

A taxonomic review of the mygalomorph spider
genus *Linothele* Karsch, 1879 (Araneae, Dipluridae)

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COUVERTURE / *COVER*:

Specimen of *Linothele fallax* (Mello-Leitão, 1926) at the entrance of its burrow. Photo: Bastian Drolshagen.

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A taxonomic review of the mygalomorph spider genus *Linothele* Karsch, 1879 (Araneae, Dipluridae)

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ABSTRACT

The neotropical diplurid spider genus *Linothele* Karsch, 1879 is reviewed. Three species of *Linothele* are newly described: *Linothele septentrionalis* n. sp. based on the absence of maxillary cuspules and presence of a sternal pattern; *Linothele spinosa* n. sp. based on the presence of preening-combs and its genital morphology; *Linothele uniformis* n. sp. based on its scopula, clypeus and genital morphology. Eight species names are newly synonymized: *Linothele soricina* (Simon, 1889) n. syn. is recognized a junior synonym of *Linothele curvitaris* Karsch, 1879; *Linothele bitaeniata* (Mello-Leitão, 1941) n. syn. and *Linothele nigerrima* (Mello-Leitão, 1941) n. syn. are removed from the synonymy with *Linothele aequatorialis* (Ausserer, 1871) and instead considered junior synonyms of *Linothele sericata* (Karsch, 1879) together with *Linothele megatheloides* Paz & Raven, 1990 n. syn. *Linothele longicauda* (Ausserer, 1871) is recognized a senior synonym of *Linothele aequatorialis* (Ausserer, 1871) n. syn. and *Linothele cousini* (Simon, 1889) n. syn.; *Linothele paulistana* (Mello-Leitão, 1924) is recognized a senior synonym of *Linothele annulifila* (Mello-Leitão, 1937) n. syn.; *Ischnothele caudata* Ausserer, 1875 is recognized a senior synonym of *Linothele dubia* (Caporiacco, 1947) n. syn.; *Linothele borgmeyer* (Mello-Leitão, 1924) is removed from the synonymy with *Linothele gymnognatha* (Bertkau, 1880) and considered a *nomen dubium*. *Linothele gymnognatha* and *Linothele keithi* (Chamberlin, 1916) are transferred back to *Diplura* C. L. Koch, 1850 and *Brachythele* Ausserer, 1871, respectively, due to original designation and considered *nomina dubia*. New distribution data and information on several species are presented.

KEY WORDS

Diplurinae,
Neotropics,
new species,
new synonymy.

RÉSUMÉ

Analyse taxonomique des araignées mygalomorphes du genre Linothele Karsch, 1879 (Araneae, Dipluridae). Les araignées diplurides du genre néotropical *Linothele* Karsch, 1879 sont examinées. Trois espèces nouvelles de *Linothele* sont décrites : *Linothele septentrionalis* n. sp. d'après l'absence de cuspules maxillaires et la présence d'un motif sternal; *Linothele spinosa* n. sp. d'après la présence de peignes de lissage et sa morphologie génitale. *Linothele uniformis* n. sp. d'après sa scopula, son clypeus et la morphologie génitale. Huit nouvelles synonymies sont établies : *Linothele soricina* (Simon, 1889) n. syn. est reconnu comme synonyme junior de *Linothele curvitaris* Karsch, 1879; *Linothele bitaeniata* (Mello-Leitão, 1941) n. syn. et *Linothele nigerrima* (Mello-Leitão, 1941) n. syn. sont supprimés de la synonymie avec *Linothele aequatorialis* (Ausserer, 1871) et transférés comme synonymes juniors de *Linothele sericata* (Karsch, 1879), ainsi que *Linothele megatheloides* Paz & Raven, 1990 n. syn. *Linothele longicauda* (Ausserer, 1871) est reconnu comme synonyme senior de *Linothele aequatorialis* (Ausserer, 1871) n. syn., ainsi que *Linothele cousini* (Simon, 1889) n. syn.; *Linothele paulistana* (Mello-Leitão, 1924) est reconnu comme synonyme senior de *Linothele annulifila* (Mello-Leitão, 1937) n. syn.; *Ischnothele caudata* Ausserer, 1875 est reconnu comme synonyme senior de *Linothele dubia* (Caporiacco, 1947) n. syn.; *Linothele borgmeyeri* (Mello-Leitão, 1924) est supprimé de la synonymie avec *Linothele gymnognatha* (Bertkau, 1880) et considéré comme un *nomen dubium*. *Linothele gymnognatha* et *Linothele keithi* (Chamberlin, 1916) sont remplacés respectivement dans les genre *Diplura* Koch, 1850 et *Brachythele* Ausserer, 1871, en raison de la désignation d'origine, et considérés *nomina dubia*. De nouvelles données de distribution et des informations sur plusieurs espèces sont présentées.

MOTS CLÉS

Diplurinae,
néotropiques,
espèces nouvelles,
synonymies nouvelles.

INTRODUCTION

The genus *Linothele* Karsch, 1879 was proposed based on a single specimen of *L. curvitaris* Karsch, 1879. Simon (1889a) proposed the monotypic genus *Uruchus* for *Uruchus gaujoni* Simon, 1889. F. O. Pickard-Cambridge (1896) proposed the monotypic genus *Neodiplura* for *Neodiplura jelskii* F. O. Pickard-Cambridge, 1896, but the genus was found to be a junior synonym of *Uruchus* by Simon (1903). As most subsequent authors followed Simon and placed newly described species in *Diplura*, *Linothele* was monotypic until Strand (1908) described *L. macrothelifera* Strand, 1908.

Pedroso *et al.* (2016: 9) noted “[...] that the first description of a lyra in the maxilla of Dipluridae was made by Blackwall (1867), this structure was not mentioned again until the reevaluation of its form and function by Pocock (1896).” All species of *Diplura*, except for *Diplura monticolens* Chamberlin, 1916, described between the mention of the lyra by Pocock and until Raven discovered its significance for taxonomic understanding, were proposed by Mello-Leitão (1924, 1926, 1937, 1941a, b, 1945).

Mello-Leitão placed newly described species in *Diplura*, until he proposed *Evagrella* Mello-Leitão, 1923 and *Trechoniinae* Mello-Leitão, 1923, which were later found to be junior synonyms of *Diplura* and Diplurinae, respectively, by Raven (1985: 73, 74). Main (1969) described *Troglodiplura* Main, 1969 based on a fragmented specimen of *T. lowryi* Main, 1969 and placed it in Diplurinae. Bücherl *et al.* (1971) reexamined material described by Mello-Leitão and transferred some of the species to *Uruchus*.

Raven (1980) initially considered *Linothele* a junior synonym of *Diplura* C. L. Koch, 1850 following Simon (1903), who claimed *Diplura* does not bear a lyra on the prolateral maxillae. Raven (1985) found the type species of *Diplura*,

Diplura macrura C. L. Koch, 1841, was in fact bearing a lyra. He therefore removed *Linothele* from the synonymy of *Diplura* and transferred all species of *Diplura*, except its type species, *Diplura macrura*, to *Linothele*. Raven (1985) synonymized those genera with a lyra consisting of a single row of bristles with *Diplura* and those with a lyra consisting of several rows of bristles with *Trechona* C. L. Koch, 1850. He synonymized the alyrate genus *Uruchus* with *Linothele* and tentatively transferred *Troglodiplura* to Nemesiidae Simon, 1889, so that of formerly ten genera included in the subfamily, only three remained. After Raven (1985), the subfamily Diplurinae, as well as the genus *Linothele* were better defined with variation in the lyra, including its absence, more clearly associated with generic boundaries.

As Raven (1985) defined *Linothele* only by the absence of a lyra, Goloboff (1994) stated the genus might well be a paraphyletic group. One year later, Goloboff (1995) provisionally transferred *Brachythele keithi* Chamberlin, 1916 to *Linothele*. Main (1993) transferred *Troglodiplura* back to Diplurinae. Pedroso *et al.* (2008) transferred *Trechona sericata* Karsch, 1879 to *Linothele*. Based on molecular data, Harvey *et al.* (2020) transferred *Troglodiplura* to Anamidae Simon, 1889, which was formerly considered a nemesiid subfamily by Raven (1985), but granted family rank by Opatova *et al.* (2020). As a result, only the three genera originally placed in Diplurinae by Raven (1985) and *Harmonicon* F. O. Pickard-Cambridge, 1896, which was revalidated from the synonymy of *Diplura* by Maréchal & Marty (1998), remain in the subfamily. The redefinition of *Linothele* by Raven (1985) was then followed and several species newly described.

Opatova *et al.* (2020) granted family rank to the former diplurid subfamilies Euagridae Raven, 1979 and Ischnothelidae F. O. Pickard-Cambridge, 1897. As a result, only Diplurinae and Masteriinae remain in Dipluridae, further supporting

Goloboff's (1993) hypothesis that the family probably has to be restricted to those genera currently placed in Diplurinae. Although there might not be a closer relationship between the genera formerly assigned to Dipluridae and *Linothele*, many of the diagnostic features of *Linothele* can also be found in species of these families.

The genus *Linothele* has never been reviewed, or revised before and examined material of *Linothele* proved difficult to identify at the species level. The problem arose from a lack of up to date taxonomic information in the literature and the unavailability of type material. Knowledge of many species of *Linothele* rests on the publications of Mello-Leitão, or earlier authors, who worked at a time when modern key characters to distinguish species of *Linothele* were not practically used.

Most species of *Linothele* build extensive sheetwebs ending in a tubular retreat (Figs 1; 2). The spiders fastly retreat upon disturbance, making them hard to collect. Due to their web-building habits, *Linothele* usually have to be collected by hand and specimens of the genus may not be found very often in museum collections. Yet, we were able to locate most of the relevant types and even some additional material. Resulting from our research, we here present a first comprehensive list of the species of *Linothele* with descriptions of three new species, a diagnostic key to the species, alongside new information and updated distribution data for many species. Some species, especially those from Brazil, are known only from the literature and in need of a revisit.

MATERIAL AND METHODS

Examinations of material were made using a stereo zoom microscope Leica MZ12.5. Illustrations of relevant structures were obtained as vectors from transparent layers above digital images photographed with varying quality and camera models in Adobe Illustrator. Dotted lines in illustration indicate broken structures. Carapace length was measured from its anterior margin 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 mm. Comparative measurements of male genitalia characters follow Coyle (1995) (also see Fig. 3). Male palpal organs have been recorded in prolateral and retrolateral view. Male megaspines and metatarsal protuberances have been recorded in retrolateral view, slightly turned to show the maximal elevation of the metatarsal protuberances. The spermathecae have been removed and cleaned in lactic acid according to von Wirth (2006). Where possible, the abbreviations proposed by Goloboff & Platnick (1987) were used to indicate relative positions. The term “scopula” refers to pseudo-scopula as defined by Pérez-Miles *et al.* (2017) on ventral anterior leg tarsi and metatarsi. Raven (1985) distinguished between sparse and dense scopulae in *Linothele*. We found what Raven (1985) referred to as “sparse scopula” is in fact scopula

interspersed (divided) by lines of spiniform setae, whereas “dense scopula” is not interspersed with such setae (undivided). For easier references the terms divided (Fig. 5A, B) and undivided (Fig. 5C, D) are herein used instead of sparse and dense, respectively. The definition of a wide clypeus follows Gertsch & Platnick (1979) and is as follows: The clypeus is defined as 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) 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). The term preening-combs refers to a field at ventrodistal posterior metatarsi that is densely covered with short spines (Fig. 11A, B). Some material examined for this study derived from lab reared specimens and is labelled accordingly: In examined material, the parental generation is marked with an asterisk (*) while following generations are labelled indicating from which generation they were taken (F1-2). For variability, only sexed specimens from the parental and F1 generation were considered.

ABBREVIATIONS

A	apical (including the meaning of distal);
B	basal (including the meaning of proximal);
BD	bulbus width;
CL	carapace length;
CT	number of cheliceral teeth;
IML	length of metatarsus I;
imm.	immature;
indet.	indeterminable;
MAD	distance along line of male metatarsus I length from proximal end of metatarsus to intersection with perpendicular line passing through the tallest part of metatarsal protuberance;
MC	number of maxillary cuspules;
MP	metatarsal protuberance (protuberance at retrolateral metatarsus I in <i>Linothele</i> males);
PL	length of male palpal organ;
PLS	posterior lateral spinnerets;
PMS	posterior median spinnerets;
undet.	undetermined.

Museum acronyms

AMNH	American Museum of Natural History, New York;
IBSP	Instituto Biológico de São Paulo, São Paulo;
IRSNB	Institut Royal de Sciences Naturelles de Belgique, Brussels;
MACN	Museo Argentino de Ciencias Naturales, Buenos Aires;
MCZ	Museum of Comparative Zoology, Harvard University, Cambridge;
MNHN	Museum National d'Histoire Naturelle, Paris;
MNRJ	Museu Nacional do Rio de Janeiro, Rio de Janeiro;
MPSP	Museu Paulista, Universidad de São Paulo, São Paulo;
MZUF	Università di Firenze, Museo Zoologico “La Specola”, Firenze;
NHM	Natural History Museum (formerly British Museum [Natural History]), London;



FIG. 1. — Specimen of *Linothele sericata* (Karsch, 1879) in its webbing. Photo: Bastian Drolshagen.



FIG. 2. — Specimen of *Linothele fallax* (Mello-Leitão, 1926) at the entrance of its burrow. Photo: Bastian Drolshagen.

NHMW	Naturhistorisches Museum Wien, Vienna;
NHRS	Naturhistoriska riksmuseet, Stockholm;
NMP6V	Department of Zoology, National Museum, Prague;
QCAZ	Museo de Zoología, Pontificia Universidad Católica del Ecuador, Quito;
SMF	Forschungsinstitut und Natur-Museum Senckenberg, Frankfurt am Main;
SMNK	Staatliches Museum für Naturkunde Karlsruhe, Karlsruhe;
ZMB	Zoologisches Forschungsinstitut und Museum Alexander Koenig, Berlin.

COMPARATIVE MATERIAL EXAMINED

Achetopus erlandi Tullgren, 1905. — **Lectotypes** (as designated by Schiapelli & Gerschman 1968). **Bolivia** • 1 ♂, 1 ♀ lost since 1965; NHRS.

Diplura bicolor Simon, 1889. — **Syntypes**. **Brazil** • 2 undet.; Minas Gerais, Caraça; [MNHN-AR-AR4932](#) (B337).

Diplura garleppi (Simon, 1892). — **Bolivia** • 1 ♀; La Paz, San Lorenzo, Caranavi, 12 km; 1-2.I.1991; Goloboff, Santisteban, Mc Hugh Leg.; AMNH_IZC 00327624.

Diplura sp. — **Brazil** • 1 ♀, 4 undet.; São Paulo; NMP6V P6d-3/2003 old collection number.

Eudiplura rogenhoferi Ausserer, 1871. — **Holotype**. **Brazil** • ♀; 1847; Helmenreich leg.; NHMW N.I.: 62.

Harmonicon rufescens F. O. Pickard-Cambridge, 1896. — **Holotype**. **Brazil** • imm. ♂; lower Amazonas, Santarem; NHM.

Harmonicon oiapoqueae Drolshagen & Bäckstam, 2011. —

Holotype. **French Guiana**. ♂ F1, near Saint-Georges; Vinmann leg.; SMNK — **Paratype**. **French Guiana** • 1 ♀*; same data as for holotype.

Schnothele sp. — **Brazil** • 1 undet; NHRS.

Lathrothele mitonae Bäckstam, Drolshagen & Seiter, 2013. — **Holotype**. **Gabon** • ♂; between Lambarene and Njole; Seiter leg.; NHMW 21867 — **Paratype**. **Gabon** • 1 ♀; same data as for holotype; NHMW 21868.

Metriura striatipes Drolshagen & Bäckstam, 2009. — **Holotype**. **Brazil** • ♂; Amazonas, Tarumã Mirín, Manaus; [03°06'00"S, 60°01'48"W](#), 1.II.1982; J. Adis leg.; INPA 3507. — **Paratypes**. **Brazil** • 1 imm. ♂; same data as for holotype; INPA 3508 • 1 ♂; same data as for holotype; SMNK ARA334.

Melodeus niger F. O. Pickard-Cambridge, 1896. — **Holotype**. **Brazil** • ♀; lower Amazonas, Santarem; NHM BM1896.12.13.49.

Melodeus sanguineus F. O. Pickard-Cambridge, 1896. — **Holotype**. **Brazil** • ♀; lower Amazonas, Santarem; NHM BM1896.12.13.41.

Mygale zebrata Walckenaer, 1835. — **Holotype**. **Brazil** • ♀; NHM.

Trechona sp. — **Brazil** • 1 ♀; Miracatu, São Paulo; SMF Nr. 38604. 2 undet.; São Paulo; NMP6V P6d-3/2003 - old collection number.

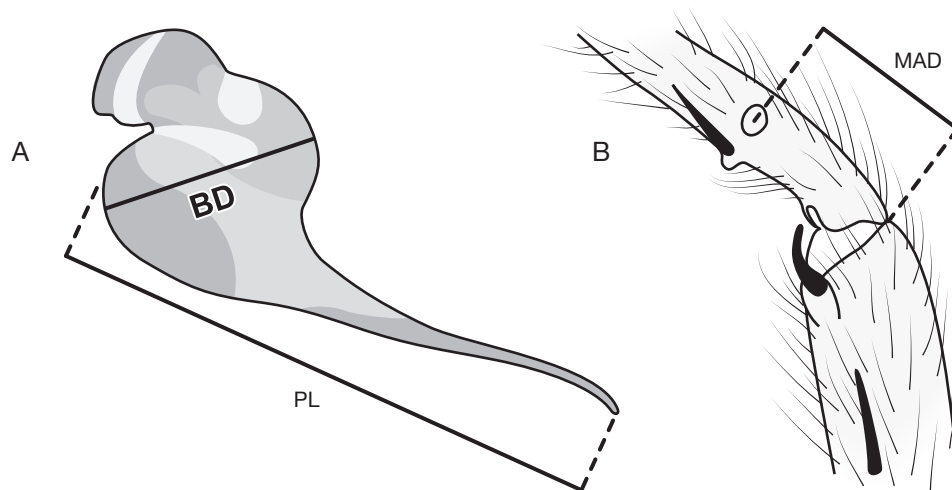


FIG. 3. — Morphometrics: **A**, *Linothele curvitaris* Karsch, 1879 male, left palp, prolateral view; **B**, *Linothele jelskii* (F. O. Pickard-Cambridge, 1896) male, left tibia I and metatarsus I, retrolateral view.

RESULTS

Family DIPLURIDAE Simon, 1889

Genus *Linothele* Karsch, 1879

Linothele Karsch, 1879: 546 (type species: *Linothele curvitaris* Karsch, 1879, by monotypy). — Raven 1980: 254; 1985: 74, 75.

Neodiplura F. O. Pickard-Cambridge, 1896: 755 (type species: *Neodiplura jelskii* F. O. Pickard-Cambridge, 1896, by monotypy). — Simon 1903: 964 (first synonymized with *Uruchus* by Simon [1903: 964]).

Uruchus Simon, 1889a: 400 (type species: *Uruchus gaujoni* Simon, 1889, by monotypy). — Raven 1985: 74, 75 (first synonymized with *Linothele* by Raven [1985: 74, 75]).

DISTRIBUTION. — Bahamas and South America (for South American species see Fig. 4).

DIAGNOSIS. — *Linothele* can be distinguished from all other Diplurinae by the absence of a maxillary lyra.

DESCRIPTION

Small to large diplurid spiders. Eyes: present, on a common tubercle. Fovea: transverse, recurved. Labium: subquadrate, with few, or no cuspules. Sternum: three pairs of sigillae, all submarginal. Chelicerae: one row of ventral conical teeth on promargin. Maxillae: longer than wide with short anterior lobe bearing a serrula. Maxillary lyra: absent. Claws on pedipalp tarsi: with a single row of teeth in juveniles and females. Leg tarsi: aspinose; dorsally with a zig-zag row of trichobothria, metatarsi with one row of trichobothria, no trichobothria in proximal third of metatarsi; scopuliform setae present on anterior tarsi and metatarsi. Tarsal claws of legs: paired tarsal claws with a

double row of teeth; unpaired claws of leg tarsi with teeth very short, or absent. Spinnerets: PLS elongated, with digitiform apical segment. Cymbium: equally bilobate, scopulate and aspinose. Palpal organ: pyriform with small subtegulum. Males with megaspine at retroventral apex of tibia I; metatarsus I with MP in 1:3B.

Variability

See Table 1. Examination of available material revealed variation of ± 5 CT and more than ± 30 MC between specimens of a single species. In single specimen we were able to observe variation from one side to the other of up to ± 3 CT and more than ± 30 MC.

REMARKS

The collections of IBSP and MNRJ were destroyed in fires of 2010 and 2018, respectively. The MNRJ collection was reviewed by Silva-Moreira *et al.* (2010), who were unable to locate many of the relevant types at that time. Following Kury *et al.* (2018), material not located in MNRJ collection in 2010 might have survived the fire of 2018.

Unfortunately, the loan request on holotypes to NHRS was rejected by QCAZ for all species described by Dupérré & Tapia (2015) and, additionally, it was not possible to arrange a loan on any of the other types. N. Dupérré provided images and confirmed a “weak” scopula with “[...] two parallel lines” for all described species (pers. comm.).

As mentioned by Ríos-Tamayo & Goloboff (2012), it seems common for mygalomorphs with many spermathecal lobes, or processes to often show minor differences in the number or shape of lobes and processes of both sides. Presumably, lobes and processes with thin, weak ducts may easily get broken during moults, producing minor differences in successive moults of the adult female. Our research presented here suggests the same applies to vesicles.

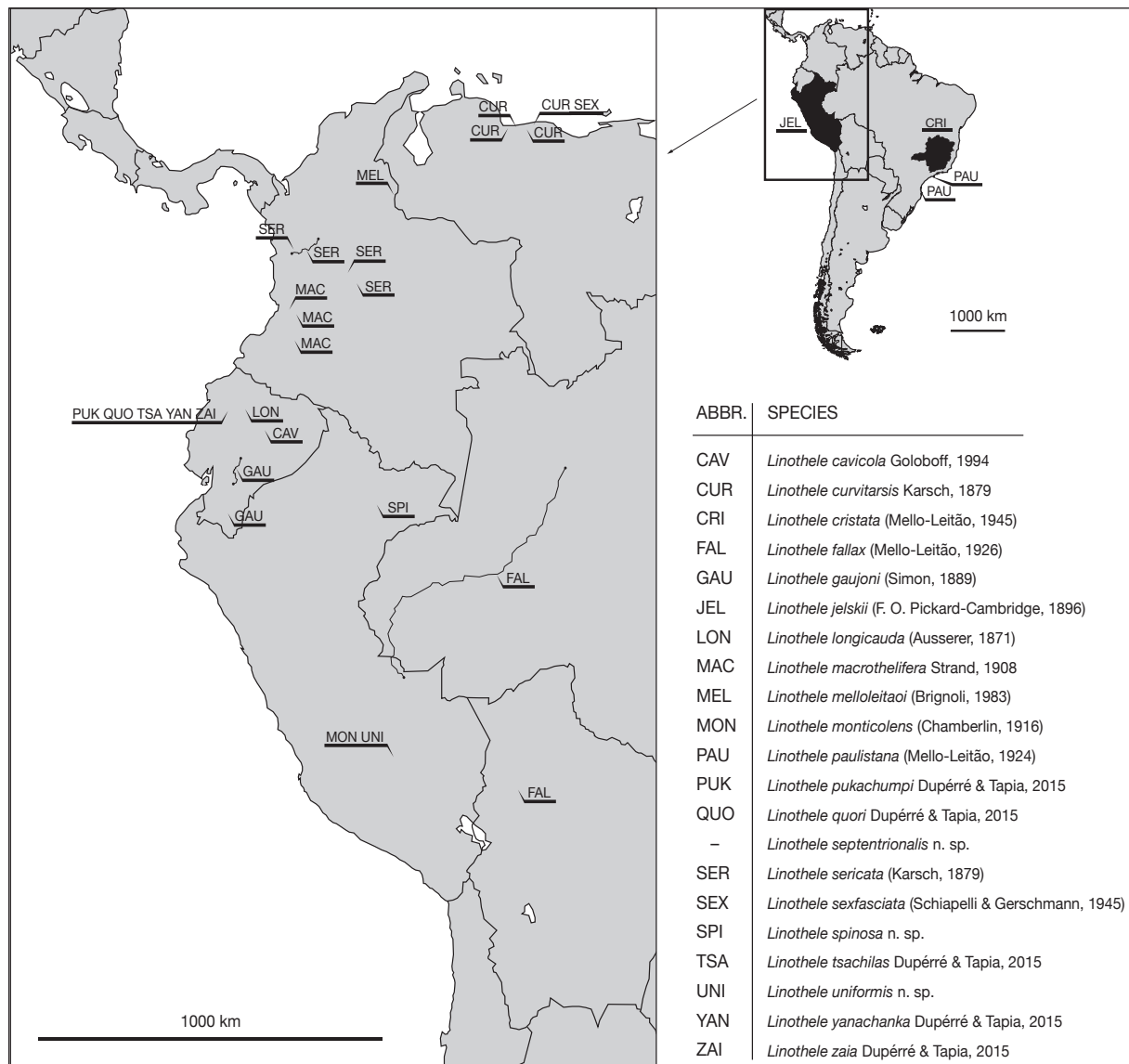


FIG. 4. — Distribution map of *Linothele* Karsch, 1879 in South America (right), with detailed distribution in North-West South America (left). Note: the type locality for *L. septentrionalis* n. sp. is out of range and not included. The type locality for *L. cristata* (Mello-Leitão, 1945) and *L. jelskii* (F. O. Pickard-Cambridge, 1896) is not specified further than Minas Gerais and Peru, respectively.

Linothele cavicola Goloboff, 1994

Linothele cavicola Goloboff, 1994: 70, figs 1-5.

TYPE MATERIAL. — **Holotype.** Ecuador • ♀; Napo Prov., Cuevas de Jumandi; 2-3.II.1983; A. & S. Roig leg.; MACN examined.

TYPE LOCALITY. — Cuevas de Jumandi, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — *Linothele cavicola* “differs from other species in the genus by having very few teeth on the STC and strong ventral setae on the tarsi. Those characters, as well as the great elongation of the legs, spinnerets, and body, are possibly associated with the cave habitat. The eyes are well developed. The pigmentation is normal,

although the spider (in alcohol) appears slightly less sclerotized than other diplurines.” Goloboff (1994).

DESCRIPTION (FOLLOWING GOLOBOFF 1994)

Male

Unknown.

Female

CT = 11. MC = 36-40. Colouration in alcohol: Overall reddish brown; maculae absent. Clypeus: narrow. Sternum, labium and maxillae: see Goloboff (1994: fig. 1). Leg formula: 4123. Scopula divided. Preening-combs absent. Leg tarsi pseudo-segmented, see Goloboff (1994: fig. 2). Spinnerets: apical segments of the PLS rigid. Spermatheca: consisting of two erect stalks bearing a single retrolateral vesicle in 1:3A, see Goloboff (1994: fig. 3).

TABLE 1. — Comparison data for *Linothele* Karsch, 1879 species. Data is partly based on the first descriptions of respective specimens; if no ranges were given, the absolute figure is used here for max and min. Specimens within a species are sorted by their CL in decreasing order. Type material is marked with an asterisk.

Specimen	CL	CTmin	CTmax	MCmin	MCmax	PL	BD	(PL*100)/BD	IML	MAD	(IML*100)/MAD
<i>Linothele cavicola</i> Goloboff, 1994 ♀*	—	11	11	36	40	—	—	—	—	—	—
<i>Linothele cristata</i> (Mello-Leitão, 1945) ♀*	—	11	11	17	25	—	—	—	—	—	—
<i>Linothele curvitaris</i> Karsch, 1879											
NHRS-KASI 000000033 ♀	10.2	11	14	33	34	—	—	—	—	—	—
NHRS-KASI 000000032 ♂	9.6	11	11	26	31	2	0.8	250	8.1	2.7	300
<i>Diplura soricina</i> ♀*	8.1	12	12	25	25	—	—	—	—	—	—
<i>Diplura soricina</i> ♂*	7.4	12	12	19	27	1.9	0.7	271	6.7	2.2	305
NHRS-KASI 000000032 ♂	7.1	11	11	19	23	1.9	0.7	271	6.9	1.8	383
NHRS-KASI 000000032 ♂	7.1	10	12	20	24	1.8	0.7	257	7.0	2	350
NHRS-KASI 000000032 undet.	5.9	9	10	18	20	—	—	—	—	—	—
<i>L. curvitaris</i> indet.*	5.5	11	11	30	32	—	—	—	—	—	—
<i>Linothele fallax</i> (Mello-Leitão, 1926)											
NHRS-KASI 000000040 ♀	16.5	10	11	30	32	—	—	—	—	—	—
NHRS-KASI 000000039 ♀	14.7	12	12	49	50	—	—	—	—	—	—
NHRS-KASI 000000038 ♂	12.0	12	13	48	48	2.9	0.9	322	11.6	2.4	483
<i>Linothele gaujoni</i> (Simon, 1889)											
<i>Uruchus gaujoni</i> ♀*	11.8	13	13	33	40	—	—	—	—	—	—
MCZ-76017 undet.	11.4	12	13	31	31	—	—	—	—	—	—
MCZ-76017 undet.	10.9	12	12	29	31	—	—	—	—	—	—
MCZ-76017 undet.	10.0	11	13	21	21	—	—	—	—	—	—
MCZ-76017 undet.	9.9	12	12	30	33	—	—	—	—	—	—
MCZ-76017 undet.	9.4	12	14	27	36	—	—	—	—	—	—
MCZ-76017 ♀	8.8	12	14	34	36	—	—	—	—	—	—
MCZ-76018 undet.	8.4	9	10	32	34	—	—	—	—	—	—
MCZ-76018 undet.	8.1	12	13	28	28	—	—	—	—	—	—
MCZ-76018 undet.	7.6	11	12	31	32	—	—	—	—	—	—
MCZ-76018 undet.	7.4	12	13	28	32	—	—	—	—	—	—
MCZ-76018 ♀	6.6	11	11	26	27	—	—	—	—	—	—
<i>Linothele jelskii</i> (F.O.Pickard-Cambridge, 1896)											
<i>Neodiplura jelskii</i> ♂*	9.9	14	—	42	—	—	—	—	10.9	2.4	454
<i>Linothele longicauda</i> (Ausserer, 1871)											
<i>Diplura longicauda</i> imm. ♂*	9.2	12	12	55	61	—	—	—	—	—	—
<i>Diplura aequatorialis</i> indet. *	9.2	12	12	37	38	—	—	—	—	—	—
<i>Diplura cousini</i> ♀*	8.6	9	9	53	58	—	—	—	—	—	—
<i>Linothele macrothelifera</i> Strand, 1908											
MCZ-70623 ♀	5.4	9	10	24	24	—	—	—	—	—	—
<i>L. macrothelifera</i> ♀*	5.3	9	9	33	33	—	—	—	—	—	—
MCZ-76021 undet.	4.3	11	11	24	26	—	—	—	—	—	—
<i>Linothele melloleitaoi</i> (Brignoli, 1983) ♀*	—	8	8	—	—	—	—	—	—	—	—
<i>Linothele monticolens</i> (Chamberlin, 1916) <i>Diplura monticolens</i> undet. *	3.4	9	9	10	10	—	—	—	—	—	—
<i>Linothele paulistana</i> (Mello-Leitão, 1924)											
<i>Diplura paulistana</i> ♀*	—	7(?)	14	—	—	—	—	—	—	—	—
<i>Diplura annulifila</i> ♀*	—	14	14	0	0	—	—	—	—	—	—
<i>Linothele pukachumpi</i> Dupérré & Tapia, 2015 <i>L. pukachumpi</i> ♀*	11.0	10	10	25	30	—	—	—	—	—	—
<i>Linothele quori</i> Dupérré & Tapia, 2015 ♀*	6.0	9	9	25	25	—	—	—	—	—	—
♂*	5.0	9	9	22	22	?	?	?	3.0	?	?
<i>Linothele septentrionalis</i> n. sp. ♀*	3.9	11	11	0	0	—	—	—	—	—	—
<i>Linothele sericata</i> (Karsch, 1879)											
<i>Trechona sericata</i> ♀*	16.0	12	12	74	74	—	—	—	—	—	—
NHRS-KASI 000000035 ♀	14.7	13	14	51	88	—	—	—	—	—	—
<i>L. megatheloides</i> ♀*	13.2	12	12	60	60	—	—	—	—	—	—
AMNH_IZC 00327625 ♀	12.3	13	14	45	50	—	—	—	—	—	—
<i>L. megatheloides</i> ♂*	10.8	12	12	28	30	?	?	?	12.9	?	?
AMNH_IZC 00327625 undet.	10.6	13	14	41	47	—	—	—	—	—	—
NHRS-KASI 000000034 ♂	10.3	11	12	57	59	3.6	1.1	327	12.2	2.1	581

TABLE 1. — Continuation.

AMNH_IZC 00327625 undet.	10.3	13	14	34	42	—	—	—	—	—	—
AMNH_IZC 00327625 undet.	9.8	12	13	49	52	—	—	—	—	—	—
AMNH_IZC 00327625 ♂	9.6	13	13	32	35	3.6	1.1	327	—	—	—
NHRS-KASI 000000034 imm.	7.9	12	12	55	59	—	—	—	—	—	—
AMNH_IZC 00327625 undet.	7.7	12	12	39	43	—	—	—	—	—	—
<i>Linothele sexfasciata</i> (Schiapelli & Gerschmann, 1945)											
<i>Diplura sexfasciata</i> ♀*	—	10	10	25	30	—	—	—	—	—	—
<i>Linothele spinosa</i> n. sp.											
NHRS-KASI 000000037 ♀*	10.8	13	14	68	72	—	—	—	—	—	—
NHRS-KASI 000000037 ♀*	10.4	12	13	54	56	—	—	—	—	—	—
NHRS-KASI 000000036 ♂*	8.7	12	12	51	52	1.9	0.5	380	6.0	2.1	286
NHRS-KASI 000000037 ♀*	8.3	11	14	40	50	—	—	—	—	—	—
<i>Linothele tsachilas</i> Dupérré & Tapia, 2015											
♀*	9.0	13	13	60	65	—	—	—	—	—	—
<i>Linothele uniformis</i> n. sp.											
♀	9.2	12	12	7	13	—	—	—	—	—	—
<i>Linothele yanachanka</i> Dupérré & Tapia, 2015											
♂*	11.0	13	13	35	40	?	?	?	5.0	?	?
♀*	10.0	10	10	35	40	—	—	—	—	—	—
<i>Linothele zaia</i> Dupérré & Tapia, 2015											
♀*	12.0	10	10	30	35	—	—	—	—	—	—

NATURAL HISTORY

According to Goloboff (1994), *L. cavicola* is known from a single cave system, where the spiders “[...] apparently do not make webs”, but “[...] were found walking on the ground, or walls of the cave [...]”.

Linothele cristata (Mello-Leitão, 1945)

Uruchus cristatus Mello-Leitão, 1945: 169.

Linothele cristata – Raven 1985: 74, 75. — Silva-Moreira *et al.* 2010: 32. — Kury *et al.* 2018: 557.

TYPE MATERIAL. — **Holotype**. Brazil • ♀; Minas Gerais; MNRJ probably lost.

TYPE LOCALITY. — Minas Gerais, Brazil.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — *Linothele cristata* may be distinguished from all other species of *Linothele* by the combined presence of divided scopula, a ventral pattern and a dorsal chevron pattern on the opisthosoma, together with its distribution.

DESCRIPTION (FOLLOWING Mello-Leitão 1945)

Male

Unknown.

Female

CT = 11. MC = 17–25. Colouration: “Carapace greenish-brown, with irradiating stripes mahogany brown. Chelicerae dark mahogany brown. Tarsi dark brown. Sternum, lip and maxillae light mahogany, the sternum with a margin sulphureous yellow.”; opisthosoma dorsally “with six pairs of oblique light stripes”, laterally “minutely spotted in light mahogany

brown”; ventral pattern present. Clypeus: narrow. Leg formula 4123. Scopula divided. Leg tarsi pseudo-segmented.

REMARKS

The species was proposed by Mello-Leitão (1945) based on a single specimen. He mentioned the labium to be longer than wide, but also did so for the holotype of *D. annulifila*, of which the labium was clearly subquadrate. The holotype of *U. cristatus* could not be located in the collection of the MNRJ, where it should be deposited; see Silva-Moreira *et al.* (2010).

NATURAL HISTORY

Unknown.

Linothele curvitaris Karsch, 1879

(Figs 6; 17A–E; 19A, B)

Linothele curvitaris Karsch, 1879: 546. — Raven 1985: 74, 75.

Diplura soricina Simon, 1889b: 189. **n. syn.**

Linothele soricina – Raven 1985: 74. — Dupérré & Tapia 2021: 268.

TYPE MATERIAL. — *Linothele curvitaris*: **Holotype**. Venezuela • indet.; Caracas; Golmer leg.; ZMB Arach-458 and Arach-458a (preparation of tarsal claw) examined.

Diplura soricina: **Lectotypes** (as designated by Dupérré & Tapia 2021). Venezuela • 1 ♂, 4 ♀, 2 undet.; Caracas, Colonie Tovar and San Esteban; M. E. Simon leg.; MNHN(339) examined.

OTHER MATERIAL EXAMINED. — Venezuela • 1 ♀*; near Choroni; 2006; D. Reimann leg.; NHRS-KASI 000000033 • 3 ♂ F1, 1 undet. F1; same data as for preceding; NHRS-KASI 000000032 • 1 ♂ F2, 1 ♀ F2; same data as for preceding; SMNK.

TYPE LOCALITY. — Caracas, Venezuela.

DISTRIBUTION. — San Esteban to Caracas, Venezuela.

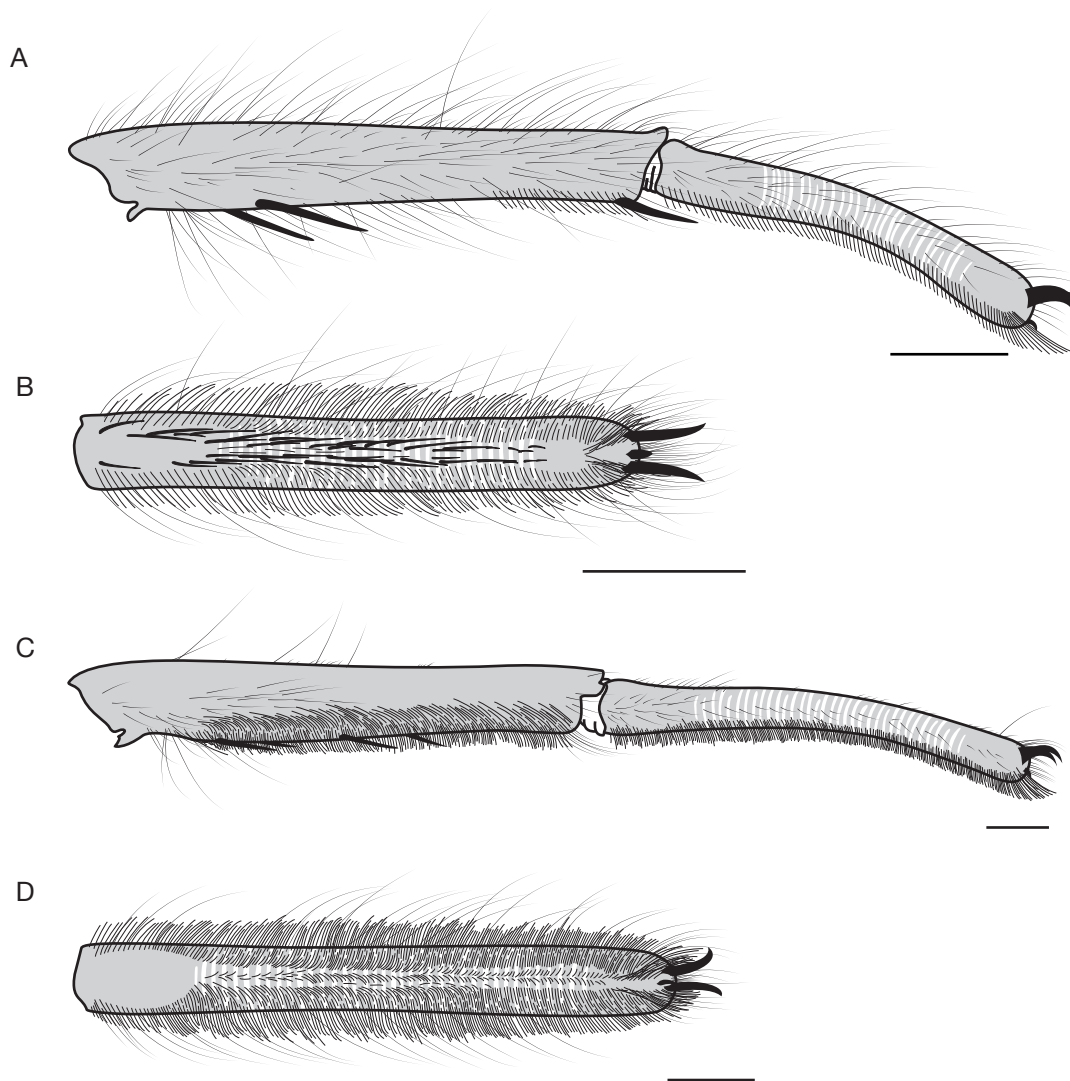


FIG. 5. — Different scopulation within *Linothele* Karsch, 1879: **A, B**, *Diplura soricina* Simon, 1889 female (MNHN (339)); **C, D**, *Uruchus gaujoni* Simon, 1889 female (MNHN-AR-AR4951 (B4348)); **A**, tarsus I and metatarsus I, lateral view; **B**, tarsus I, ventral view; **C**, tarsus I and metatarsus I, lateral view; **D**, tarsus I, ventral view. Scale bars: 1 mm.

DIAGNOSIS. — Males and females of *Linothele curvitaris* can be distinguished from those of most other species of *Linothele* by their flexible apical segments of the PLS (Fig. 6E) and the presence of a mid-dorsal pattern on the opisthosoma (Figs 17A, B, D, E; 19A, B). Males furthermore differ from those of *L. sericata* by their emboli bearing no keel (Fig. 6A, B). Females of *L. curvitaris* can be distinguished from females of *L. paulistana* by the presence of maxillary cuspules (Fig. 6G) and from those of *L. sericata* by their spermathecae stalks bearing several distal vesicles (Fig. 6H, I).

DESCRIPTION

Male (after male type of D. soricina)

CL = 7.4. CT = 12. MC = 19-27. Colouration in alcohol: Prosoma, chelicerae, legs and pedipalps brown; opisthosoma with distinct pattern, mid-dorsally consisting of quadrate spots anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines, laterally with several spots, ventrally with longitudinal lines and spots; maculae absent. Clypeus: narrow. Leg formula:

4123. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS flexible. Palpal organ: [(PL*100)/BD = 271], see Figure 6A, B. Megaspine and MP: [(IML*100)/MAD = 263], see Figure 6C, D.

Variability

CL = 7.1-9.6. CT = 10-12. MC = 19-31. Colouration alive (Fig. 19B): As in alcohol, but carapace covered with golden setae and patterns more distinct. [PL(100)/BD = 250-271]. [(IML*100)/MAD = 300-383].

Female

Colouration (Figs 17A-E; 19A): as for male. Clypeus: narrow, see Figure 6F. Sternum, labium and maxillae: see Figure 6G. Leg formula: 4123. Scopula divided, see Figure 5A, B. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS flexible, see Figure 6E. Spermathecae:

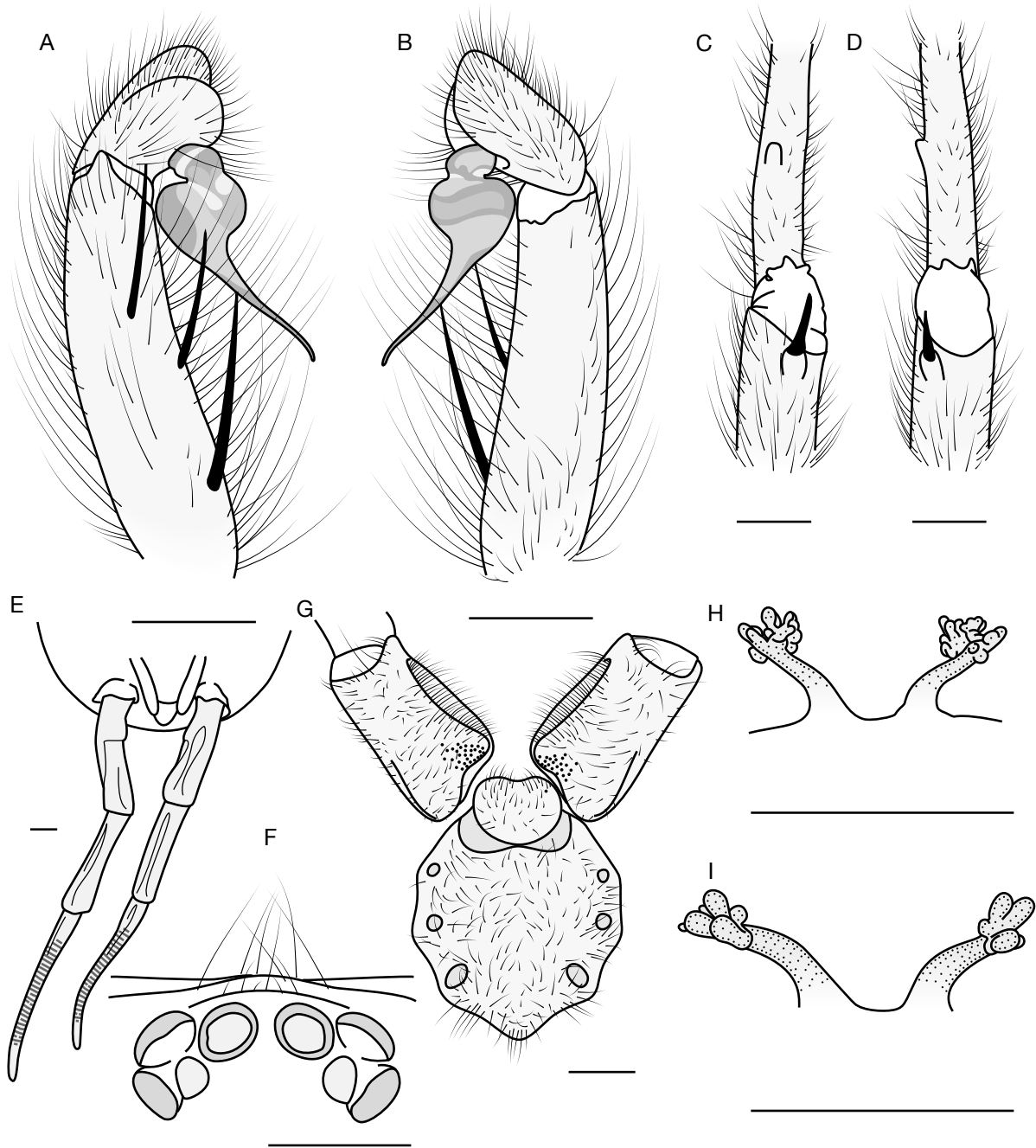


FIG. 6. — *Linothele curvitaris* Karsch, 1879: **A–D**, *Diplura soricina* Simon, 1889, n. syn. male (MNHN (339)); **E**, *L. curvitaris* female (NHRS-KASI 000000033); **F–I**, *Diplura soricina* female (MNHN (339)); **A**, left palp, prolateral view; **B**, left palp, retrolateral view; **C**, right tibia I and metatarsus I, retrolateral view; **D**, right tibia I and metatarsus I, ventral view; **E**, spinnerets, ventral view; **F**, eye tubercle, dorsal view; **G**, maxillae, labium and sternum, ventral view; **H**, **I**, spermathecae, dorsal view. Scale bars: 1 mm.

consisting of two retrolaterally bent stalks bearing several vesicles at 1:5A, see Figure 6H, I.

Variability

CL = 8.1–10.2. CT = 11–14. MC = 25–34.

REMARKS

The type of *Linothele curvitaris* is accompanied by a preparation of the epigastrium with no detectable spermatheca.

Linothele soricina is recognized a junior synonym of *L. curvitaris* on account of flexible apical segments of the PLS, the distinct pattern of immatures and females on opisthosoma, and its type locality which is partly consistent with the type locality of *L. curvitaris*. Dupérré & Tapia (2021) designated a male lectotype and a single female paralectotype. Following ICZN 74.1.3 all specimens of the syntype collection, except for the lectotype, are to be considered paralectotypes.

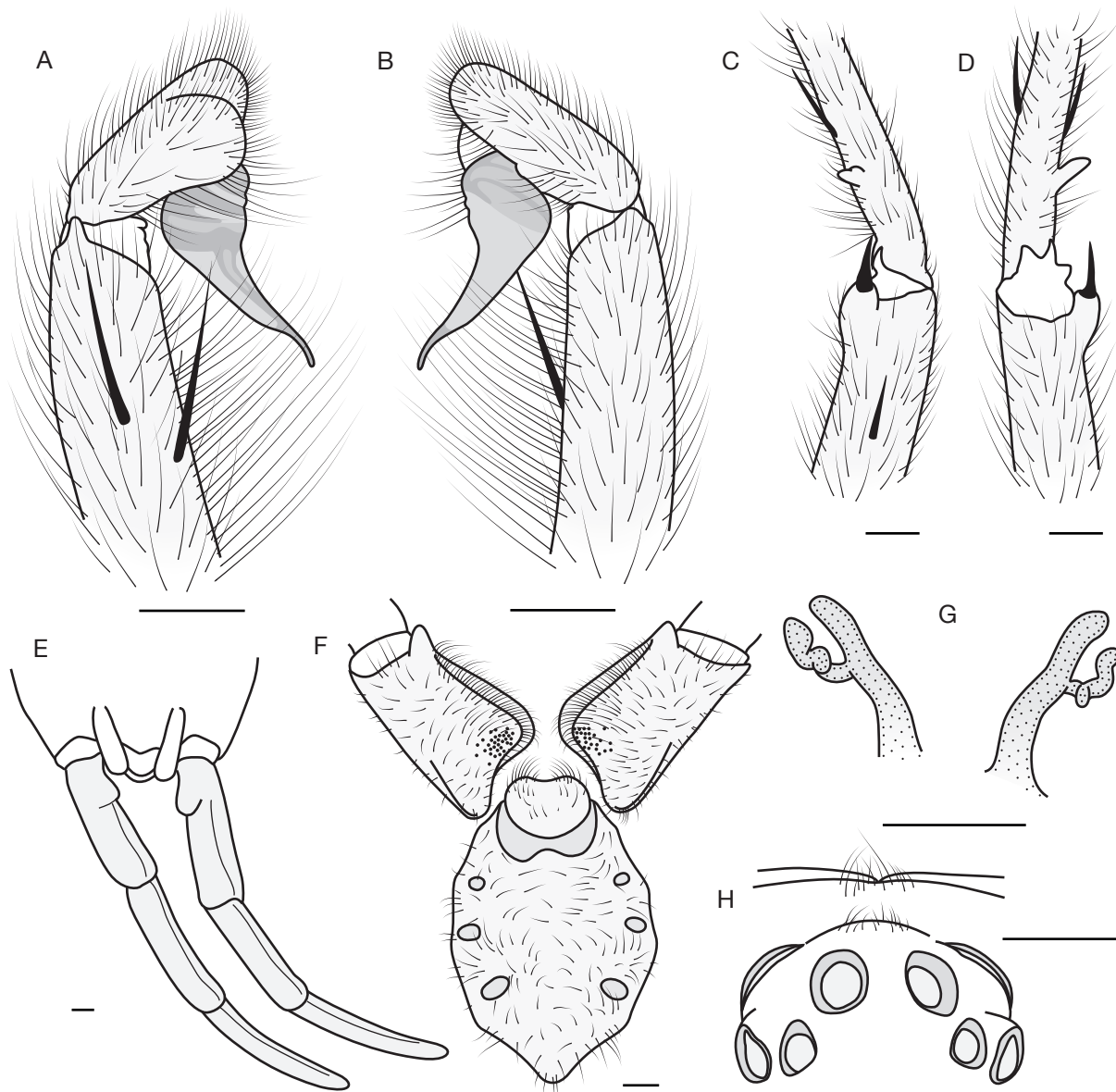


FIG. 7. — *Linothele fallax* (Mello-Leitão, 1926): **A-D**, *L. fallax* male (NHRS-KASI 000000038); **E, G, H**, *L. fallax* female (NHRS-KASI 000000039); **F**, *L. fallax* female (NHRS-KASI 000000040); **A**, left palp, prolateral view; **B**, left palp, retrolateral view; **C**, left tibia I and metatarsus I, retrolateral view; **D**, left tibia I and metatarsus I, prolateral view; **E**, spinnerets, ventral view; **F**, maxillae, labium and sternum, ventral view; **G**, spermatheca, dorsal view; **H**, eye tubercle, dorsal view. Scale bars: 1 mm.

A juvenile (F1) in NHRS was examined: CL = 7.9. CT = 9-10. MC = 18-20. As this specimen is clearly conspecific to other specimens in NHRS, we were able to observe the maximum range of variability for CT (± 5). The immature holotype of *L. curvitaris* was smaller CL (5.5), but had more CT (11) and MC (30-32).

NATURAL HISTORY

According to D. Reimann and B. Striffler (pers. comm.) the spiders settle in coastal forests of Venezuela, where they can be found under stones or between buttress roots. The species seems to be synanthropic. It takes about one year for males and one and a half years for females to reach maturity. Males

mature from July to October. Usually they produce less extensive, but more three-dimensional webs than other species of the genus. The tubular retreat, where the spider stays during the day, ends in a funnel-web which is approximately 30-40 cm in diameter.

Linothele fallax (Mello-Leitão, 1926)
(Figs 2; 7; 18A-C; 19H-J)

Diplura fallax Mello-Leitão, 1926: 312.

Uruchus fallax — Bücherl *et al.* 1971: 122, figs 9-10.

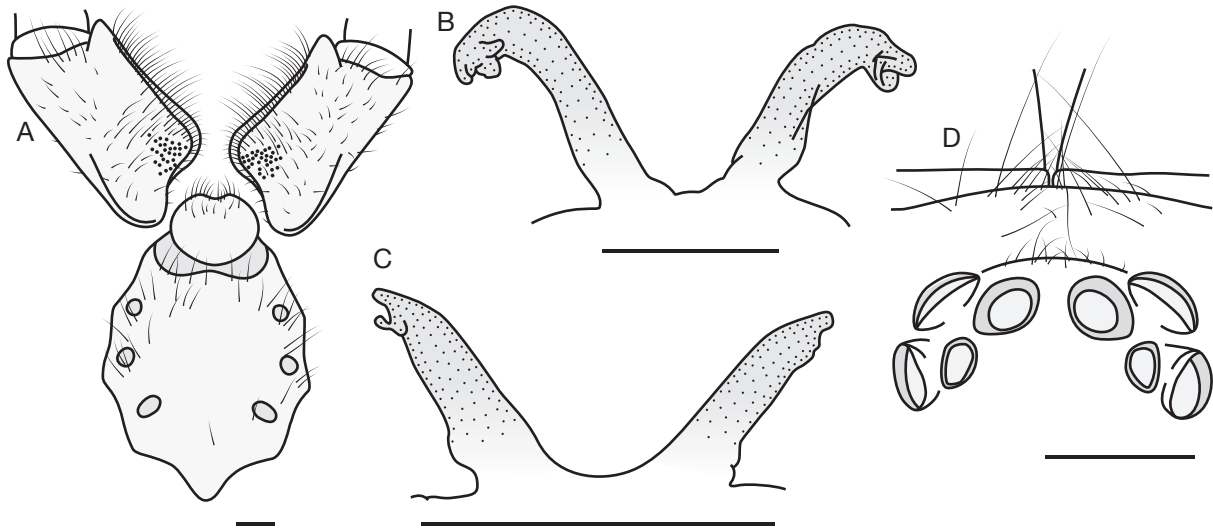


FIG. 8. — *Linothele gaujoni* (Simon, 1889): **A, B, D**, *Uruchus gaujoni* Simon, 1889 female syntypes (MNHN AR4951 (B4348)); **C**, *L. gaujoni* female (MCZ-76017); **A**, maxillae, labium and sternum, ventral view; **B, C**, spermathecae, dorsal view; **D**, eye tubercle, dorsal view. Scale bars: 1 mm.

Linothele fallax — Raven 1985: 74, 75. — Silva-Moreira *et al.* 2010: 31. — Kury *et al.* 2018: 557.

TYPE MATERIAL. — **Holotype**. Brazil • ♀; Alto Juruá; Alvaro Leitão leg; MNRJ 44(MLPC 679), probably lost.

OTHER MATERIAL EXAMINED. — **Bolivia** • 1 ♀*; Beni, near Rurrenabaque; 2005; A. Stirn leg.; NHRS-KASI000000039 • 1 ♂ F1; same data as for preceding; NHRS-KASI 000000038 • 1 ♀ F1; same data as for preceding; NHRS-KASI000000040 • 1 undet. F2; same data as for preceding; NHRS-KASI000000041 • 1 undet. F2; same data as for preceding; NHRS-JUST0000000529 • 2 ♂ F2 and 1 ♀ F2; same data as for preceding; SMNK.

TYPE LOCALITY. — Alto Juruá, Brazil.

DISTRIBUTION. — Juruá, Brazil to Rurrenabaque, Bolivia.

DIAGNOSIS. — The male of *Linothele fallax* can be distinguished from those of other species of *Linothele* by the almost straight megaspine, the position of the MP [(IML*100)/MAD = 442] and its v-shaped apex (Fig. 7C, D), as well as the embolus [(PL*100)/BD = 322] bearing no keel (Fig. 7A, B). It can further be distinguished from the male of *L. jelskii* by the leg formula of 4123 rather than 1423. Females of *Linothele fallax* differ from those of most other species of *Linothele* by their undivided scopula. They can be distinguished from those of *L. gaujoni* by their narrow clypeus (Fig. 7H) and their spermathecae stalks bearing a single retrolateral lobe (Fig. 7G). Females furthermore differ from the female of *L. uniformis* n. sp. by their higher number of maxillary cuspules (Fig. 7F), as well as their spermathecae bearing a single retrolateral lobe (Fig. 7G).

DESCRIPTION

Male

CL = 12.0. CT = 12–13. MC = 48. Colouration in alcohol: Prosoma, chelicerae, legs and pedipalps brown; opisthosoma dorsally with pattern consisting of complete chevrons; maculae absent. Colouration alive (Fig. 19I): as for alcohol, but patterns slightly more distinct. Carapace covered with orange setae. Opisthosoma with dorsal chevron pattern (Fig. 18A). Clypeus: narrow. Leg formula: 4123. Preening-combs absent.

Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Palpal organ: [(PL*100)/BD = 322], see Figure 7A, B. Megaspine and MP: [(IML*100)/MAD = 483], see Figure 7C, D.

Female

Colouration as for male, but carapace in alive specimens either orange, or green and pattern on opisthosoma more distinct (especially in younger specimens; Figs 18B, C; 19H, J). Clypeus: narrow, see Figure 7H. Sternum, labium and maxillae: see Figure 7F. Leg formula: 4123. Scopula undivided. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segment of the PLS rigid, see Figure 7E. Spermathecae: consisting of two stalks, bearing an isolated retrolateral lobe at 1:3A, see Figure 7G.

Variability

CL = 14.7–16.5. CT = 10–12. MC = 30–50.

REMARKS

According to the first description (Mello-Leitão 1926), the type locality is “Alto Juruá”. Bücherl *et al.* (1971) and Silva-Moreira *et al.* (2010) referred to the type locality as Juruá, Amazonas, ignoring the “alto” part, which might actually refer to the “upper” Juruá river at Peru and Acre, Brazil; thus, the type locality is somewhat ambiguous. The holotype could not be located by Silva-Moreira *et al.* (2010).

Material from Bolivia was found to match the descriptions by Mello-Leitão (1926) and Bücherl *et al.* (1971), as well as the illustration of the spermatheca provided by the latter.

NATURAL HISTORY

Linothele fallax can be found in natural crevices near ground level, but also in burrows in the ground. The spiders seem not to burrow, but occupy existing crevices. They usually

produce less extensive funnel-webs, which end in a short funnel at the entrance of their burrow. Females produce an egg-sac with up to 120 eggs as a fixed hammock, usually attached to the entrance funnel or shortly behind in the tubular retreat. Unfortunately, we lack information on the time of the year the spiders mature and produce offspring in the wild. Under artificial conditions females started to build their egg-sacs after the humidity has been raised, indicating that mating and oviposition take place at the start of the wet season.

Linothele gaujoni (Simon, 1889)
(Figs 8; 18D-E; 19G)

Uruchus gaujoni Simon, 1889a: 401.

Linothele gaujoni – Raven 1985: 74, 75.

TYPE MATERIAL. — **Syntypes.** Ecuador • 2 ♀; Loja; Gaujon leg.; MNHN-AR-AR4951 (B4348), examined.

OTHER MATERIAL EXAMINED. — Ecuador • 1 ♀; Cuenca to Guamote; 19-21.II.1965; L. Peña leg.; MCZ-76019 • 3 ♀, 8 undet.; Loja; 23.III.1965; L. Peña leg.; MCZ-76017 MCZ-76018.

TYPE LOCALITY. — Loja, Ecuador.

DISTRIBUTION. — Guamote to Loja, Ecuador.

DIAGNOSIS. — Females of *Linothele gaujoni* differ from those of all other species of *Linothele* by the combined presence of undivided scopula, a wide clypeus (Fig. 8D) and their elongated, tube-shaped spermathecae stalks bearing only few vesicles distally (Fig. 8B, C). They can further be distinguished by their habitat and distribution (Paramó regions of southern Ecuador).

DESCRIPTION

Male

Unknown.

Female

Colouration in alcohol: prosoma, chelicerae, legs and pedipalps brown; opisthosoma with distinct patterns, dorsally with chevrons extending laterally, ventrally with longitudinal lines and spots (Fig. 18D, E); maculae absent. Colouration alive (Fig. 19G): see Samadi (2009) Clypeus: wide, see Figure 8D. Sternum, labium and maxillae: see Figure 8A. Leg formula: 4123. Scopula undivided, see Figure 5C, D. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Spermathecae: consisting of two tube-shaped stalks bearing few vesicles at 1:5A, see Figure 8B, C.

Variability

CL = 6.6-11.8. CT = 11-14. MC = 26-40.

REMARK

The vial sent to us from MNHN contained two females. Hence, we cannot comment on the male.

NATURAL HISTORY

Linothele gaujoni occurs in Paramó regions of southern Ecuador. According to Samadi (2009) the species occupies 20 cm deep, almost vertical, burrows. At the entrance, there is a small funnel-web, which is approximately 15-20 cm in diameter. The species may not live only in burrows, but also occupy natural crevices at rocky steeps along roads (Samadi, pers. comm.). The average temperature in the natural habitat of the species is around 16 °C, at high humidity during the whole year.

Linothele jelskii (F. O. Pickard-Cambridge, 1896)
(Figs 9; 18F, G)

Neodiplura jelskii F. O. Pickard-Cambridge, 1896: 755, pl. 35, figs 5, 10, 11, 14.

Uruchus jelskii – Simon 1903: 964.

Linothele jelskii – Raven 1985: 74, 75.

TYPE MATERIAL. — **Syntypes.** Peru • 1 ♂, 1 imm. ♂; Kulczyński leg.; NHM BM1896.12 examined.

TYPE LOCALITY. — Peru, without exact location.

DISTRIBUTION. — Peru.

DIAGNOSIS. — The male of *Linothele jelskii* can be distinguished from males of other species of *Linothele* by its leg formula of 1423. It furthermore differs from the males of *Linothele curvitaris* and *L. sericata* by its rigid apical segments of the PLS, from the male of *L. quori* by the absence of maculae and from males of *L. fallax* by the curved megaspine on distal tibia I and the apex of the MP being domed, rather than v-shaped (Fig. 9C, D).

DESCRIPTION

Male

CL = 9.9. CT = 14. MC = 42. Colouration in alcohol: prosoma, chelicerae, legs and pedipalps brown; opisthosoma with distinct dorsal pattern, consisting of an anterior line and chevrons (Fig. 18F); maculae absent. Clypeus: narrow. Leg formula: 1423. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Palpal organ: see Figure 9A, B. Megaspine and MP: [(IML*100)/MAD = 442], see Figure 9C, D.

Female

Unknown.

REMARKS

F. O. Pickard-Cambridge (1896) stated a leg formula of 4123 in the genus description of *Neodiplura*, but shows a leg formula of 1423 for the adult male syntype, which we hereby confirm. The tip of the only embolus still attached to the adult male type is damaged (Fig. 9A, B). The immature syntype of *N. jelskii* bears undivided scopula and has a narrow clypeus as the adult male syntype. A loose opisthosoma

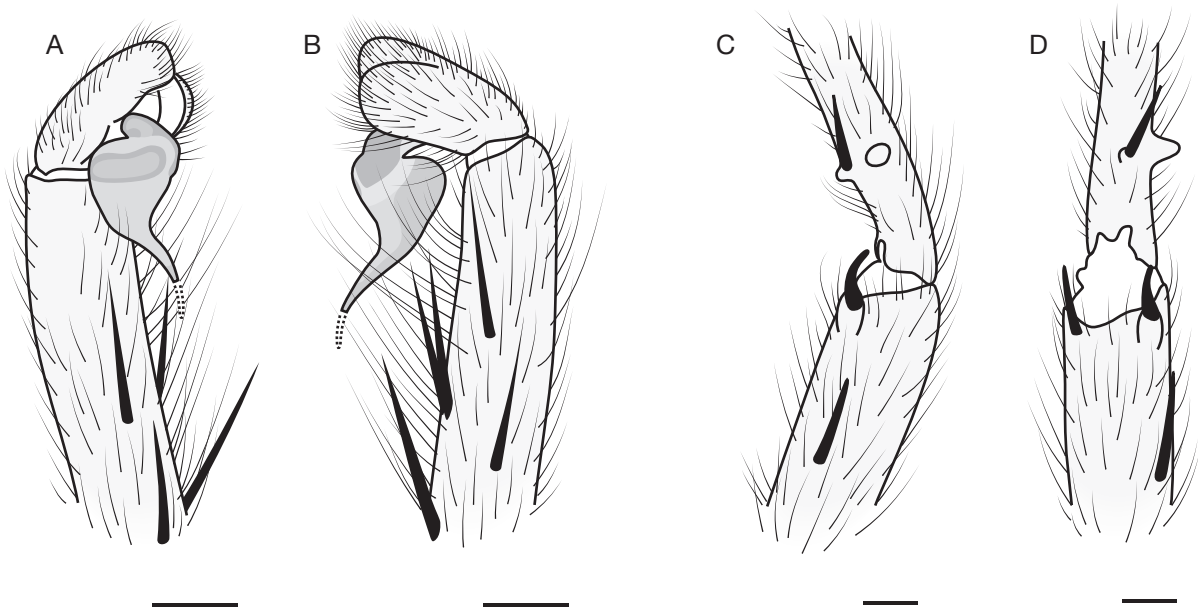


FIG. 9. — *Linothele jelskii* (F. O. Pickard-Cambridge, 1896): **A–D**, *Neodiplura jelskii* F. O. Pickard-Cambridge, 1896 male syntype (BMNH BM1896.12); **A**, right palp, retrolateroventral view; **B**, right palp, prolateral view; **C**, left tibia I and metatarsus I, retrolateral view; **D**, left tibia I and metatarsus I, retrolateroventral view. Scale bars: 1 mm.

can be found in the vial (Fig. 18G), whereas another one has been pinned to the prosoma of the adult male, both showing a distinct dorsal pattern consisting of chevrons.

Bücherl *et al.* (1971) mentioned that they examined two females from Peru (without specified locality) of ‘*Uruchus costatus*’ from a vial labelled by Mello-Leitão. They stated the species has not been mentioned in any of Mello-Leitão’s works and consider the specimens conspecific with *Uruchus jelskii*. The specimens of *U. costatus* are supposed to have a wide clypeus (as wide as the “diameter of an anterior lateral eye”; Bücherl *et al.* [1971]), clearly distinguishing them from both examined specimens of *N. jelskii*. Hence, we doubt Bücherl *et al.* examined the types of *N. jelskii* and that the specimens they examined were truly conspecific with *N. jelskii*. We can verify the species has never been published, but also that no such material could be located in MNRJ collection by Silva-Moreira *et al.* (2010). From the short description alone, the specimens of *U. costatus* could be distinguished from *Linothele gaujoni* only by their type locality. We are confident the short notes Bücherl *et al.* (1971) provided on *U. costatus* were never intended to serve as a first description. We therefore do not consider the species to be formally described and therefore a *nomen nudum*.

NATURAL HISTORY
Unknown.

Linothele longicauda (Ausserer, 1871)
(Fig. 10)

Diplura longicauda Ausserer, 1871: 178.

Diplura aequatorialis Ausserer, 1871: 179, **n. syn.**

Diplura cousini Simon, 1889a: 400, **n. syn.**

Linothele longicauda – Raven 1985: 74.

Linothele aequatorialis – Raven 1985: 74.

Linothele cousini – Raven 1985: 74.

TYPE MATERIAL. — *Diplura longicauda*: **Holotype**. Ecuador • imm. ♂; Quito; Schmarda leg.; NHMW I.N.: 61, examined.

Diplura aequatorialis: **Holotype**. Ecuador • indet.; Cordillera; Schmarda leg.; NHMW I.N.: 59, examined.

Diplura cousini: **Syntypes**. Ecuador • 2 ♀, 1 imm. ♂; Quito, Rumipamba; A. Cousin leg.; [MNHN-AR-AR4938](#) (B338), examined.

TYPE LOCALITY. — Quito, Ecuador.

DISTRIBUTION. — Cordillera to Quito, Ecuador.

DIAGNOSIS. — Females of *Linothele longicauda* differ from those of all other species of *Linothele* by the combined presence of divided scopula, rigid apical segments of the PLS, but absence of preening-combs, maculae and patterns on the opisthosoma. They can further be distinguished from females of other species by their genital morphology and from females of *L. pukachumpi* by the absence of yellowish setae on the carapace.

DESCRIPTION

Male

Unknown.

Female

Colouration in alcohol: Prosoma, opisthosoma, chelicerae, legs and pedipalps uniformly brown; maculae absent. Clypeus: narrow. Leg formula: 4123. Scopula divided. Preening-combs

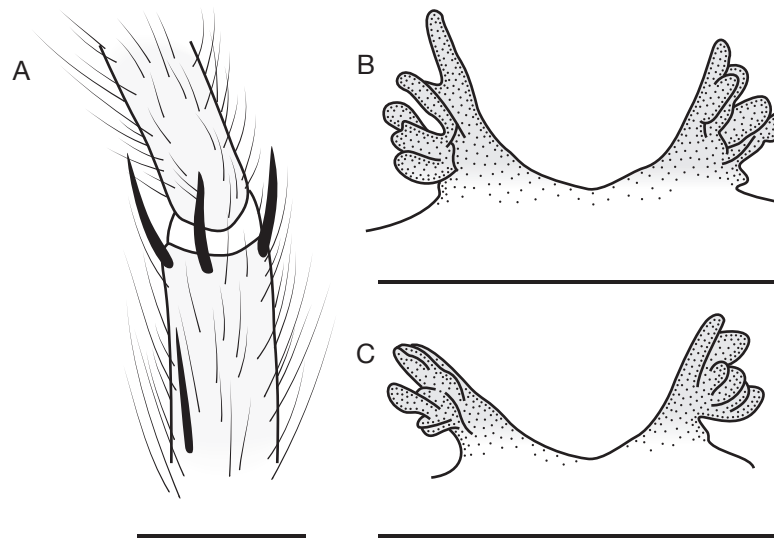


FIG. 10. — *Linothele longicauda* (Ausserer, 1871): **A–C**, *L. cousini* Simon, 1889, n. syn. female syntypes [MNHN, AR 4938 (B338)]; **A**, metatarsus III, ventral view; **B**, **C**, spermathecae, dorsal view. Scale bars: A, 1 mm; B, C, 0.5 mm.

absent, see Figure 10A, B. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Spermathecae: consisting of two apically elongated stalks, bearing several vesicles at 1:2–1:3A, see Figure 10B, C.

Variability

CL = 8.6–9.2. CT = 9–12. MC = 37–61.

REMARKS

Ausserer (1871) wrongly stated that the holotype of *D. longicauda* was a female. It is in fact an immature male. As it lacks a spermatheca, the holotype of *D. longicauda* cannot be distinguished from the syntypes of *D. cousini*, both originating from the same type locality (Quito).

The medial and apical segments of the PLS of the holotype of *Diplura aequatorialis* are missing. The epigastrium has been dissected by an earlier examiner, but no preparation can be found in the vial of the holotype. Bücherl *et al.* (1971: 117) considered *Diplura nigerrima* Mello-Leitão, 1941 and *D. bitaeniata* Mello-Leitão, 1941 junior synonyms of *D. aequatorialis*. According to the authors, the type specimens should be deposited at MNRJ, but Silva-Moreira *et al.* (2010) did not list them for MNRJ collection. Of all material examined by Bücherl *et al.* (1971), only the material of *Harmonicon nigradorsi* Mello-Leitão, 1924 could be located in MNRJ collection by Silva-Moreira *et al.* (2010). The synonymies of *D. nigerrima* and *D. bitaeniata* established by Bücherl *et al.* (1971: 117) are rejected for the following reasons: apparently, the apical segments of the PLS in *D. nigerrima* and *D. bitaeniata* were very elongated. Unfortunately, Mello-Leitão (1941a) did not explicitly state on the structure of the apical PLS segment in any of the two species, but in no other species, except for *L. sericata*, the apical PLS segment is as elongated as mentioned for *D. nigerrima*; PLS: 23.4 (5.6, 5.6, 12.2). Sizes (22.6 for

D. bitaeniata, 37.0 for *D. nigerrima*; both probably incl. chelicerae) and CT (9 for *D. bitaeniata*, 8 for *D. nigerrima*) might well fall within the range observed for *Linothele sericata*. Additionally, the dorsal pattern on the opisthosoma, which Mello-Leitão (1941a) described for *D. bitaeniata* and Paz & Raven (1990) described for *L. megatheloides*, resembles that of younger *L. sericata*, whereas the holotype of *D. aequatorialis* bears no distinct pattern. Furthermore, the type localities (both Bogotá) of *Diplura bitaeniata* and *D. nigerrima* are consistent with the one of *L. sericata* and notably disjunct from the rather unspecific type locality of *D. aequatorialis*. As a result, *D. bitaeniata* n. syn. and *D. nigerrima* n. syn. are removed from the synonymy of *L. aequatorialis* and instead considered junior synonyms of *L. sericata*. The holotype of *D. aequatorialis* matches variation and overall appearance observed in the types of *D. longicauda* and *D. cousini*. The holotype of *D. longicauda* is indistinguishable from the types of *D. cousini* and *D. aequatorialis*. As a result, *L. aequatorialis* n. syn. and *L. cousini* n. syn. are considered junior synonyms of *L. longicauda*.

NATURAL HISTORY

Unknown.

Linothele macrothelifera Strand, 1908 (Figs 11; 17F–H)

Linothele macrothelifera Strand, 1908: 771.

TYPE MATERIAL. — **Holotype**. Colombia • ♀; “Popayan de Cauca” [Popayán]; 1700 m a.s.l.; S. Lehmann leg.; SMF Nr. 2680–86 examined.

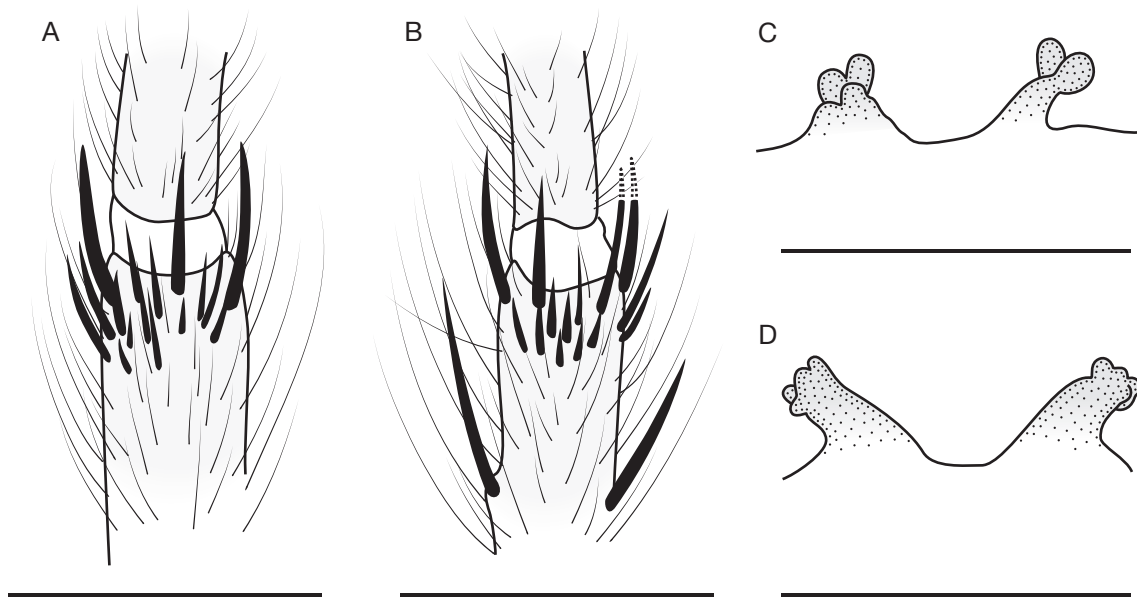


FIG. 11. — *Linothele macrothelifera* Strand, 1908: **A, C**, *L. macrothelifera* female holotype (SMF Nr. 2680-86); **B, D**, *L. macrothelifera* female (MCZ-76023); **A**, metatarsus III, ventral view; **B**, metatarsus III, ventral view; **C, D**, spermathecae, dorsal view. Scale bars: A, B, 1 mm; C, D, 0.5 mm.

OTHER MATERIAL EXAMINED. — **Colombia** • 1 undet.; Valle del Cauca, near Querebral; 1600 m a.s.l.; VIII.1977; W. G. Eberhard leg.; MCZ-76021 • 1 ♀; Valle del Cauca, near Cali; 1300 m a.s.l.; IX.1972; W. G. Eberhard leg.; MCZ-76023.

TYPE LOCALITY. — Popayán, Colombia.

DISTRIBUTION. — Valle del Cauca, Colombia.

DIAGNOSIS. — Females of *Linothele macrothelifera* differ from those of most other species of *Linothele* by the presence of preening-combs (Fig. 11A, B). Females may further be distinguished from those of *L. spinosa* n. sp. by their shorter spermathecae stalks lacking an elongated vesicle (Fig. 11C, D) and their distribution.

DESCRIPTION

Male

Unknown.

Female

Coloration in alcohol: Prosoma, chelicerae, legs and pedipalps pale, yellow; opisthosoma with distinct patterns, mid-dorsally consisting of quadrate spots anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines, laterally with several spots, ventrally with longitudinal lines and spots (Fig. 17F-H); maculae absent. Clypeus: narrow. Leg formula: 4123. Scopula divided. Preening-combs present, see Figure 11A, B. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Spermathecae: consisting of two stalks with broad bases, bearing several vesicles at 1:2–1:3A and a short globular apex, see Figure 11C, D.

Variability

CL = 5.3–5.4. CT = 9–10. MC = 24–33.

NATURAL HISTORY

According to Eberhard & Hazzi (2013), *L. macrothelifera* build sheet webs on the surface of forest leaf litter.

Linothele melloleitaoi (Brignoli, 1983)

Diplura maculata Mello-Leitão, 1941b: 236. — Brignoli 1983: 124 (preoccupied by Thorell, 1890).

Diplura melloleitaoi Brignoli 1983: 124 (homonym replacement name).

Linothele melloleitaoi — Raven 1985: 74. — Silva-Moreira *et al.* 2010: 31.

TYPE MATERIAL. — **Holotype**. **Colombia** • ♀; Norte de Santander, Cúcuta; probably lost.

TYPE LOCALITY. — Cúcuta, Colombia.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — *Linothele melloleitaoi* resembles *L. quori* and may be distinguished from it by its flexible leg tarsi, the absence of a ventral pattern from the opisthosoma, alongside its distribution.

DESCRIPTION (FOLLOWING MELLO-LEITÃO 1941B)

Male

Unknown.

Female

CT = 8. Coloration: Reddish brown; opisthosoma dorsally with pattern of spots that interconnect, ventrally uniformly black; maculae present. Leg formula: 4123. Leg tarsi flexible.

REMARKS

Mello-Leitão (1941b) mentioned no type repository. Most of the type material described by Mello-Leitão has either been

deposited at IBSP, or MNRJ. Silva-Morreira *et al.* (2010) mention *Linothele melloleitaoi* and refer to *Diplura melloleitaoi* (Brignoli, 1983) with no further mention. It remains unclear if the type was deposited in MNRJ collection. Unfortunately, we have to assume the holotype to be lost. According to the first description, maxillary cuspules were present.

A single fragmented male of a *Linothele* species from Northern Colombia (MCZ) has maculae and a palpal organ of similar shape as the one in males of *L. fallax*, which certainly differs from the one in *L. quori*. Without having examined more material from Colombia, it can currently not be assured that the examined male (MCZ) is the conspecific male of *L. melloleitaoi*. However, this suggests there is another species of *Linothele* with maculae in northern Colombia that differs from *L. quori*.

NATURAL HISTORY
Unknown.

Linothele monticolens (Chamberlin, 1916)

Diplura monticolens Chamberlin, 1916: 202, pl. 7, figs 9, 10.

Linothele monticolens – Raven 1985: 74.

TYPE MATERIAL. — **Holotype.** Peru • ♀; Huadquina; 5000 ft a.s.l.; VII.1911; R. V. Chamberlin leg.; MCZ 15460(MCZ-146) examined.

TYPE LOCALITY. — Huadquina, Peru.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — *Linothele monticolens* can be distinguished from all other species of *Linothele* by the combined presence of a dorsal chevron pattern on opisthosoma, leg tarsi with only few medial cracks and its distribution.

DESCRIPTION
Male
Unknown.

Female

CL = 3.4, CT = 9, MC = 10. Colouration in alcohol: prosoma, legs and pedipalps pale yellow; opisthosoma dorsally with faint pattern, ventrally without pattern; maculae absent. Clypeus: narrow. Leg formula 4123. Scopula divided. Preening-combs absent. Leg tarsi with only few medial cracks. Spinnerets: apical segments of the PLS rigid.

REMARKS

Chamberlin (1916) mentioned the presence of a chevron pattern on the opisthosoma, which has faded and cannot be observed very well in the holotype.

Unfortunately, MCZ did not allow dissections on type material and we therefore cannot comment on the female genitalia. The sex of the holotype is referred to by original designation. Legs are partly disarticulated from prosoma, but on no leg an undivided scopula, or preening-combs could be observed.

NATURAL HISTORY
Unknown.

Linothele paulistana (Mello-Leitão, 1924) (Fig. 12)

Diplura paulistana Mello-Leitão, 1924: 185; 1926: 310. — Bücherl *et al.* 1971: 122, fig. 11.

Diplura annulifila Mello-Leitão, 1937: 3, fig. 4. **n. syn.**

Linothele paulistana – Raven 1985: 74. — Silva-Morreira *et al.* 2010: 31 — Kury *et al.* 2018: 557.

Linothele annulifila – Raven 1985: 74.

TYPE MATERIAL. — *Diplura paulistana*: **Holotype.** Brazil • ♀; Sao Paulo, Santos; W. Bristowe leg.; MNRJ MNRJ 55 (personal collection of Mello-Leitão #84 and #884) probably lost. *Diplura annulifila*: **Holotype.** Brazil • ♀; Santa Catharina, Jaraguá; 30.I.1935; Godofredo Ruce leg.; IBSP formerly IBSP 3453 (personal collection of Mello-Leitão No.99) examined by photographs, lost.

TYPE LOCALITY. — Sao Paulo, Brazil.

DISTRIBUTION. — Santa Catarina to Sao Paulo, Brazil.

DIAGNOSIS. — *Linothele paulistana* may be distinguished from other species in the genus by the combined presence of flexible apical segments of the PLS (Fig. 12A), but absence of maxillary cuspules (Fig. 12B).

DESCRIPTION
Male
Unknown.

Female

CT = 7(?)–14. MC = 0. Colouration in alcohol: prosoma, chelicerae, legs and pedipalps brown; opisthosoma dorsally and ventrally without distinct patterns; maculae absent. Clypeus: narrow. Sternum, labium and maxillae: see Figure 12B. Spinnerets: apical segments of the PLS flexible, see Figure 10A. Spermatheca: see Figure 12C–E.

REMARKS

The original description of *D. paulistana* by Mello-Leitão (1924) mentions 14 cheliceral teeth, whereas the second description (1926) mentions only 7. For some reason Mello-Leitão described different specimens as *L. paulistana* and marked them as “sp. n.” in both descriptions (Mello-Leitão 1924, 1926). In the first description (Mello-Leitão 1924), it is assigned collection number #84 of Mello-Leitão’s personal collection, whereas in the second description (Mello-Leitão 1926) it is assigned #848. None of the descriptions, nor following works on the species mention the presence of maxillary cuspules. Both descriptions mention “flexible” apical segments of the PLS. Bücherl *et al.* (1971: fig. 11) illustrated the spermathecae, which overall resembles that of the holotype of *D. annulifila* and which we found to bear no maxillary cuspules. The holotype of *D. paulistana* could not

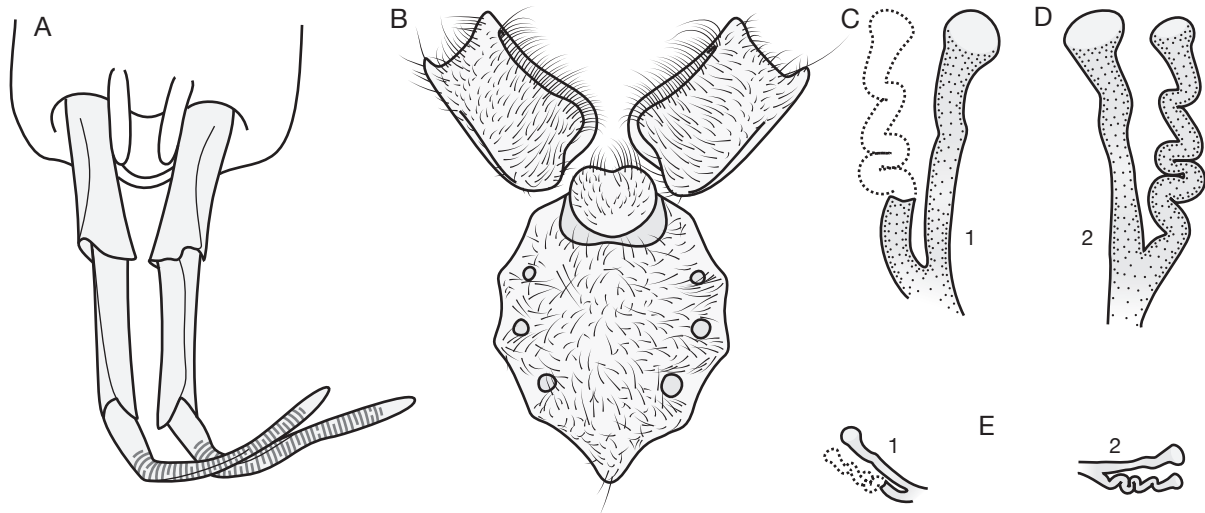


FIG. 12. — *Linothele paulistana* (Mello-Leitão, 1924): **A–E**, *Diplura annulifila* Mello-Leitão, 1937, n. syn. female holotype (formerly IBSP 3453); **A**, spinnerets, ventral view; **B**, maxillae, labium and sternum, ventral view; **C**, spermathecal component 1, dorsal view; **D**, spermathecal component 2, dorsal view; **E**, spermatheca (arrangement of component 1 and 2 as it was seen), dorsal view. Not to scale.

be located in the collection of the MNRJ, where it should be deposited; Silva-Moreira *et al.* (2010).

Before the type material of *D. annulifila* was lost in the fire of 2010, A. Brescovit (IBSP) provided images of the holotype (all lacking scales) of the holotype of *D. annulifila*. The preparation of the spermatheca was broken and the holotype clearly lacked maxillary cuspules. All legs were disarticulated with some leg tarsi appearing less flexible, with only few medial cracks. As the images were not highly resolved, many characters have to be reconsidered. Mello-Leitão (1937) reported a length of 9.0 for the cephalothorax of *D. annulifila*.

D. annulifila n. syn. is recognized a junior synonym of *D. paulistana* on account of the absence of maxillary cuspules and patterns, but presence of flexible apical segments of the PLS, alongside their close type localities.

NATURAL HISTORY

Unknown.

Linothele pukachumpi Dupérré & Tapia, 2015

Linothele pukachumpi Dupérré & Tapia, 2015: 356, figs 30–33.

TYPE MATERIAL. — **Holotype**. Ecuador • ♀; Cotopaxi Province, Otonga Biological Reserve; 0°25'21.396"S, 79°30'38.519"W; 2225 m a.s.l.; 04–09.IX.2014; N. Dupérré, E. Tapia and C. Tapia leg.; QCAZ.

Paratype. Ecuador • 1 ♀; same collecting data as for holotype; 26.V.2014; A. Tapia leg.; QCAZ.

TYPE LOCALITY. — Otonga Biological Reserve, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — “Females are diagnosed by their uniform red-brown colour [...]. From *L. longicauda*, *L. aequatorialis* and *L. cousini* by

the presence of yellowish setae on the carapace [...]. Females can be further diagnosed by their elongated and apically tapering spermathecae, with a few elongated vesicles medially [...].” see Dupérré & Tapia (2015: 356–357).

DESCRIPTION (FOLLOWING DUPÉRRÉ & TAPIA 2015)

Male

Unknown.

Female

CL = 11.0. CT = 10. MC = 25–30. Colouration: overall reddish brown, see Dupérré & Tapia (2015: fig. 30); maculae absent. Sternum, labium and maxillae: see Dupérré & Tapia (2015: fig. 31). Leg formula: 4123. Scopula divided. Leg tarsi pseudo-segmented. Spermathecae: “joined at base, elongated and tapering apically, with a few elongated vesicles medially, most on long stalk”, see Dupérré & Tapia (2015: figs 32, 33).

REMARKS

Dupérré & Tapia (2015) diagnosed *Linothele pukachumpi* as follows: “From *L. longicauda*, *L. aequatorialis* and *L. cousini* by the presence of yellowish setae on the carapace [...]. Females can be further diagnosed by their elongated and apically tapering spermathecae, with a few elongated vesicles medially [...].” Yellowish/golden setae on carapace, dorsal trochanter, or coxae are known at least from living specimens of *L. curvitaris*, *L. gaujoni*, *L. sericata*, and *L. spinosa* sp. n. Furthermore, yellowish/golden setae can be observed in all species, except for the male of *L. yanachanka*, in the original descriptions by Dupérré & Tapia 2015. The golden shine visible in living specimens fades shortly after preparation in alcohol. The setae become dull and more greyish, likely due to shrinking of the cuticula; see Foelix *et al.* 2009. While the yellowish setae are an easy way to distinguish alive specimens of *L. longicauda* and *L. pukachumpi*, further characteristics to distinguish between preserved specimens of these species might become necessary.

NATURAL HISTORY

According to Dupérré & Tapia (2015), specimens “[...] of *L. pukachumpi* were collected in a primary cloud forest at 2225m, they build webs of 50 × 40 cm on dirt talus along trails, the retreat is located in soil crevices.”

Linothele quori Dupérré & Tapia, 2015

Linothele quori Dupérré & Tapia, 2015: 361, figs 41–47.

TYPE MATERIAL. — **Holotype.** Ecuador • ♂; Santo Domingo de Las Tsáchilas, Parroquia San José de Alluriquín, La Florida; 0°15'0.9144"S, 79°1'49.547"W; 884 m a.s.l.; 20.XI.2014; E. Tapia, I. Tapia, A. Tapia and N. Dupérré leg.; hand collected from female's web; QCAZ. **Paratype.** Ecuador • 1 ♀; same collecting data as for holotype.

TYPE LOCALITY. — La Florida, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — “Males and females are diagnosed by their unique gold and purple colour [...]. Males are further distinguished by the straight embolus with slightly bent tip [...]; females by their wide and short spermathecae [...], elongated and tapering apically in all other species.” see Dupérré & Tapia (2015: 361).

DESCRIPTION (FOLLOWING Dupérré & Tapia 2015)

Male

CL = 5.0. CT = 9. MC = ~22. Colouration alive: overall yellowish; opisthosoma “yellow-brown with purplish mesh pattern (purplish pattern appears dark brown in alcohol) [...], ventrally with purplish pattern”; maculae present. Sternum, labium and maxillae: see Dupérré & Tapia (2015: fig. 45). Leg formula 4123. Preening-combs absent. Leg tarsi pseudo-segmented. Palpal organ: “bulb pyriform; embolus long and thin, half the length of the tibia”, see Dupérré & Tapia (2015: fig. 44). Megaspine and MP: see Dupérré & Tapia (2015: fig. 46).

Female

CL = 6.0. CT = 9. MC = ~25. Colouration alive: as for male, see Dupérré & Tapia (2015: figs 41, 47). Leg formula: 4123. Scopula divided. Leg tarsi weakly pseudo-segmented. Spermathecae: “joined at base, wide and short, with small vesicles medially, with or without stalks”, see Dupérré & Tapia (2015: figs 42, 43).

REMARKS

Unfortunately, we were unable to obtain images of the relevant structures, but the illustrations for male characters in the first description show a megaspine and MP at prolateral tibia and metatarsus I. The description mentions those to be situated retrolaterally. As a prolateral megaspine and MP have not been observed in any other *Linothele*, it is likely the terms “prolateral” and “retrolateral” have been swapped in the illustration legends.

NATURAL HISTORY

According to Dupérré & Tapia (2015), specimens of *L. quori* “[...] were collected in foothill forest. This species builds webs approximately 30 × 20 cm [...], with a central funnel that is almost always 1 m from the ground, attached to epiphyte bases or tree trunks. The specimens collected live in sympatry with *L. tsachilas* and *L. zaia*, but in a very distinctive microhabitat. Two juveniles females were collected in a low evergreen forest at 1426 m, where they build webs of 30 × 20 cm from 1 m to 3 m from the ground, attached to epiphytes bases or tree trunks [...]”.

Linothele septentrionalis n. sp. (Figs 13; 17I, J)

[urn:lsid:zoobank.org:act:514DF6CE-3DC9-4416-B71B-1C60C698EBEB](https://zoobank.org/act:514DF6CE-3DC9-4416-B71B-1C60C698EBEB)

TYPE MATERIAL. — **Holotype.** Bahamas • ♀; Nathan Banks leg.; MCZ 76012.

ETYMOLOGY. — The specific epithet is a Latin adjective, meaning ‘northern’ and refers to the most northern locality in *Linothele* zoogeography; the gender is feminine.

TYPE LOCALITY. — Bahamas.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — The female of *Linothele septentrionalis* n. sp. differs from those of all other *Linothele* by the combined presence of maculae (Fig. 13B), presence of a pattern on the sternum and absence of maxillary cuspules (Fig. 13A).

DESCRIPTION

Male

Unknown.

Female (holotype)

CL = 3.9. CT = 11. MC = 0. Colouration in alcohol: Prosoma, chelicerae, legs and pedipalps pale, yellow; sternum (length: 2.0) dark, with bright longitudinal pattern (Fig. 13A); opisthosoma with distinct mid-dorsal pattern, consisting of quadrate spots anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines, laterally with several spots; ventrally with longitudinal lines and spots (Fig. 17I, J); maculae present, see Figure 13B. Clypeus: narrow. Sternum, labium and maxillae: see Figure 13A. Palp measurements: 7.6 (2.5, 1.4, 1.7, 2.0). Leg measurements: I: 13.0 (3.3, 1.5, 3.0, 2.9, 2.3); II: 10.8 (2.9, 1.5, 2.0, 2.6, 1.8); III: 10.6 (2.8, 1.3, 2.1, 2.4, 2.0); IV: 14.9 (2.4, 3.8, 3.2, 1.5, 4.0). Leg formula: 4123. Scopula divided. Preening-combs absent. Leg tarsi integral. Spinnerets: PMS: 1.3, separated by less than length of segment (0.7); PLS: 5.9 (1.6, 1.9, 2.4), apical segments rigid. Spermatheca: consisting of two stalks with basal lobes, see Figure 13C.

NATURAL HISTORY

Unknown.

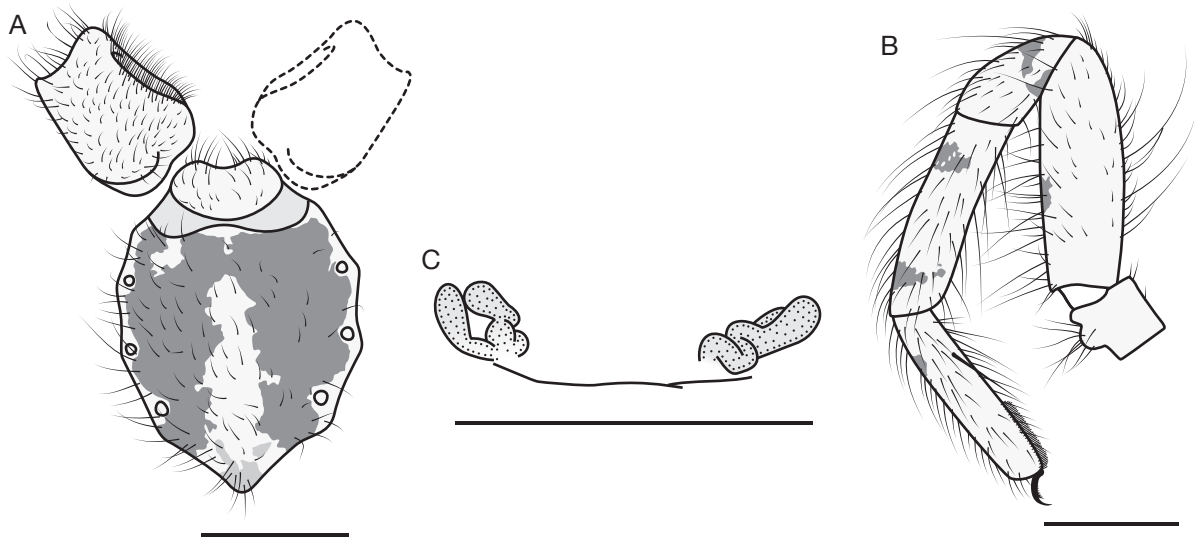


FIG. 13. — *Linothele septentrionalis* n. sp. **A-C**, *L. septentrionalis* n. sp. female holotype (MCZ-76012); **A**, maxilla, labium and sternum, ventral view; **B**, left palp, retrolateral view; **C**, spermatheca, dorsal view. Scale bars: A, B, 1 mm; C, 0.5 mm.

***Linothele sericata* (Karsch, 1879)**
(Figs 1; 19C-E)

Trechona sericata Karsch, 1879: 545.

Diplura bitaeniata Mello-Leitão, 1941a: 114. — Bücherl *et al.* 1971: 121, fig. 8. **n. syn.**

Diplura nigerrima Mello-Leitão, 1941a: 115. — Bücherl *et al.* 1971: 121. **n. syn.**

Linothele megatheloides Paz & Raven, 1990: 79, figs 1-12. **n. syn.**

Linothele sericata – Pedroso *et al.* 2008: 366.

TYPE MATERIAL. — *Trechona sericata*: **Holotype**. Colombia • ♀; Bogotá; Lindig leg.; ZMB Arach-2082 examined by photographs. *Diplura bitaeniata*: **Holotype**. Colombia • ♀; Bogotá; Irmão Nicéforo Maria leg.; lost. *Diplura nigerrima*: **Holotype**. Colombia • ♀; Bogotá; Irmão Nicéforo Maria leg.; lost. *Linothele megatheloides*: **Holotype**. Colombia • ♂; Choco, Tutunendo; 27.VII.1983; N. Paz leg.; AMNH. **Paratype**. Colombia • 1 ♀; same data as for holotype.

OTHER MATERIAL EXAMINED. — Colombia • 1 ♂, 2 ♀, and 3 undet.; Quibdó-Medellin, between km 178-134; 85m a.s.l.; 20.II.1983; N. Paz S. leg.; AMNH_IJC 00327625 • 1 ♀ *; Sasaima, Cundinamarca; 2005; A. Stirn and D. Weinmann leg.; NHRS-KASI 000000035 • 1 ♂ F1 and 1 undet. F1; same data as for preceding; NHRS-KASI 000000034 • 2 undet. F2 (first instar); same data as preceding; NHRS-JUST 000000675 • 2 ♂ F2; same data as preceding; SMNK • 1 ♀ F2; same data as preceding; SMNK • 1 undet.; Antioquia, Rio Clara; 900m a.s.l.; 27.VII.1983; F. Coyle leg.; tropical evergreen forest; AMNH_IJC 00327615 • 4 undet.; same data as for preceding; AMNH_IJC 00327621.

TYPE LOCALITY. — Bogotá, Colombia.

DISTRIBUTION. — Tutunendo to Bogota, Colombia.

DIAGNOSIS. — Females of *Linothele sericata* can be distinguished from those of other species in the genus by the combined presence

of flexible apical articles of the PLS, presence of maxillary cuspsules and absence of vesicles on the spermathecae stalks. Males differ from those of all other species in the genus by the presence of a keel on the embolus. Also see Paz & Raven (1990).

DESCRIPTION (FOLLOWING Paz & Raven 1990)

Male

CL = 10.83. CT = 13. MC = 28-30. Coloration: “Carapace red brown, striae marked by black reticulations along edges; caput brown with donut-shaped darkened ring medially; chelicerae, and legs red brown. Dorsum of abdomen brown with two lighter colored longitudinal bands, venter brown.” Clypeus: narrow. Sternum, labium and maxillae: Paz & Raven (1990: fig. 12). Leg formula 4123. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS flexible, see Paz & Raven (1990: fig. 7). Palpal organ: “bulb pyriform with small subtegulum; embolus broad with scooped tip”, see Paz & Raven (1990: fig. 8). Megaspine and MP: see Paz & Raven (1990: fig. 6).

Variability

CL = 9.6-10.8. CT = 11-13. MC = 28-59. [(PL*100)/BD = 327]. [(IML*100)/MAD = 581].

Female

CL = 13.7. CT = 12. MC = ~60. Colouration: “Carapace orange brown with brown mottling on caput and interstitial ridges; chelicerae and legs red brown. Dorsum of abdomen brown with medial pallid area, venter brown.” Sternum, labium and maxillae: see Paz & Raven (1990: fig. 10). Clypeus: narrow. Leg formula: 4123. Scopula divided. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS flexible, see Paz & Raven (1990: fig. 9). Spermathecae: consisting of two stalks, “each with long lobe apically enlarged with a shallow apical invagination.”, see Paz & Raven (1990: fig. 11).

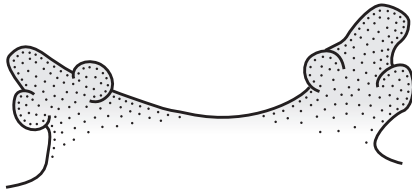


FIG. 14. — *Linothele sexfasciata* (Schiapelli & Gerschmann, 1945) female holotype (MACN No. 800), spermatheca, dorsal view. Scale bars: 0.5 mm.

Variability

CL = 12.3-16.0. CT = 12-14. MC = 45-88.

REMARKS

The holotype of *Trechona sericata* is a dried and pinned specimen, which seems to be in fragile condition. For this reason, photographic examination by the curators is clearly to be preferred and the ZMB team was so kind to send us images of the holotype, allowing for a proper diagnosis. As stated by Pedrosa *et al.* (2008), we confirm the specimen described as *Trechona sericata* by Karsch (1879) is a misidentified *Linothele*. Karsch was not able to observe a prolateral lyra on the maxillae, since the specimen was already dried when he examined it (Karsch 1879: 544). The type specimen shows maxillary cuspules, two rows of teeth on paired tarsal claws, divided scopula, and flexible apical segment of the PLS; a combination of features that can only be found in *Linothele*.

The type material of *Linothele megatheloides* has not been studied and identification is based on the very detailed description by Paz & Raven (1990), alongside examination of the additional material (AMNH_IZC 00327625) mentioned in the first description. *L. megatheloides* n. syn. is recognized a junior synonym of *L. sericata* on account of the presence of maxillary cuspules, flexible apical segment of the PLS (at least twice the length of the medial segment), the homogeneous colouration described by Karsch (1879), as well as the type locality close to the one of *L. sericata*. For information on other synonymies established here refer to remarks at *L. longicauda*.

As observed in lab-reared specimens, younger living females, immature males of *L. sericata* and even early instars bear distinct patterns on dorsal (see Paz & Raven 1990: fig. 9) and ventral opisthosoma. In older females, patterns can become indistinct and the opisthosoma of the spider appears almost black. Early instar specimens of *Linothele sericata* (CL = 2.3-2.7) bear fewer cheliceral teeth (CT = 7-9), fewer maxillary cuspules (MC = 15-17) and only few scopuliform setae on anterior leg tarsi.

NATURAL HISTORY

According to Paz (1988), *L. sericata* build large sheet webs ending in a tubular retreat at the base of tree trunks, in which several different symbionts and cleptoparasites may be found. The reproduction strategies of the species have been well documented by Paz (1993).

Linothele sexfasciata (Schiapelli & Gerschman, 1945) (Fig. 14)

Diplura sexfasciata Schiapelli & Gerschman, 1945: 177, pl. VI.

Linothele sexfasciata – Raven 1985: 74.

TYPE MATERIAL. — **Holotype.** Venezuela • ♀; Caracas; III.1936; J. Vellard leg.; MACN No. 800 examined.

TYPE LOCALITY. — Caracas, Venezuela.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — The female of *Linothele sexfasciata* resembles *L. monticolens*, but can be distinguished from it by its pseudo-segmented leg tarsi, alongside its distribution.

DESCRIPTION

Male

Unknown.

Female

CT = 10. MC = 25-30. Colouration in alcohol: Overall pale yellow; opisthosoma dorsally with distinct pattern consisting of complete chevrons, see Schiapelli & Gerschman (1945: Pl. IV), ventral pattern absent from opisthosoma; maculae absent. Clypeus: narrow. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: apical segments of the PLS rigid. Spermatheca: consisting of two stalks with one prolateral and one dorsal vesicle at 1:3A, see Figure 14A.

REMARKS

The holotype is partly disarticulated with no leg, nor pedipalp still attached to the prosoma. Fortunately, one leg II has been dissected including coxa with other coxae still attached to the prosoma. We therefore could evaluate the scopula on tarsus II, which is divided. On no other leg an undivided scopula or preening-combs could be observed. Schiapelli & Gerschman (1945: Pl. VI) show a distinct dorsal pattern consisting of chevrons, which is still evident in the holotype.

NATURAL HISTORY

Unknown.

Linothele spinosa n. sp. (Figs 15; 17K-M; 19F)

[urn:lsid:zoobank.org:act:B9735F95-4D4F-46E2-9CDE-7F9CF1DAA503](https://doi.org/10.21203/rs.3.rs-10000000/v1)

TYPE MATERIAL. — **Holotype.** Peru • ♂ F1; near Iquitos; 2007; H. W. Auer leg.; NHRS-KASI000000036.

Paratypes. Peru • 1 ♀*, 2 ♀ F1; same data as for holotype; NHRS-KASI000000037.

ETYMOLOGY. — The specific epithet is a Latin adjective, meaning 'spined' and refers to the presence of preening-combs on ventrodistal posterior metatarsi, otherwise only observed in *L. macrothelifera*; the gender is feminine.

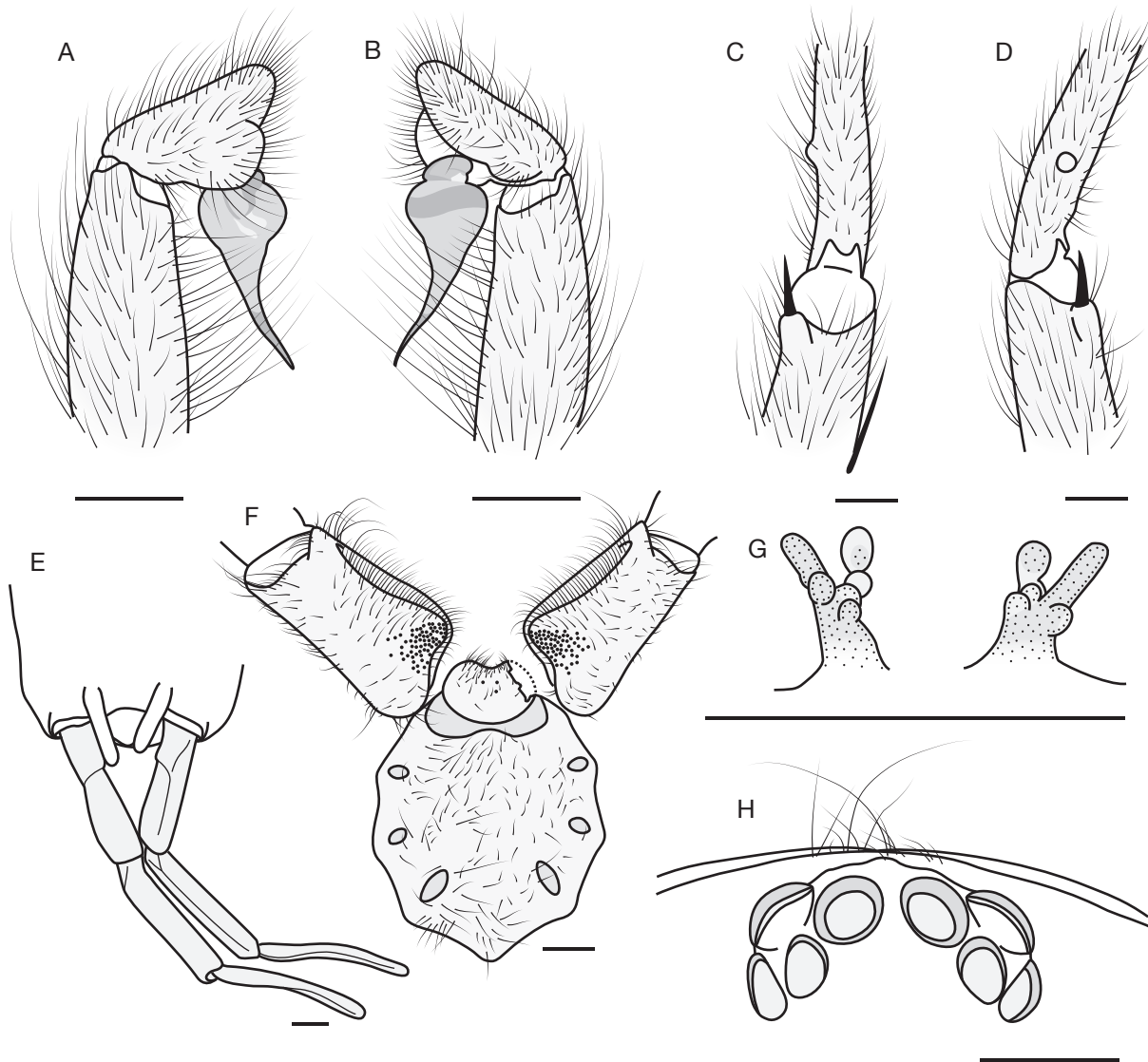


FIG. 15. — *Linothele spinosa* n. sp.: **A–D**, *L. spinosa* n. sp. male holotype (NHRS-KASI 000000036); **E–H**, *L. spinosa* n. sp. female paratypes (NHRS-KASI 000000037); **A**, left palp, prolateral view; **B**, left palp, retrolateral view; **C**, right tibia I and metatarsus I, ventral view; **D**, right tibia I and metatarsus I, retrolateral view; **E**, spinnerets, ventral view; **F**, maxillae, labium and sternum, ventral view; **G**, spermatheca, dorsal view; **H**, eye tubercle, dorsal view. Scale bars: 1 mm.

TYPE LOCALITY. — Iquitos, Peru.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — The male of *L. spinosa* n. sp. can be distinguished from those of other species of *Linothele* by the MP [(IML*100)/MAD = 416], being low and domed (Fig. 15C, D), as well as their proportionally long [(PL*100)/BD = 385] embolus bearing no keels (Fig. 15A, B). Females differ from those of most other species of *Linothele* by the presence of preening-combs and can further be distinguished from those of *L. macrothelifera* by their longer spermathecae stalks bearing an elongated vesicle (Fig. 15G) and their distribution.

DESCRIPTION

Male (holotype)

CL = 8.6. CT = 12. MC = 50–51. Colouration in alcohol: Prosoma, chelicerae, legs and pedipalps pale, yellow; opisthosoma (length: 12.04) with distinct pattern, mid-dorsally

consisting of quadrate spots anteriorly, which become more rectangular posteriorly, or can be interconnected, forming longitudinal lines, laterally with several spots, ventrally with longitudinal lines and spots (Fig. 17K, L); maculae absent. Clypeus narrow. Palp measurements: 15.3 (5.6, 3.1, 4.8, 1.8). Leg measurements: I: 39.8 (9.7, 5.1, 8.8, 8.6, 7.6); II: 36.9 (9.0, 4.3, 7.9, 8.5, 7.2); III: 35.1 (8.4, 3.8, 7.2, 9.7, 6.0); IV: 43.9 (10.5, 4.2, 8.9, 12.9, 7.4). Leg formula 4123. Leg tarsi pseudo-segmented. Spinnerets: PMS: 1.43; PLS: apical segment broken off. Palpal organ: [(PL*100)/BD = 385], see Figure 15A, B. Megaspine and MP: [(IML*100)/MAD = 416], see Figure 15C, D.

Female

Colouration as for male, but prosoma, chelicerae, legs, and pedipalps light brown and dorsal pattern on opisthosoma more distinct (Fig. 17M). Colouration alive (Fig. 19F): Carapace

covered with golden setae. Clypeus: narrow, see Figure 15H. Sternum, labium and maxillae: see Figure 15F. Leg formula: 4123. Scopula divided. Preening-combs present. Leg tarsi pseudo-segmented. Spinnerets: apical segment of the PLS rigid, see Figure 15E. Spermathecae: consisting of two apically elongated stalks with thin bases, bearing several short and an elongated vesicle at 1:2–1:3B, see Figure 15G.

Varibility

CL = 8.3–10.8. CT = 11–14. MC = 40–72. Palp measurements: 15.0–20.0 (5.0–6.3, 2.7–3.6, 3.7–5.2, 3.6–4.9). Leg measurements: I: 34.0–36.1 (8.9–9.6, 5.1–5.3, 8.0–8.5, 7.0–7.6, 5.0–5.1); II: 26.0–34.1 (7.0–9.1, 3.8–5.2, 5.7–7.7, 5.5–7.1, 4.0–5.0); III: 24.5–32.9 (6.2–8.5, 3.0–4.4, 5.3–6.8, 6.4–8.4, 3.6–4.8); IV: 37.9–42.1 (8.0–10.5, 4.5–9.4, 7.0–9.2, 9.1–11.6, 4.4–6.0).

REMARKS

The male holotype has been preserved immediately after the moult to adulthood which might have caused its very light colouration.

NATURAL HISTORY

Unknown.

Linothele tsachilas Dupérré & Tapia, 2015

Linothele tsachilas Dupérré & Tapia, 2015: 359, figs 37–40.

TYPE MATERIAL. — **Holotype.** Ecuador • ♀; Santo Domingo de Las Tsáchilas, Parroquia San José de Alluriquín, La Florida; 0°15'9.144"S, 79°1'49.547"W; 884 m a.s.l.; 7.XII.2014; E. Tapia leg.; QCAZ. **Paratype.** Ecuador • 1 ♀; same collecting data as for holotype; 30.X.2014; QCAZ.

TYPE LOCALITY. — La Florida, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — “Females are diagnosed by their closely positioned spermathecae [...]. From *L. longicauda*, *L. aequatorialis* and *L. cousini* by their carapace margin, coxae and trochanters with golden setae [...].” see Dupérré & Tapia (2015: 360).

DESCRIPTION (FOLLOWING Dupérré & Tapia 2015)

Male

Unknown.

Female

CL = 9.0. CT = 13. MC = 60–65. Colouration: overall reddish brown; opisthosoma “dark brown with few patches of golden setae, with a purplish tinge”, see Dupérré & Tapia (2015: fig. 37), ventral pattern absent from opisthosoma; leg femora with indistinct maculae. Sternum, labium and maxillae: see Dupérré & Tapia (2015: fig. 38). Leg formula: 4123. Scopula divided. Leg tarsi pseudo-segmented. Spermathecae: “joined at base, close together, with elongated apically tapering spermathecae, with numerous vesicles on short stalk medio-apically”, see Dupérré & Tapia (2015: fig. 39, 40).

NATURAL HISTORY

According to Dupérré & Tapia (2015) specimens of *L. tsachilas* “[...] were collected in a foothill forest at 884m elevation. This species builds webs approximately 50 × 30 cm near the ground, and the retreat is underneath or in a hole of a dead tree trunk. The two specimens collected live in sympatry with *L. zaia* and *L. quori*, but seem to prefer distinct microhabitats.”

Linothele uniformis n. sp.

(Fig. 16)

[urn:lsid:zoobank.org:act:8016A2A6-BA64-4AC3-99F1-DA6E892F7D87](https://zoobank.org/act:8016A2A6-BA64-4AC3-99F1-DA6E892F7D87)

TYPE MATERIAL. — **Holotype.** Peru • ♀; Cuzco, road up to Machu-Picchu ruins; in forest; 2100 m a.s.l.; 20.II.1965; Herbert W. Levi leg.; MCZ-75998.

ETYMOLOGY. — The specific epithet is a Latin adjective, meaning ‘uniform’ and refers to the overall homogenous colouration of the opisthosoma; the gender is feminine.

TYPE LOCALITY. — Machu-Picchu, Peru.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — The female of *Linothele uniformis* n. sp. can be distinguished from those of most other species of *Linothele* by its undivided scopula. It resembles females of *L. fallax*, but differs from them by the absence of patterns on the opisthosoma, a significantly lower number of maxillary cuspules (Fig. 16A) and its spermatheca stalks not bearing a single retrolateral lobe (Fig. 16D).

DESCRIPTION

Male

Unknown.

Female (holotype)

CL = 9.2. CT = 12. MC = 7–13. Colouration in alcohol: Carapace, chelicerae, sternum (3.9), pedipalps and legs reddish brown, maculae absent; opisthosoma (9.7) uniformly greyish. Clypeus: narrow, see Figure 16B. Sternum, labium and maxillae: see Figure 16A. Palp measurements: 15.8 (5.0, 3.3, 4.1, 3.4). Leg measurements: I: 28.6 (7.7, 3.9, 6.2, 6.0, 4.8); II: 27.2 (7.4, 3.8, 5.2, 6.0, 4.8); III: 26.2 (6.9, 3.2, 5.5, 6.3, 4.3); IV: 36.0 (8.7, 4.3, 7.6, 9.5, 5.9). Leg formula: 4123. Scopula undivided. Preening-combs absent. Leg tarsi pseudo-segmented. Spinnerets: see Figure 16C; PMS: 2.3, separated by less than length of segment (1.3); PLS: 9.5 (3.1, 2.9, 3.5), apical segments rigid; see Figure 16C. Spermatheca: consisting of two stalks, bearing a retrolateral lobe in 1:3A and a midventral vesicle, see Figure 16D.

NATURAL HISTORY

Unknown.

Linothele yanachanka Dupérré & Tapia, 2015

Linothele yanachanka Dupérré & Tapia, 2015: 353, figs 23–29.

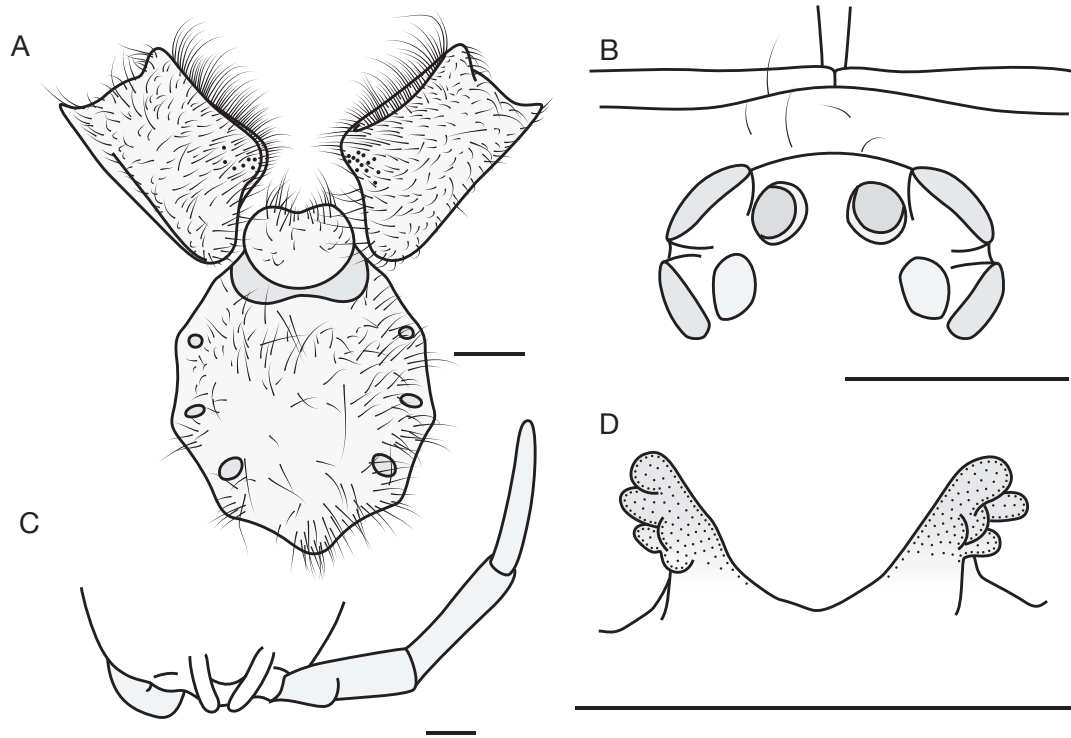


FIG. 16. — *Linothele uniformis* n. sp. female (MCZ-75998): **A**, maxillae, labium and sternum, ventral view; **B**, eye tubercle, dorsal view; **C**, spinnerets, ventral view; **D**, spermatheca, dorsal view. Scale bars: 1 mm.

TYPE MATERIAL. — **Holotype.** Ecuador • ♀; Cotopaxi Province, Parroquia San Francisco de Las Pampas, Casa César Tapia; $0^{\circ}25'26.94''\text{S}$, $78^{\circ}57'25.883''\text{W}$; 1426 m a.s.l.; 8.XII.2014; E. Tapia and C. Tapia leg.; hand collected from web; QCAZ.

Paratypes. Ecuador • 1 ♂, 1 ♀, same collecting data as for holotype; 25.XII.2014; E. Tapia, I. Tapia and C. Tapia leg.; QCAZ.

TYPE LOCALITY. — San Francisco de Las Pampas, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — “Females are diagnosed by their colour pattern [...]; from *L. gaujoni* by their golden brown abdomen, black in the latter, and from *L. quori* by their black legs with brown tarsi [...], light brown with dark bands in the latter [...]. Furthermore females are distinguished by their internal genitalia with numerous vesicles medially on short to elongated stalks [...]. Males are distinguished by their overall black coloration, from *L. gaujoni* by their black carapace without yellow setae [...]; from *L. quori* by their black and curved embolus [...], straight and light brown in the latter species [...].” see Dupérré & Tapia (2015: 354).

DESCRIPTION (FOLLOWING Dupérré & Tapia 2015)

Male

CL = 11.0. CT = 13. MC = 35–40. Colouration alive: overall dark brown to black; opisthosoma “dorsally dark brown with black median band [...] covered by short black setae and long black erected setae”, “laterally and ventrally uniformly black”, see Dupérré & Tapia (2015: fig. 24); maculae absent. Leg formula 4123. Preening-combs absent. Leg tarsi pseudo-segmented. Palpal organ: “bulb pyriform; embolus black, curved”, see Dupérré & Tapia (2015: fig. 28). Megaspine and MP: see Dupérré & Tapia (2015: fig. 29).

Female

CL = 10.0. CT = 10. MC = 35–40. Colouration alive: as for male, but opisthosoma “dorsally orange-brown with black-purplish median band and zigzag pattern laterally”, “ventrally uniformly orange-brown”, see Dupérré & Tapia (2015: fig. 23); maculae absent. Sternum, labium and maxillae: see Dupérré & Tapia (2015: fig. 25). Leg formula: 4123. Scopula divided. Leg tarsi pseudo-segmented. Spermathecae: “joined at base, elongated and tapering apically, with numerous vesicles medially on short to elongated stalks”, see Dupérré & Tapia (2015: figs 26, 27).

NATURAL HISTORY

According to Dupérré & Tapia (2015) the “holotype female was collected in a 40×30 cm web approximately 1.5m from the ground in a secondary subtropical forest. The web was attached to a palm tree (*Phytelephas macrocarpa*), the base was made of dead palm tree leaves. Other specimens were collected in palm tree from 1m up to 6m high (fig. 49), and one was collected at ground level.”

Linothele zaia Dupérré & Tapia, 2015

Linothele zaia Dupérré & Tapia, 2015: 358, figs 34–36.

TYPE MATERIAL. — **Holotype.** Ecuador • ♀; Santo Domingo de Las Tsáchilas, Parroquia San José de Alluriquín, La Florida; $0^{\circ}15'9.144''\text{S}$, $79^{\circ}1'49.547''\text{W}$; 884 m a.s.l.; 17.XII.2014; E. Tapia leg.; hand collected from web; QCAZ.

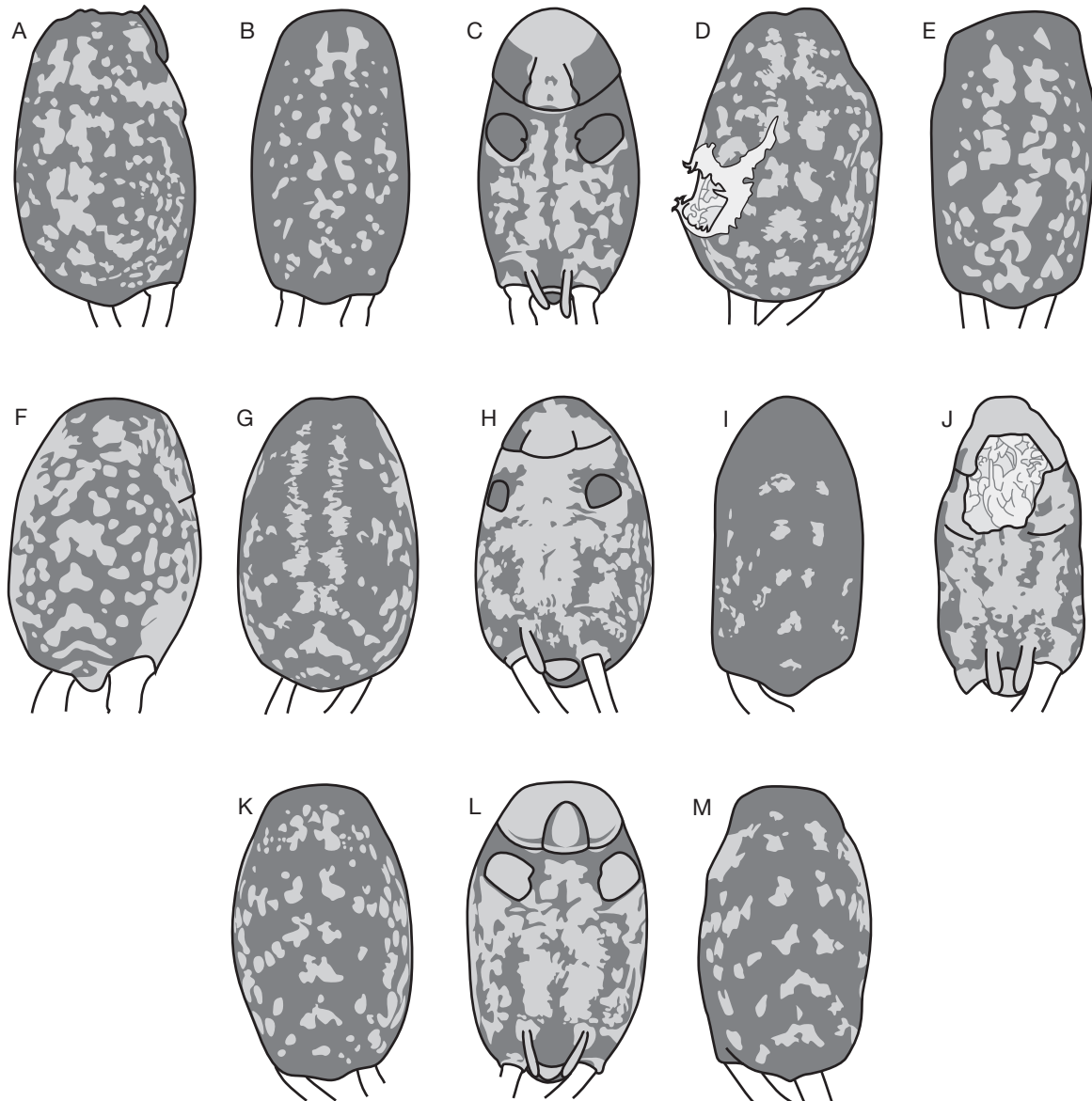


FIG. 17. — Patterns on opisthosoma in *Linothele* Karsch, 1879: **A–E**, *L. curvitaris* Karsch, 1879; **F–H**, *L. macrothelifera* Strand, 1908; **I, J**, *L. septentrionalis* n. sp.; **K–M**, *L. spinosa* n. sp.; **A**, *L. curvitaris* indet. holotype (ZMB Arach-458), dorsal view; **B**, *L. curvitaris* male (NHRS-KASI 000000032), dorsal view; **C**, ventral view; **D**, *Diplura soricina* Simon, 1889 female (MNHN (339)), dorsal view; **E**, *Diplura soricina* male (MNHN (339)), dorsal view; **F**, *L. macrothelifera* imm. male (MCZ-76020), dorsal view; **G, H**, *L. macrothelifera* undet. (MCZ-76021); **G**, dorsal view; **H**, ventral view; **I, J**, *L. septentrionalis* n. sp. female holotype (MCZ-76012); **I**, dorsal view; **J**, ventral view; **K–M**, *L. spinosa* n. sp. male holotype (NHRS-KASI 000000036); **K**, dorsal view; **L**, ventral view; **M**, *L. spinosa* n. sp. female paratype (NHRS-KASI 000000037), dorsal view. Not to scale.

TYPE LOCALITY. — La Florida, Ecuador.

DISTRIBUTION. — Only known from the type locality.

DIAGNOSIS. — “Females are diagnosed by their brown abdomen with black median band [...] and their widely separated spermathecae [...]. From *L. gaujoni* by their red-brown abdomen with black pattern [...], black with dark yellow-red pubescence with dark striae in the latter.” see Dupérré & Tapia (2015: 358).

DESCRIPTION (FOLLOWING Dupérré & Tapia 2015)

Male

Unknown.

Female

CL = 12.0. CT = 10. MC = 30–35. Colouration: overall dark brown to black; opisthosoma “dorsally red-brown with black median band”, “ventrally uniformly dark red-brown”, see Dupérré & Tapia (2015: fig. 34); maculae absent. Sternum, labium and maxillae: see Dupérré & Tapia (2015: fig. 35). Leg formula: 4123. Scopula divided. Leg tarsi pseudo-segmented. Spermatheca: “joined at base, widely separated, short and wide with few vesicles on short stalk medially”, see Dupérré & Tapia (2015: fig. 36).

NATURAL HISTORY

According to Dupérré & Tapia (2015) the “[...] holotype female was collected in a foothill forest at 884m elevation.

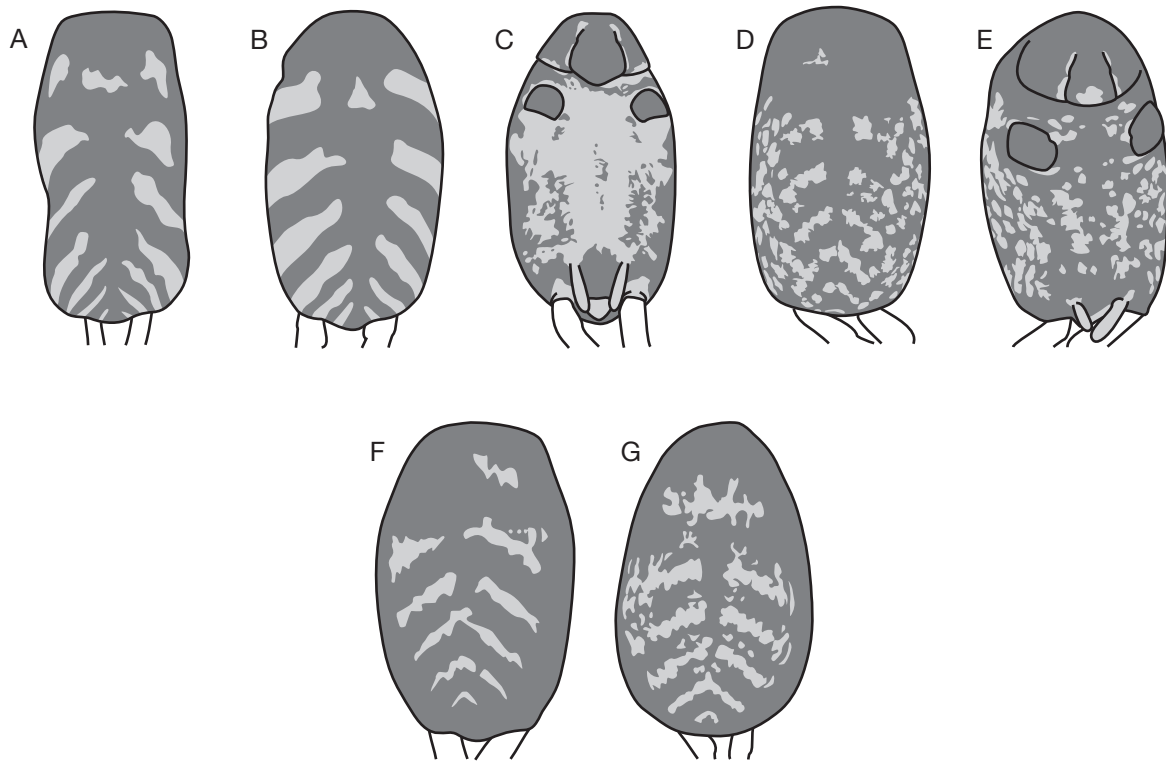


FIG. 18. — Patterns on opisthosoma in *Linothele* Karsch, 1879: **A–C**, *L. fallax* (Mello-Leitão, 1926); **D, E**, *L. gaujoni* (Simon, 1889); **F, G**, *L. jelskii* (F. O. Pickard-Cambridge, 1896); **A**, *L. fallax* male (NHRS-KASI 000000038), dorsal view; **B**, *L. fallax* female (NHRS-KASI 000000039), dorsal view; **C**, *L. fallax* undet. imm. (NHRS-JUST 000000529), ventral view; **D, E**, *L. gaujoni* undet. (MCZ-76017); **D**, dorsal view; **E**, ventral view; **F**, *L. jelskii* male syntype (BM1896.12), dorsal view; **G**, *L. jelskii* imm. male syntype (BM1896.12), dorsal view. Not to scale.

The web of approximately 60 × 40 cm was along a vertical dirt talus or landslide 6m from the ground, and the retreat was concealed in a soil crevice. The only specimen collected lives in sympatry with *L. zaia* and *L. quori*, but was found in a somewhat distinct microhabitat.”

NOMINA DUBIA

Linothele borgmeyeri (Mello-Leitão, 1924) *nomen dubium*

Diplura borgmeyeri Mello-Leitão 1924: 185; 1926: 311–312. — Bonnet 1956: 1499. — Silva-Moreira *et al.* 2010: 31 — Kury *et al.* 2018: 557.

TYPE MATERIAL. — **Syntypes**. **Brazil** • 3 ♀; Petropolis; T. Borgmeyer leg.; MNRJ 18(MLPC 849 partim) probably lost • 1 ♂; MNRJ 1592(MLPC 849 partim) lost.

REMARKS

For information on the rejection of the synonymy established by Bücherl *et al.* (1971) see remarks at *Diplura gymnognatha*.

Mello-Leitão described the species twice (Mello-Leitão 1924, 1926), once as *Diplura borgmeyeri* and later as *Diplura borgmeieri*. In both cases, Mello-Leitão considered the specific epithet a patronym of the collector, “Thomaz Borgmeyer”, but apparently misspelled the family name. Thomas Borg-

meier was a German priest and entomologist who lived at Petropolis (the type locality mentioned in both descriptions) and joined the National Museum at Rio de Janeiro in 1923, where Mello-Leitão worked at that time. The German family name suffix “-meyer” is very common, even as a standalone name and comes in various spellings: The “ey” may be spelled “ei”, “ay”, or “ai”; all pronounced the same. Despite the incorrect spelling of the collector’s family name, the description by Mello-Leitão (1926) clearly indicates the epithet to be a patronym dedicated to “Borgmeyer”. Considering this, there is clear evidence of an inadvertent error in the original publication (without recourse to any external source of information) and the epithet in the second description has to be corrected to “*borgmeyeri*” (following ICZN 32.5.1), as correctly noted by Bonnet (1956) and followed by Silva-Morreira *et al.* (2010), who considered Mello-Leitão’s (1926) description to be redundant.

Mello-Leitão (1924) states the size of the specimen was 25.0, whereas Mello-Leitão (1926) mentions a size of 18.0 (opisthosoma: 8.0. spinnerets: 7.0). Both descriptions state the number of chelical teeth to be 8; (Mello-Leitão 1924, 1926). In the first description of *D. borgmeyeri*, Mello-Leitão (1924) mentioned a dorsal chevron pattern and maculae, whereas in the second description (Mello-Leitão 1926) he mentioned the legs to be uniformly colored, but reports a dorsal pattern consisting of bright spots and the presence of a ventral pattern on the opisthosoma. Later, a key is provided

in which Mello-Leitão (1926) stated the PLS to be short. None of the descriptions mentioned the presence, or absence of maxillary cuspules.

Bücherl *et al.* (1971) apparently did not follow Bonnet (1956) and used the uncorrected spelling of “*D. borgmeieri*”. They considered *Diplura borgmeyeri* a junior synonym of *D. gymnognatha* based on the spermatheca and their close type localities. The authors clearly stated the examined spermathecae to be rudimentary, coming from a juvenile specimen. Yet, they considered it to be similar to the illustration provided by Bertkau (1880). We are confident the illustration provided by Bertkau lacks detail making it hard to compare to the spermathecae examined by Bücherl *et al.* (1971), who, unfortunately, did not illustrate it.

Mello-Leitão (1924, 1926) described only a single measured specimen in both descriptions. Contrary, Bücherl *et al.* (1971) mentioned a female holotype and two female syntypes, while Silva-Moreira *et al.* (2010) mentioned 3 female and 1 male syntypes, of which only the male syntype could be located at the museum collection at that time. Mello-Leitão is known to have added material to types after describing a species, or switch labels (Silva-Moreira *et al.* 2010). In the case of *D. borgmeyeri* only a single male from the supposed syntype series could be located, while neither descriptions by the first describer (Mello-Leitão 1924, 1926), nor the following work on this species (Bücherl *et al.* 1971) mention a male to be part of the type series. It is highly unlikely that consecutive authors failed to identify a male as a part of a syntype series. The only logical conclusion is that the male in MNRJ collection (MNRJ 1592) has not been added by Mello-Leitão (†1948) himself. Consequently, this male was not part of the original type series and its name-bearing status cannot be confirmed.

As all types are probably lost and descriptions on the species are contradictory, *Linothele borgmeyeri* is herein considered a *nomen dubium*.

Genus *Diplura* C. L. Koch, 1850

Diplura gymnognatha Bertkau, 1880
comb. rev. *nomen dubium*

Diplura gymnognatha Bertkau, 1880: 21, pl. 1, fig. 5. comb. rev.

Linothele gymnognatha – Raven 1985: 74.

TYPE MATERIAL. — **Holotype**. Brazil • ♀; Pedra do Açú; E. Van Beneden leg; not located, presumably lost.

REMARKS

The original description (Bertkau 1880) mentioned 11 cheliceral teeth and 20 maxillary cuspules. The description is confusing with regards to the legs: Bertkau (1880) mentioned the presence of ventral spines on tarsi, pseudo-segmented metatarsi, presence of a dense scopula on anterior tarsi and metatarsi, but divided scopula on posterior metatarsi. It

seems like the terms metatarsi and tarsi were mixed in the original description. Bertkau further mentioned short spinnerets. The female genitalia are illustrated (Bertkau 1880: Pl. 1, fig. 5) and resemble the shape observed in *Linothele gaujoni*, with long, tube-shaped stalks, as also reported for *Trechona diamantina* Guadanucci, Fonseca-Ferreira, Baptista & Pedroso, 2016. The spermathecae of *L. gaujoni* and *T. diamantina* differ from the latter by the lack of lateral vesicles. It might have been hard to identify such details for Bertkau, but the type locality is also noticeably disjunct from the one of *L. gaujoni*.

According to Pedroso *et al.* (2008), who refer to Kury (2003), most of the arachnids collected during the Belgian mission to Brazil and described by Bertkau (1880) were deposited at IRSNB. Unfortunately, the holotype could not be located in IRSNB collection (L. Baert, pers. comm.) and might have been lost during WWII.

Bücherl *et al.* (1971) synonymized *D. borgmeyeri* with *D. gymnognatha* and provided variation data for *D. borgmeyeri* (CT = 12–14). They further added measurements for the opisthosoma (10.5) and a PLS: 8.9 (2.5, 2.6, 3.8). It becomes clear that these measurements do not match the ones provided for *D. gymnognatha* by Bertkau (1880), who reported the spinnerets (6.0) to be a lot shorter than the opisthosoma (10.0). Bücherl *et al.* (1971) stated they examined the epigastrium of 3 juvenile females, of which two lacked a spermatheca (= imm. male) and the only spermatheca found was rudimentary. Yet, they considered it to equal the illustration of the spermatheca of *D. gymnognatha* provided by Bertkau (1880). Contradictory to Bertkau (1880), who mentioned the presence of 20 maxillary cuspules, Bücherl *et al.* (1971) noted the absence of maxillary cuspules in *D. borgmeyeri*. Considering the possible lapsus in the first description of *D. gymnognatha*, the scopula on anterior tarsi and metatarsi was dense and possibly undivided. The fact that Bücherl *et al.* (1971) did not transfer *D. borgmeyeri* to *Uruchus*, as they did with *D. fallax*, indicates the scopula on all tarsi of *D. borgmeyeri* was divided.

As the holotype of *D. gymnognatha* is presumably lost since WWII, Bücherl *et al.* certainly did not examine it and the specimens they examined were not conspecific. As a result, the synonymy established by Bücherl *et al.* (1971) is herein rejected.

Bertkau (1880) neither mentioned the presence, or absence of a maxillary lyra for *D. gymnognatha*. In the same work, Bertkau (1880) proposed *Thalerothele* for *T. fasciata* Bertkau, 1880 without mentioning a lyra. *Thalerothele* was found to bear a lyra by Simon (1903), clearly indicating Bertkau did not check for the presence of such a structure. Considering the possible lapsus, the description might match either *Linothele*, or *Trechona*.

As the absence of a lyra cannot be confirmed by original designation and the type is lost, the species cannot be placed in any diplurine genus with certainty. As a result, *Linothele gymnognatha* is transferred back to *Diplura* due to original designation and *Diplura gymnognatha* comb. rev. is considered a *nomen dubium*.



FIG. 19. — Specimens of *Linothele* Karsch, 1879 in life: **A, B**, *L. curvitaris* Karsch, 1879; **C-E**, *L. sericata* (Karsch, 1879); **F**, *L. spinosa* n. sp.; **G**, *L. gaujoni* (Simon, 1889); **H-J**, *L. fallax* (Mello-Leitão, 1926); **A**, adult female; **B**, adult male; **C**, adult female; **D**, adult male (both distal articles of PLS are broken); **E**, undet. juvenile; **F**, adult female; **G**, adult female; **H**, adult female; **I**, adult male; **J**, juvenile female. Not to scale.

Family NEMESIIDAE Simon, 1889
Genus *Brachythele* Ausserer, 1871

Brachythele keithi Chamberlin, 1916
comb. rev. *nomen dubium*

Brachythele keithi Chamberlin, 1916: 204, pl. 7, fig. 11. comb. rev.

Linothele keithi – Goloboff 1995: 95.

TYPE MATERIAL. — **Holotype**. Peru • indet.; Huadquiña; 5000 ft a.s.l.; 1911; H. W. Foote leg.; MCZ 15491(RVC 147) examined.

REMARKS

Chamberlin (1916) proposed *B. keithi* based on a single specimen. He noted the labium to be much wider than long for *B. keithi* and *Diplura monticolens*. In the latter, we observed a more subquadrate labium. According to Chamberlin (1916) legs II and IV are missing, but tarsal scopulae are “dense, extending to base; none divided by a setose line or band.” Goloboff (1995) mentioned the holotype to be in extremely poor condition (“reduced to a series of loose fragments”) and tentatively transferred the species to *Linothele*, due to the “loose fragments of spinnerets accompanying the specimen, which appear to have corresponded to long spin-

nerets.” Chamberlin (1916) provided measurements for the cephalothorax and the spinnerets, of which he reported “the three joints subequal in length”. As the “cephalothorax” usually includes the chelicerae and the opisthosoma may vary in size, we have to agree the spinnerets seem to have been elongated. Chamberlin (1916) explicitly mentioned “conspicuously curved” tarsi for *Diplura monticolens*, but not so for *Brachythele keithi*. Goloboff (1995) further mentioned only 10 maxillary cuspules and “the epigastrium dissected and at least some parts of it placed in a separate microvial, but with no detectable spermathecae”. The largest intact part we were able to find in the vial of the holotype was a single maxilla with all cuspules broken off and no lyra visible. As none of the spinnerets, or leg tarsi was still intact, the transfer to *Linothele* by Goloboff (1995) cannot be confirmed with certainty. Despite its incorrect placement in *Brachythele*, the type is too fragmented to allow for a certain placement. As a result, *Linothele keithi* is transferred back to *Brachythele* due to original designation and *Brachythele keithi* comb. rev. is considered a *nomen dubium*.

MISPLACED SPECIES

Family ISCHNOTHELIDAE

F. O. Pickard-Cambridge, 1897

Genus *Ischnothele* Ausserer, 1875

Ischnothele caudata Ausserer, 1875

Ischnothele caudata Ausserer, 1875: 163. — Simon 1891: 328; 1892: 187. — Pocock 1895: 224. — F. O. Pickard-Cambridge 1896: 762; 1897: 37. — Raven 1985: 77. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Entomothele pusilla Simon, 1889b: 190; 1892: 188. — F. O. Pickard-Cambridge 1896: 764. — Vellard 1945: 199. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Thelechoris zebrina Simon, 1891: 329; 1892: 187. — F. O. Pickard-Cambridge 1896: 764; 1897: 37. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Ischnothele guianensis (or *guyanensis*) (misidentification): Simon, 1891b: 551. — F. O. Pickard-Cambridge 1896: 762; 1897: 37 (in part). — Banks 1909: 195; 1929: 54. — Mello-Leitao 1923: 85 (in part). — Petrunkevitch 1925: 65. — Bücherl 1967: 117 (in part). — Platnick & Shadab 1978: 5. — Vollrath 1978: 351. — Nentwig & Wissel 1986: 595. — Strohmenger & Nentwig 1987: 10. — Jantschke & Nentwig 1987: 315. — Coyle & Ketner 1990: 103 (in part). — Coyle 1995: 57, f. 14-19, 34, 111-137.

Thelechoris funesta Fischel, 1927: 61, figs 1-3. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Thelechoris obtusa Fischel, 1927: 63, figs 4-6. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Diplura dubia Caporiacco, 1947: 21; 1948: 622. n. syn.

Ischnothele sexpunctata Bücherl, Costa & Lucas, 1971: 123, figs 17, 18. — Mello-Leitao 1941b: 237. — Coyle 1995: 57, f. 14-19, 34, 111-137.

Linothele dubia — Raven 1985: 74.

TYPE MATERIAL. — *Ischnothele caudata*: **Holotype**. Mexico • ♀; Yucatan; NHM.

Thelechoris zebrina: **Holotype**. Nicaragua • imm. ♂; El Polvon; MNHN.

Thelechoris funesta: **Holotype**. Venezuela • ♂; Maracay or Caracas; probably lost.

Thelechoris obtusa: **Holotype**. Venezuela • ♂; Maracay or Caracas; probably lost.

Entomothele pusilla: **Lectotypes** (as designated by Coyle 1995). Venezuela • 1 ♂ and 1 ♀; Orinoco; MNHN

Diplura dubia: **Syntypes**. Guyana • 1 undet.; Port Diamond; 1931; Beccari leg.; MZUF [160] examined • 1 undet.; Campo IV, Demerara, Canister Falls; 1936; Romiti leg.; MZUF [161] examined.

Ischnothele sexpunctata: **Syntypes**. Colombia • 3 ♀; Bogota; MNRJ no. 1035 lost.

REMARKS

The MZUF catalog (Berdondini & Whitman 2001) mentions two syntypes of *D. dubia*, whereas Caporiacco (1947) mentions only a single female. Either labels have been swapped, or the catalog information is incorrect. The species was redescribed the following year (Caporiacco 1948) and the redescription mentions cuspules on the inner anterior maxillary corner. One specimen of the syntype collection lacks maxillary cuspules, securely indicating the specimen bearing maxillary cuspules to be Caporiacco's (1948) specimen. The specimen shows a combination of characters that cannot be found in the Diplurinae, such as a single row of teeth on paired tarsal claws, flexible apical segment of the PLS, presence of two rows of conical teeth ventrally on the chelicerae, rigid leg tarsi and the absence of scopuliform setae on anterior leg tarsi. This character combination indicates a misidentified *Ischnothele* Ausserer, 1875, whereas a single row of teeth on paired tarsal claws, alongside the absence of maxillary cuspules found in the other syntype might indicate a misidentified Masteriinae or Euagridae. Caporiacco's (1948) specimen can be found conspecific only with *Ischnothele caudata* Ausserer, 1875 per Coyle (1995). We thereby consider *Ischnothele caudata* Ausserer, 1875 a senior synonym of *Diplura dubia* Caporiacco, 1947 n. syn.

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KEY TO SPECIES OF *LINOTHELE* KARSCH, 1879 (FEMALES)

1. Teeth on paired claws of posterior leg tarsi reduced and appendages elongated, see Goloboff (1994); Cuevas de Jumandi, Napo, Ecuador *L. cavicola* Goloboff, 1994
 — Teeth on paired claws not reduced and appendages not elongated; not from Cuevas de Jumandi 2
2. Scopula divided (Fig. 5A, B) 3
 — Scopula undivided (Fig. 5C, D) 18
3. Apical segment of the PLS flexible (Figs 6E; 12A) 4
 — Apical segment of the PLS rigid (Figs 7E; 15E; 16C) 6
4. Maxillary cuspules absent (Fig. 12B) *L. paulistana* (Mello-Leitão, 1924)
 — Maxillary cuspules present (Fig. 6G) 5
5. Spermatheca with long, v-shaped stalks bearing several distal vesicles; see Fig. 6H, I
 *L. curvitaris* Karsch, 1879
 — Spermatheca not v-shaped and without lateral lobes, or vesicles; see Paz & Raven (1990: fig. 11)
 *L. sericata* (Karsch, 1879)
6. Patterns absent from opisthosoma, see Dupérré & Tapia (2015: fig. 30); spermatheca with elongated and apically tapering stalks, bearing few elongated vesicles medially; see Fig. 10B, C, Dupérré & Tapia (2015: figs 32-33) 7
 — Opisthosoma with dorsal pattern 8
7. Carapace covered with yellowish setae *L. pukachumpi* Dupérré & Tapia, 2015
 — Carapace without yellowish setae *L. longicauda* (Ausserer, 1871)
8. Opisthosoma with dorsal pattern consisting only of chevrons, see Schiapelli & Gerschman (1945: pl. 4) 9
 — Opisthosoma with mid-dorsal pattern consisting of longitudinal lines, or spots interconnected to lines, see Fig. 17F, G, I, K, M and Dupérré & Tapia (2015: figs 23; 34; 37; 41) 11
9. Ventral pattern present on opisthosoma; Minas Gerais, Brazil *L. cristata* (Mello-Leitão, 1945)
 — Ventral pattern absent from opisthosoma; Venezuela, or Peru 10
10. Leg tarsi pseudo-segmented; spermatheca stalks low with few vesicles medially, see Figure 14A; Venezuela
 *L. sexfasciata* (Schiapelli & Gerschman, 1945)
 — Leg tarsi with only few medial cracks; Peru *L. monticolens* (Chamberlin, 1916)
11. Preening-combs present (Fig. 11A, B) 12
 — Preening-combs absent (Fig. 10A) 13
12. Spermatheca with short stalks bearing only short vesicles, see Figure 11C, D; Andes
 *L. macrothelifera* Strand, 1908
 — Spermatheca with long stalks, bearing a long vesicle, see Figure 15G; eastern of the Andes *L. spinosa* n. sp.
13. Appendages with distinct maculae (Fig. 13B) 14
 — Appendages more or less unicolour 16
14. Maxillary cuspules absent and sternum with distinct pattern (Fig. 13A); Bahamas *L. septentrionalis* n. sp.
 — Maxillary cuspules present; sternum unicolour; Colombia, or Ecuador 15
15. Leg tarsi flexible; ventral opisthosoma without distinct pattern; Norte de Santander, Colombia
 *L. melloleitaoi* (Mello-Leitão, 1941)
 — Leg tarsi not flexible and weakly pseudosegmented; ventral opisthosoma with distinct pattern, see Dupérré & Tapia (2015: fig. 47); Santo Domingo de Las Tsáchilas, Ecuador *L. quori* Dupérré & Tapia, 2015
16. Spermathecae stalks closely positioned, see Dupérré & Tapia (2015: figs 39-40)
 *L. tsachilas* Dupérré & Tapia, 2015
 — Spermathecae stalks widely separated, see Dupérré & Tapia (2015: figs 26-27, 36) 17
17. Opisthosoma brown with black median band, see Dupérré & Tapia (2015: fig. 34); spermathecae see Dupérré & Tapia (2015: fig. 36) *L. zaia* Dupérré & Tapia, 2015
 — Opisthosoma with mid-dorsal golden band, see Dupérré & Tapia (2015: figs 23); spermathecae see Dupérré & Tapia (2015: figs 26-27) *L. yanachanka* Dupérré & Tapia, 2015

18. Clypeus wide (Fig. 8D); dorsal pattern on opisthosoma consisting of several dots forming incomplete chevrons and ventral pattern on opisthosoma present and distinct (Figs 18D, E; 19G); spermatheca with long, tube-shaped stalks bearing few vesicles distally, see Fig. 8B, C; Paramó regions of Ecuador *L. gaujoni* (Simon, 1889)
— Clypeus narrow, see Figure 7H; dorsal pattern on opisthosoma consisting of complete chevrons (Fig. 18B), or absent; ventral pattern on opisthosoma absent, or indistinct (Fig. 18C); spermatheca stalks shorter and without vesicles only distally; Peru, or Brazil 19
19. More than 30 maxillary cuspules, see Figure 7F; dorsal pattern on opisthosoma consisting of complete chevrons (Figs 16A, B; 17J); spermatheca with single retrolateral lobe, see Fig. 7G *L. fallax* (Mello-Leitão, 1926)
— Less than 15 maxillary cuspules, see Figure 16A; patterns absent from opisthosoma; spermatheca with several vesicles and lobe, see Figure 16D *L. uniformis* n. sp.

MALES (THE MALES OF MOST SPECIES OF *LINOTHELE* KARSCH, 1879 REMAIN UNKNOWN)

1. Specimen overall black; embolus curved, without keel; see Dupérré & Tapia (2015: fig. 28)
L. yanachanka Dupérré & Tapia, 2015
— Colouration different (e.g. Fig. 17B, I); embolus not curved (Figs 6A, B; 7A, B; 16A, B), or with keel; see Paz & Raven (1990: fig. 8) 2
2. Appendages with distinct maculae *L. quori* Dupérré & Tapia, 2015
— Appendages more or less unicolour 3
3. Apical segments of the PLS flexible 4
— Apical segments of the PLS rigid 5
4. Embolus with distinct keel; see Paz & Raven (1990: fig. 8) *L. sericata* (Karsch, 1879)
— Embolus without distinct keel (Fig. 6A, B) *L. curvitaris* Karsch, 1879
5. Dorsal pattern on opisthosoma consisting only of complete chevrons 6
— Dorsal pattern on opisthosoma with mid-dorsal dots connecting to lines *L. spinosa* n. sp.
6. Leg formula 1423; megaspine curved; MP [(IML*100)/MAD = 442], domed at apex (Fig. 9C, D)
L. jelskii (F. O. Pickard-Cambridge, 1896)
— Leg formula 4123; megaspine almost straight; MP [(IML*100)/MAD = 483], v-shaped at apex (Fig. 7C, D)
L. fallax (Mello-Leitão, 1926)

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