-1-1-1; tibia p 1-1-0, r 1-1-0, v 0-1-1, d 0; metatarsus p 0, r 0, v 0, d 0. Leg II: femur p 0-0-1, r 1-1-1-1, v 0, d 2-2-2-2; tibia p 1-1-0, r 0, v 1-1-2, d 0; metatarsus p 1-1-0, r 0, v 1-2-2, d 0. Leg III: femur p 0-0-1, r 0, v 0, d 1-2-2-1-1; tibia p 1-1-0, r 1-2-1, v 2-2-2, d 0; metatarsus p 1-1-1, r 1-1-2, v 2-1-1-2, d 1-2-1. Leg IV: femur p 0, r 0, v 0, d 1-2-2-2-1-2; tibia p 1-1-0, r 1-1-0, v 2-2-2, d 1-0-0; metatarsus p 1-1-1-1-1-2, r 1-1-1, v 1-1-2, d 1-1-1-1-2. Genitalia: Palpal cym-

Fig. 6: Habitus of immature *Linothele cornigera* sp. nov., in life.

bium large and pointed; pyriform palpal bulb with a ventral median depression visible in retrolateral, prolateral, and apical views (Fig. 4A,D,F), weakly developed tegular heel visible only in prolateral view (Fig. 4A,E), short prolateral crease (Fig. 4A,E), and superior prolateral depression visible in prolateral, dorsal, and apical view (Fig. 4A–B,E–F); twisted and thick embolus with an elongate and weakly developed retrolateral keel making the apex appear flattened (Fig. 4B–C,F); bulb longer than wide, BD 0.42, PL 1.12.

Description of immatures (n = 7): Legs: maculae present in basal and apical parts of segments (Fig. 6). Abdomen longer than wide, oval, with cuticular dorsal burnt sienna [38] colouration. One single, irregular, cuticular, burnt-sienna line is lengthwise with two dark salmon [59] lines at its dexterous and sinister sides; three lines form a main V shape (Fig. 6). Three irregular dark salmon lines extend from this main shape at distal end of opisthosoma. Rest of dorsum reticulated with variety of dark salmon spots. Dark salmon setae throughout opisthosoma covering cuticular pattern (Fig. 6). Darker, longer, and more sclerotized setae present, especially in proximal and distal extremes of opisthosoma. Ventral zone with main cuticular dark salmon ladder-shaped pattern; rest of abdomen blotched with variety of golden spots; dark salmon and burnt sienna setae also present throughout abdominal cuticle. Laterals have a blotched cuticular colouration with numerous golden spots on black brown; setae on laterals mostly golden.

Distribution: *Linothele cornigera* sp. nov. is only known from its type locality, on the eastern slopes of Churuco mountain, Parroquia Chigüinda, province of Morona Santiago, Ecuador.

Natural history: Specimens were collected in the transitional zone between low montane and montane evergreen forest and were found in a small ravine with waterfalls and creeks. The female holotype and one juvenile were found without funnel webs and webbing limited to the entrance of their burrow on stone walls covered by wet mosses and abundant dropping water. Other juveniles were found among stones accumulated on the ground where large funnel webs were built. The male paratype was found walking on a dirt road around 22:00. Seven months after being found, one juvenile in captivity presented a parasitoid larva. The larva was almost half the length of its abdomen and remained attached to the abdomen side for five days. The parasitized juvenile showed normal behaviour before the larva emerged, constantly feeding, and building a dense web similar to other *Linothele*. After the larva emerged, the spider remained paralysed for a few hours until it died (Fig. 7). Based on photographs, the larva was identified as a species of Acroceridae (Diptera). Unfortunately, it was not possible to successfully rear the larva. Members of the acrocerid subfamily Panopinae are parasitoids of mygalomorphs. Little research has been conducted on the Panopinae of Ecuador, currently with five species reported in the country: *Camposella insignata* Cole, 1919, known from the western slopes of the Andes of northern Ecuador; *Lasia ecuadorensis* Bequaert, 1931 and *Pialea ecuadorensis* Schlinger, 1956 from the inter-Andean valleys of northern and central Ecuador; and *Ocnaea falcifer* Aldrich, 1928 and *O. gigas* Aldrich, 1928 from the eastern slopes of the Andes of central Ecuador (Cole 1919; Aldrich 1928; Bequaert 1931; Schlinger 1956; Tadashima-Rivera *et al*. 2021). Schlinger (1987) provided the only known record of a host of an Ecuadorian panopine, with *Linothele longicauda* (reported as *Diplura cousini*) serving as the host of *Lasia ecuadorensis*.

Discussion

The diversity of Dipluridae in the Neotropics is most probably underestimated. In recent years, the number of species has increased significantly. Dupérré & Tapia (2015) described five species from a small area on the western Andean slopes of Ecuador, Drolshagen & Bäckstam (2021) described new species from the Amazonian lowlands and the highlands of Peru, and Nicoletta *et al*. (2022) described a new species from the high Andes of Peru. The description of *Linothele cornigera* raises to 23 the number of known species in the genus and to nine the species known from Ecuador (Ausserer 1871; Simon 1889; Goloboff 1994; Dupérré & Tapia 2015; World Spider Catalog 2022).

This study describes for the first time the condition of the ventral median depression, prolateral crease, and tegular heel in *Linothele*, structural characters that might prove useful for better understanding the taxonomy of the genus. *Linothele fallax* and *L. jelskii* have a prolateral crease (Danniella Sherwood *in litt*. 2022); and we infer the presence of a ventral median depression in *L. jelskii* based on the illustrations provided by Drolshagen & Bäckstam (2021, see Fig 9A). Further data are required from other species to understand the intraspecific and interspecific variation of these characters in *Linothele* (e.g. weakly developed, developed, well developed for ventral median depression *sensu* Sherwood *et al*. 2021) to understand their usefulness for species delimitation in *Linothele*.

The dorsal pattern on the abdomen of juveniles of *Linothele cornigera* disappears as they become adults, evidencing that the species has ontogenetic changes in its

Fig. 7: Juvenile of *Linothele cornigera* sp. nov with parasitoid Acroceridae larva.

colouration. Similar ontogenetic changes have been reported in *L. sericata* (Drolshagen & Bäckstam 2021). Little information about ontogenetic changes has been published for *Linothele*, and future studies are strongly encouraged. In the absence of the most important characters for species diagnosis (male palpal bulb and female spermathecae), specific identification of juvenile specimens solely based on dorsal patterns should be considered unwarranted if colouration ontogenetic changes are common in the genus. We recommend avoiding taxonomic decisions based on juveniles.

Linothele cornigera sp. nov. is the first record of the genus on the south-eastern slopes of the Andes of Ecuador. Five species of *Linothele* have been reported from the eastern slopes of the Andes and the Amazonian lowlands across South America: *L. cavicola*, *L. fallax*, *L. monticolens*, *L. sericata*, *L. spinosa*, and *L. uniformis*. Many species of *Linothele* from the eastern Andes and Amazonia seem to have restricted ranges and are known from a few localities like *L. cornigera* sp. nov. For example, *L. cavicola* is only known from the Jumandi cave system in the north-eastern slopes of the Andes of Ecuador; *L. monticolens* from Huadquiña (Huadquina [sic] Drolshagen & Bäckstam 2021), on the south-eastern slopes of the Andes of Peru; *L. uniformis* from the road up to Machu-Picchu, south-eastern Andean slopes of Peru, and *L. spinosa* from Iquitos in the Amazonian lowlands of Peru (Drolshagen & Bäckstam 2021). *Linothele fallax* and *L. sericata* have been reported from broader distributions than their congenerics. *Linothele fallax* is known from the Upper River Jurua region in Brazil. Drolshagen & Bäckstam (2021: 175) commented that "According to the first description (Mello-Leitão 1926), the type locality is 'Alto Juruá'... the 'alto' part, which might actually refer to the "upper" Juruá River at Peru and Acre, Brazil; thus, the type locality is somewhat ambiguous". We found sources confirming that Alvaro Leitão, collector of the holotype of *L. fallax*, lived and worked for at least part of his life in the upper Juruá region (Santos 2018; Carvalho 2020), supporting the idea that the species is from the Amazonian lowlands in the upper Juruá region of Brazil, in the same region as the second locality cited by Drolshagen & Bäckstam (2021), at Beni, near Rurrenabaque, Bolivia. However, in contrast, *Linothele sericata* would inhabit a rather unexpectedly wide range in Colombia, from the Cordillera Oriental, Eastern Andes (Bogota and Sasaima, department of Cundinamarca) to the Pacific lowlands (Tutunendo and Quibdó-Medellín road, department of Choco, and Río Clara, department of Antioquia) (Drolshagen & Bäckstam 2021). The population from the Pacific lowlands was recognised initially as *Linothele megatheloides* Paz & Raven, 1990, later synonymized with *L. sericata* by Drolshagen & Bäckstam (2021: 184), based on qualitative morphological characters "on account of the presence of maxillary cuspules, flexible apical segment of the PLS…, the homogeneous colouration described by Karsch (1879), as well as the type locality close to the one of L. Sericata". However, it should be remarked that the type localities of *L. megatheloides* and *L. sericata* are not close to each other, separated by ~300 km and two Andean mountain ranges (Cordillera Occidental and Oriental of Colombia) and located in different biogeographic provinces. It would be advisable to review in detail the taxonomic status of the populations from the Pacific lowlands and study key diagnostic characteristics (especially genitalia) to corroborate their association with *L. sericata*.

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