

## Five new species of the millipede family Trichopolydesmidae from Peru (Diplopoda: Polydesmida)

### Пять новых видов многоножек-диплопод семейства Trichopolydesmidae из Перу (Diplopoda: Polydesmida)

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КЛЮЧЕВЫЕ СЛОВА: таксономия, иконография, новая синонимия, новая комбинация, Анды.

ABSTRACT. The following five new Trichopolydesmidae millipedes are described from the Andes of Peru: *Moojenodesmus simplex* sp.n., *Cryptogonodesmus sacciformis* sp.n., *C. unciger* sp.n., *Phaneromerium eskovi* sp.n., and *P. carpish* sp.n. The scope and diagnosis of the genus *Cryptogonodesmus* Silvestri, 1898 are revised viz-à-viz the apparently most similar *Brachycerodesmus* Carl, 1914, with *C. latior* (Golovatch, 1994) proposed as a comb.n. ex *Brachycerodesmus*. The monobasic genus *Phylacomerium* Verhoeff, 1941 is formally synonymized with *Brachycerodesmus*, syn.n., this also implying *Brachycerodesmus albus* (Verhoeff, 1941), comb.n. ex *Phylacomerium*.

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РЕЗЮМЕ. Из Анд Перу описаны следующие пять новых видов многоножек-трихополидесмид: *Moojenodesmus simplex* sp.n., *Cryptogonodesmus sacciformis* sp.n., *C. unciger* sp.n., *Phaneromerium eskovi* sp.n. и *P. carpish* sp.n. Ревизованы объем и диагноз рода *Cryptogonodesmus* Silvestri, 1898 по отношению к, вероятно, самому схожему роду *Brachycerodesmus* Carl, 1914, а вид *C. latior* (Golovatch, 1994) включен в качестве comb.n. ex *Brachycerodesmus*. Монотипический род *Phylacomerium* Verhoeff, 1941 формально сведен в синонимы к роду *Brachycerodesmus* sup.n., что также влечет за собой *Brachycerodesmus albus* (Verhoeff, 1941), comb.n. ex *Phylacomerium*.

#### Introduction

Among the small to very small polydesmoid millipedes (2–16 mm long), or so-called micropolydesmids, the family Trichopolydesmidae has been considered within either the superfamily Trichopolydesmoidea [Golovatch, 2013; Enghoff *et al.*, 2015] or the superfamily Polydesmoidea [Shear, Reddell, 2017]. Depending on approach, Trichopolydesmidae contain ca 100 genera

and 220+ species, mainly in the Northern Hemisphere, both temperate and, especially, tropical. They are only marginally represented in Java, Indonesia and Wallacea in the southeast, being totally absent from New Zealand, Australia, the southern half of Africa, and Madagascar [Enghoff *et al.*, 2015]. According to Shear & Reddell [2017], however, true Trichopolydesmidae are also absent from the Nearctic which is populated instead only by members of the related families Macrosterodesmidae and Polydesmidae.

The Trichopolydesmidae in the broad sense can be characterized by the gonopod aperture being large, transversely oval, with exposed to deeply sunken gonocoxae. The latter are subglobose, usually with normal, tube-shaped cannulae, from small to rather large, while the telopodites from strongly exposed to concealed inside a considerable central gonocoel; prefemoral portion, or prefemorite, tends to be orientated transversely to the main body axis, only occasionally somewhat to clearly shortened and thus resembling the condition observed in Polydesmoidea; acropodite tri-, bi- or uniramous, usually directed cephalad or cephalomesad; solenomere mostly evident, simple, only seldom a short tooth, more often long, distal in location, either stout or slender/flagelliform. Normally neither an accessory seminal chamber nor a hairy pulvillus are observed, and only exceptionally can a primordial accessory seminal chamber be traced [Golovatch, 2013].

A general trend to complication is observed in the evolution of the trichopolydesmid gonopodal structure, ranging from relatively small gonocoxae that form a shallow central cavity (gonocoel) and leave the telopodites strongly exposed, through a series of intermediate conditions, to the strongly hypertrophied gonocoxae that conceal/protect the entire or almost entire telopodites inside a deep to very deep gonocoel [Golovatch, 1992, 1994, 2013; Golovatch *et al.*, 2022].

Trichopolydesmidae are quite common, diverse and widespread in the Neotropical Region [Golovatch, 1992, 1994, 1996; Tabacaru, 1996; Hoffman, 2000]. “About 55



Figs 1–3. *Moojenodesmus simplex* sp.n., ♂ holotype, habitus, dorsal, lateral and ventral views, respectively. Photographs by K.V. Makarov, taken not to scale.

Рис. 1–3. *Moojenodesmus simplex* sp.n., голотип ♂, общий вид, соответственно сверху, сбоку и снизу. Фотографии К.В. Макарова, сняты без масштаба.

very nominal genera, most of them monobasic”, are known from Central America, including Panama and the Caribbean [Hoffman, 2000: 442]. The trichopolydesmid fauna of South America south of Panama is presently known to be composed of 51 species from nine or ten accepted genera [Golovatch, 1992, 1994, 1996; Tabacaru, 1996; Golovatch, Wytwer, 2004; Golovatch *et al.*, 2022]. Historically, the best prospected faunule concerns the environs of Manaus, Amazonia [Hoffman *et al.*, 2002], with nine South American genera of Trichopolydesmidae properly diagnosed and keyed [Golovatch, 1994].

Most trichopolydesmid species and genera are epigean,

but a few from Europe or the Himalaya, as well as quite a few from Central America, are presumed troglomorphs showing evident troglomorphic traits such as an unpigmented and fragile body, clearly elongated extremities and body outgrowths, sometimes coupled with a relatively large size (the so-called “cave gigantism”) (e.g., Golovatch [2013]). *Phaneromerium cavernicolum* Golovatch et Wytwer, 2004 and *P. troglopterygotum* Golovatch et Gallo, 2022, each from a single cave in Bahia, Brazil, are presently the only clearly troglomorphic trichopolydesmids recorded from entire South America, both showing a pallid body with unusually broad paraterga and long

tergal setae, antennae, and legs [Golovatch, Wytwer, 2004; Golovatch *et al.*, 2022].

The present paper puts on record another five new Neotropical trichopolydesmids, all epigeal and all from the Andes of Peru.

## Material and methods

All samples underlying this contribution were handed to me for treatment by Kirill Y. Eskov (Moscow), a renowned arachnologist, palaeontologist and biogeographer. All material is currently deposited in the Zoological Museum, Moscow State University (ZMUM), Russia, incorporated into the ZMUM collection due to the kind efforts of Arkady A. Schileyko, the Keeper of Myriapoda.

The pictures were taken with a Canon EOS 5D digital camera and stacked using Zerene Stacker software. Final image processing was performed with Adobe Photoshop CC.

## Taxonomy

### Genus *Moojenodesmus* Schubart, 1945

Type species: *Moojenodesmus pygmaeus* Schubart, 1945, from Brazil, by original designation.

COMPOSITION. In addition to *Moojenodesmus pygmaeus*, the following species are included in this genus: *M. angulifer* (Peters, 1864) sensu Carl, 1914, from Colombia, *M. armatus* (Kraus, 1959) and *M. polydesmoides* (Kraus, 1960), both from Peru, *M. arenicola* Golovatch, 2001, *M. bethaniae* Golovatch, 1992, *M. irmgardae* Golovatch, 1992, *M. susannae* Golovatch, 1992 and *M. wellingtoni* Golovatch, 1994, all from the environs of Manaus, Brazil, *M. schubarti* Golovatch et Gallo in Golovatch *et al.*, 2022, a troglobiont from Bahia state, Brazil, as well as *M. pumilus* Schubart, 1944, from several other states of Brazil (Rio de Janeiro, São Paulo, Amazônia). The identity of *M. pygmaeus* vs *M. pumilus* is questioned [Golovatch *et al.*, 2022]. Because a key exists only to most species occurring near Manaus [Golovatch, 1994], all other relevant descriptions must be consulted for morphological comparisons [Carl, 1914; Schubart, 1944, 1945; Kraus, 1959, 1960; Golovatch, 1992, 1994, 2001; Golovatch *et al.*, 2022].

DIAGNOSIS. One of the most advanced genera of Trichopolydesmidae with a particularly deeply excavate and strongly enlarged, often transverse gonopodal coxites that form together a very prominent gonocoel cavity which conceals and protects usually rather complex, subtransverse and medially swollen telopodites, uni- to tripartite (including a more or less distinct, mesal, solenomere branch), held parallel to each other [Golovatch 1992, 1994, 2001]. This condition is deemed to represent one of the most advanced in the gonopodal evolution of Neotropical Trichopolydesmidae compared to the developments observed in most of the remaining eight genera that occur in the region [Golovatch, 1992, 1994, 2001; Golovatch, Wytwer 2004; Golovatch *et al.*, 2022].

#### *Moojenodesmus simplex* sp.n.

Figs 1–4.

HOLOTYPE ♂ (ZMUM), Peru, Junin Region, Satipo, S 11°15'15", W 038°17", fruit orchard, under wooden planks and stones, 21.IX.2017, K.Yu. Eskov leg.

NAME. To emphasize the unusually simple gonopods.

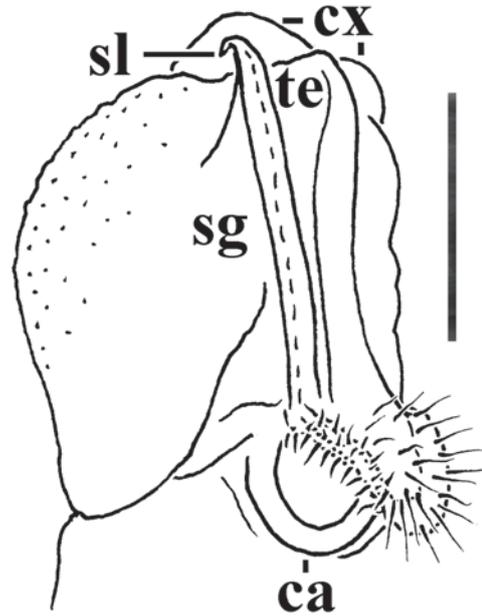


Fig. 4. *Moojenodesmus simplex* sp.n., ♂ holotype, right gonopod, caudal view. Abbreviations: **ca** — cannuia; **cx** — coxite; **sg** — seminal groove; **sl** — solenomere; **te** — telopodite. Scale bar: 0.2 mm.

Рис. 4. *Moojenodesmus simplex* sp.n., голотип ♂, правый гонопод, сзади. Обозначения: **ca** — канюля; **cx** — коксит; **sg** — семенной канал; **sl** — соленомер; **te** — телоподит. Масштаб: 0,2 мм.

DIAGNOSIS. Differs from all 10 or 11 presently recognized congeners by the unusually simple gonopods (Fig. 4), which are basically sac-shaped, squarish and totally devoid of considerable outgrowths, and showing subequally high coxite (**cx**) and telopodite (**te**), the latter with only a rudimentary solenomere (**sl**) that terminates a straight, fully mesal seminal groove (**sg**).

DESCRIPTION. Length ca 10.5 mm, width of midbody pro- and metazonae 0.45 and 0.65 mm, respectively (♂). Colouration in alcohol uniformly light brown with lighter grey-brown paraterga and legs (Figs 1–3). Body with 20 segments. Tegument moderately shining, texture very delicately shagreened. Head unmodified, clypeolabral region very finely and densely pilose, vertex and occiput bare, genae squarish. Antennae medium-sized, clearly clavate due to highest antennomere 6 (height measured from the lower to the higher edge) (Figs 1–3), *in situ* reaching past ring 2 dorsally (♂).

In width, collum  $\ll$  head  $<$  ring 2 = 3  $<$  4  $<$  5 = 15, thereafter body gradually tapering towards telson (Fig. 1). Paraterga strongly developed, set high (at about upper  $\frac{1}{4}$  midbody height), starting with collum, mostly subhorizontal, leaving dorsum largely slightly convex. Caudolateral corner of paraterga spiniform, postcollum ones extending increasingly past rear tergal margin, especially clearly so in rings 17 and 18. All poreless segments with two, all pore-bearing ones with three, minute, barely visible, setigerous incisions at lateral margin. Front margins of metaterga very narrowly bordered and forming distinct shoulders. Pore formula normal, ozopores evident pits, fully dorsal, located behind posteriormost marginal indentation at about caudal  $\frac{1}{4}$  poriferous metaterga. Metatergal sculpture typical, poorly-developed, obliterate, with three transverse rows of typical (= polydesmid), setigerous, polygonal bosses (Figs 1–3). Tergal setae very short, slightly longer only on collum, simple, usually sharpened at tip, often obliterate. Stricture between pro- and metazona wide, shallow and nearly smooth. Limbus very thin and microdenticulate. Pleurosternal carinae



Figs 5–7. *Cryptogonodesmus sacciformis* sp.n., ♂ paratype, habitus, dorsal, lateral and ventral views, respectively. Photographs by K.V. Makarov, taken not to scale.

Рис. 5–7. *Cryptogonodesmus sacciformis* sp.n., паратип ♂, общий вид, соответственно сверху, сбоку и снизу. Фотографии К.В. Макарова, сняты без масштаба.

absent. Epiproct rather short, conical, pre-apical lateral papillae very small (Figs 1, 3). Hypoproct semi-circular; caudal, paramedian, setigerous papillae very distinct and well-separated cones (Fig. 3). Sterna without modifications, setose. Legs (♂) generally rather long and slender (Figs 1–3), ca 1.7–1.8 times as long as midbody height, very densely setose, almost all setae being simple; prefemora slender, devoid of lateral bulges (Fig. 3). In length, tarsus = femur > prefemur > postfemur = tibia > coxa (Fig. 3).

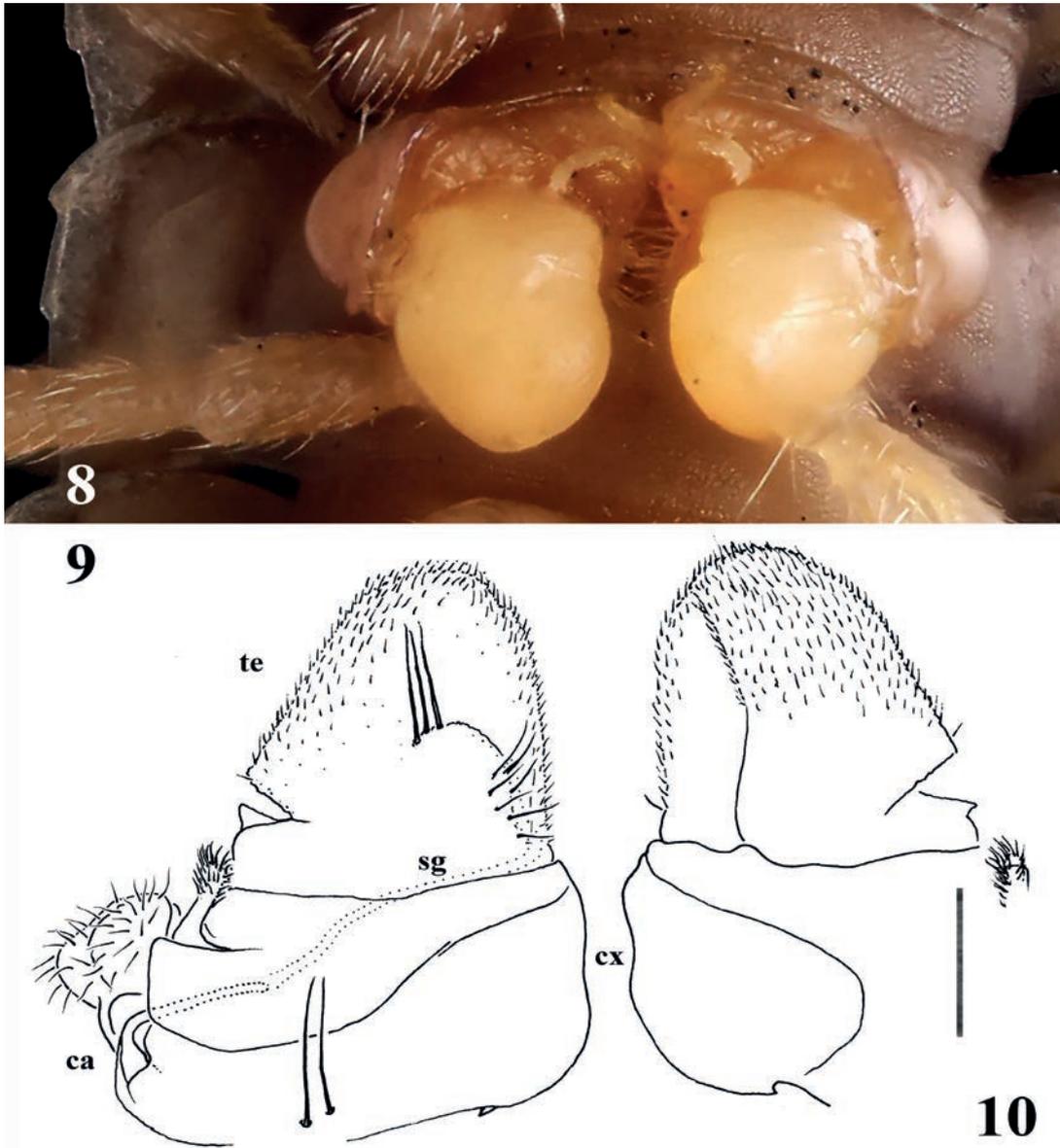
Gonopods (Fig. 4) with large, subquadrate and transverse coxites (cx) strongly fused medially at base and carrying a few long setae ventrally; a long, simple and unciform cannula (ca) as usual. Telopodite (te) only slightly stouter than cx, also subquadrate, prefemorite (= densely setose part) much shorter than both cx and te; seminal groove (sg) running over most of te extent on mesal side alone, straight, terminating on a very small solenomere (sl).

### Genus *Cryptogonodesmus* Silvestri. 1898

Type species: *Cryptogonodesmus clavidives* Silvestri, 1898, from La Moca, southeast of Carácas, Miranda state, Venezuela [Silvestri, 1898], non *Cryptogonodesmus* sensu Carl [1914], revised by Golovatch [1994].

COMPOSITION. According to Golovatch [1994], the genus is monobasic, but presently it is to be supplemented by further three congeners: *C. latior* (Golovatch, 1994), **comb.n.** ex *Brachycerodesmus*, *C. sacciformis* sp.n. and *C. unciger* sp.n.

Indeed, because a gonopodal conformation similar to that of *Cryptogonodesmus* is also observed in *Brachycerodesmus* Carl, 1914, both these genera had been synonymized [Golovatch, 1992] until Golovatch [1994] revalidated *Brachycerodesmus* on account of a somewhat less strongly developed and more deeply sunken gonotelopodite relative to the coxite. In the light



Figs 8–10. *Cryptogonodesmus sacciformis* sp.n., ♂ paratype. 8 — both gonopods *in situ*, ventral view; 9, 10 — right gonopod, caudal and oral views, respectively. Abbreviations: **ca** — cannula; **cx** — coxite; **sg** — seminal groove; **te** — telopodite. Photograph by K.V. Makarov (8), taken not to scale; scale bar: 0.2 mm (9, 10).

Рис. 8–10. *Cryptogonodesmus sacciformis* sp.n., паратип ♂. 8 — оба гонопода на месте, снизу; 9, 10 — правый гонопод, соответственно сзади и спереди. Обозначения: **ca** — канюля; **cx** — коксит; **sg** — семенной канал; **te** — телоподит. Фотография К.В. Макарова (8), снята без масштаба; масштаб: 0,2 мм (9, 10).

of certain new species reported here from Peru, this distinction, however, needs revision.

*Brachycerodesmus* has hitherto been considered as encompassing the following species: *B. petersi* Carl, 1914 (the type species) and *B. fuhrmanni* (Carl, 1914), both from Colombia, *B. peruvianus* (Kraus, 1954), *B. oxapampaensis* Kraus, 1960 and *B. tarmaensis* Kraus, 1959, all from Peru, and *B. latior* Golovatch, 1994, from Central Amazonia of Brazil [Golovatch, 1994]. One more species, *B. albus* (Verhoeff, 1941), is to be added as well (see below).

Whereas all above congeners except *B. latior* show very considerably elaborate gonopodal telopodites [Carl, 1914; Verhoeff, 1941; Kraus, 1954, 1959, 1960], as opposed to quite

simple, voluminous and sacciform ones in *B. latior* and *Cryptogonodesmus clavidives* [Golovatch, 1994], also given two new *Cryptogonodesmus* species put on record below, the generic diagnosis of *Cryptogonodesmus* seems best to be amended as follows.

**DIAGNOSIS.** This genus can be characterized by a hypertrophied, simple, more or less sac-shaped and strongly exposed gonopodal telopodite relative to a moderately to strongly developed, invariably simple and poorly excavate gonocoxite [Golovatch, 1994]; a parabasal to distal solenomere located fully on mesal face, at most being short, rudimentary or missing.

Sac-shaped structures are occasionally observed in the gonopodal telopodites of some *Brachycerodesmus* spp. as well,



Figs 11–13. *Cryptogonodesmus unciger* sp.n., ♂ paratype, habitus, dorsal, lateral and ventral views, respectively. Photographs by K.V. Makarov, taken not to scale.

Рис. 11–13. *Cryptogonodesmus unciger* sp.n., паратип ♂, общий вид, соответственно сверху, сбоку и снизу. Фотографии К.В. Макарова, сняты без масштаба.

but these are small and clearly subordinate to the other, more complex elements. In contrast, the sac-shaped gonotelopodites in *Cryptogonodesmus* are by far the main and fully exposed structures of the gonopods.

#### *Cryptogonodesmus sacciformis* sp.n.

Figs 5–10.

HOLOTYPE ♂ (ZMUM), Peru, Junin Region, Calabaza, 2200 m a.s.l., S 11°30'38", W 74°49'15", 16.IX.2017, K.Yu. Eskov leg.

PARATYPES: 2 ♂♂, 2 incomplete ♂♂ (posterior halves of body missing), same place, together with holotype.

NAME. To emphasize the very large, simple and sac-shaped gonopodal telopodite.

DIAGNOSIS. Differs from congeners by the gonocoxite being small, rather washer-shaped and devoid of a gonocoel, whereas the telopodite is clearly unipartite, strongly hypertrophied, roundly sac-shaped and mostly finely and densely hirsute; a solenomere totally wanting.

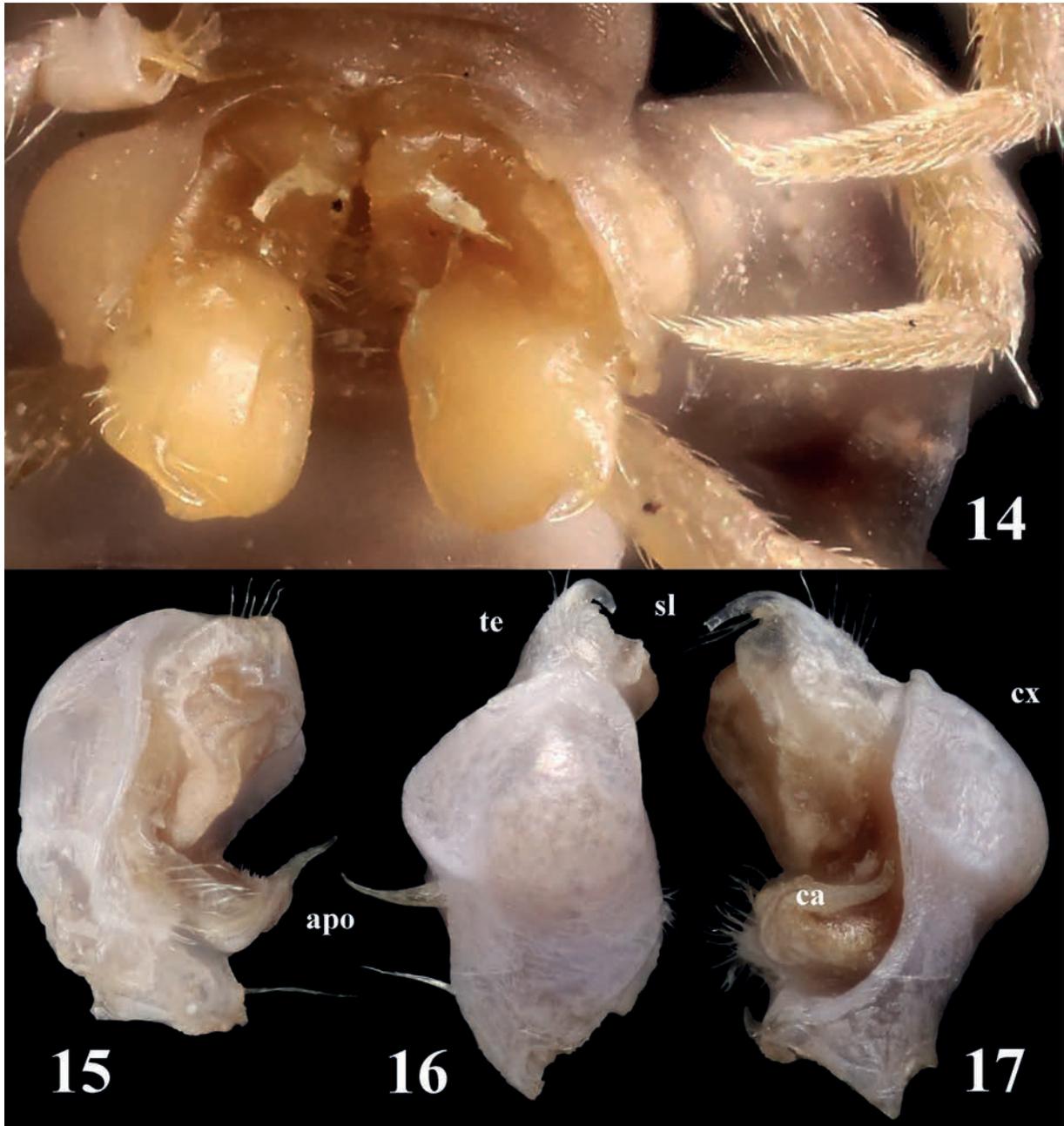
DESCRIPTION. Length of all types ca 10.5 mm, width of midbody pro- and metazonae 1.0 and 1.6 mm, respectively (♂).

Colouration in alcohol uniformly brown with light grey-brown venter and legs (Figs 5–7). Body with 20 rings.

All characters as in *Moojenodesmus simplex* sp.n., except as follows.

In width, collum < head < ring 2 < 3 < 4 < 5=15, thereafter body gradually tapering towards telson (Figs 5–7). Paraterga strongly developed, set high (at about upper ¼ midbody height), starting with collum, dorsum at most very faintly convex; paraterga largely subhorizontal to faintly upturned.

Gonopods (Figs 8–10) with relatively small coxites (cx), these being rather washer-shaped and about as high as telopodites (te), each cx at base with two long setae on caudal face; a long, simple and unciform cannula (ca) as usual. Telopodite (te) simple, massive, rounded and entirely sac-shaped, densely and finely hirsute almost all over, very strongly exposed due to a rudimentary gonocoel, on caudal face with an inconspicuous tubercle/shelf supporting three strong setae apically and several shorter setae closer to base, all marking the terminal course of a fully mesal seminal groove. A solenomere missing.



Figs 14–17. *Cryptogonodesmus unciger* sp.n., ♂ paratype. 14 — both gonopods *in situ*, ventral view; 15–17 — right gonopod, caudal, lateral and mesal views, respectively. Abbreviations: **apo** — basal apophysis; **ca** — cannula; **cx** — coxite; **sl** — solenomere; **te** — telopodite. Photographs by K.V. Makarov, taken not to scale.

Рис. 14–17. *Cryptogonodesmus unciger* sp.n., паратип ♂. 14 — оба гонопода на месте, снизу; 15–17 — правый гонопод, соответственно сзади, сбоку и изнутри. Обозначения: **apo** — базальный вырост; **ca** — канноля; **cx** — коксит; **sl** — соленомер; **te** — телоподит. Фотографии К.В. Макарова, сняты без масштаба.

*Cryptogonodesmus unciger* sp.n.  
Figs 11–19.

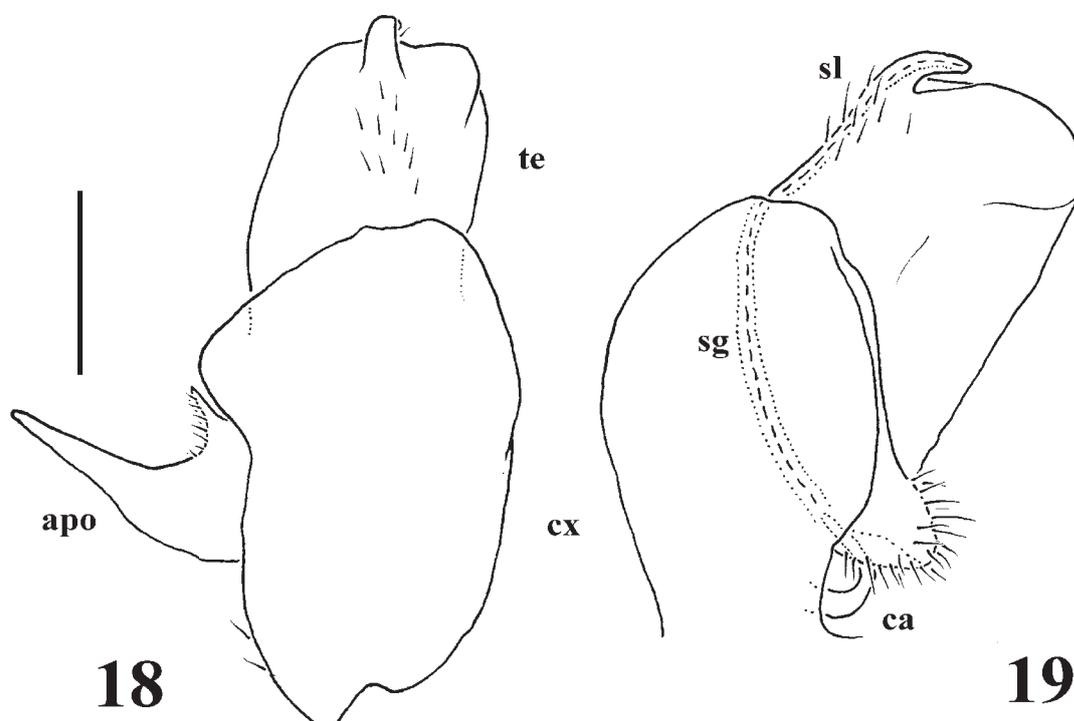
HOLOTYPE ♂ (ZMUM), Peru, Junin Region, 16 km NW of Satipo, Rio Venado, 1120 m a.s.l., forest on slopes, 13–14.IX.2017, K.Yu. Eskov leg.

PARATYPES: 2 ♂♂, 1 ♀ (ZMUM), same place, together with holotype.

NAME. To emphasize the hook-shaped solenomere.

DIAGNOSIS. Based on gonopodal conformation, as well as geographically, this new species seems to be especially similar to *C. sacciformis* sp.n., as the gonocoxite is likewise strongly reduced, rather washer-shaped and devoid of a gonocoel, whereas the telopodite is mostly unipartite, hypertrophied, well exposed and sac-shaped. However, *C. unciger* sp.n. differs in a non-hirsute gonotelopodite supplied with both a strong laterobasal apophysis (**apo**) and an unciform apical solenomere (**sl**) (Figs 14–19).

DESCRIPTION. Length ca 11.0–11.5 mm (♂, ♀), width of



Figs 18, 19. *Cryptogonodesmus unciger* sp.n., ♂ paratype, right gonopod, lateral and mesal views, respectively. Abbreviations: **apo** — basal apophysis; **ca** — cannula; **cx** — coxite; **sg** — seminal groove; **sl** — solenomere; **te** — telopodite. Scale bar: 0.2 mm.

Рис. 18, 19. *Cryptogonodesmus unciger* sp.n., паратип ♂, правый гонопод, соответственно сбоку и изнутри. Обозначения: **apo** — базальный вырост; **ca** — канюля; **cx** — коксит; **sg** — семенной канал; **sl** — соленомер; **te** — телоподит. Масштаб: 0,2 мм.

midbody pro- and metazonae 1.0 and 1.8 mm, respectively (♂, ♀). Colouration in alcohol rather uniformly red-brown, usually with lighter yellowish to yellow-brown head, telson, venter and legs (Figs 11–13). Body with 20 rings.

All other characters as in *Moojenodesmus simplex* sp.n., except as follows.

Antennae (Figs 11–13) longer and slightly more slender, *in situ* reaching past ring 3 dorsally. In width, collum < head < ring 2 < 3 < 4 < 5=15, thereafter body gradually tapering towards telson (Figs 11–13). Paraterga very strongly developed, broad, set high (at about upper ¼ midbody height), starting with collum, dorsum very faintly convex; paraterga mostly weakly upturned above dorsum (♂) to subhorizontal (♀).

Gonopods (Figs 14–19) with relatively small coxites (**cx**), these being about as high as telopodites (**te**), each **cx** with a long, simple and unciform cannula (**ca**) as usual. Telopodite (**te**) massive, rounded and roughly sac-shaped, very strongly exposed due to a rudimentary gonocoel, with a conspicuous vermiform lateral apophysis (**apo**) at base and a short unciform solenomere (**sl**) apicolaterally; distal course of seminal groove (**sg**) ornamented with a number of setae.

### Genus *Phaneromerium* Verhoeff, 1941

Type species: *Cryptogonodesmus obtusangulus* Carl, 1914, from Colombia, by subsequent designation of Verhoeff [1941].

Other species included: *P. laticeps* (Kraus, 1954), *P. longipes* (Kraus, 1954), *P. minimum* (Kraus, 1954), *P. robustum* (Kraus, 1955), *P. taulisense* (Kraus, 1954), all from Peru, *P. distinctum*

Golovatch, 1994, *P. latum* Golovatch, 1994, *P. minutum* Golovatch, 1994, all three from near Manaus, Brazil, *P. cavernicolum* Golovatch et Wytwer, 2004, and *P. troglopterygotum* Golovatch et Gallo, in Golovatch *et al.*, 2022, both latter species being troglobionts from Bahia, Brazil [Carl, 1914; Verhoeff, 1941; Kraus, 1954, 1955; Golovatch, 1994; Golovatch, Wytwer, 2004; Golovatch *et al.*, 2022]. Most species of the genus have been keyed [Golovatch, Wytwer, 2004].

DIAGNOSIS. To slightly extend the earlier characterization [Golovatch *et al.*, 2022], this is one of the basalmost genera of Trichopolydesmidae with relatively little enlarged gonopod coxites that form together no considerable gonocoel cavity, but support instead almost fully exposed, suberect and relatively simple to complex telopodites, uni-, bi- or tripartite, held parallel to each other [Golovatch, 1994]. This condition is deemed to be the most primitive in the gonopodal evolution of Neotropical Trichopolydesmidae compared to the developments observed in the remaining eight recognized genera that occur in the region [Golovatch, 1992, 1994; Golovatch, Wytwer, 2004].

### *Phaneromerium eskovi* sp.n.

Figs 20–30.

HOLOTYPE ♂ (ZMUM), Peru, Junin Region, Calabaza, 2200 m a.s.l., S 11°30'38", W 74°49'15", 16.IX.2017, K.Yu. Eskov leg.

PARATYPES: 3 ♂♂ (ZMUM), same place, together with holotype.

NAME. To honour my friend Kirill Yu. Eskov, the collector.

DIAGNOSIS. Differs from congeners by the clearly incrassate anterior ♂ legs, including the laterally swollen prefemora (Fig.



Figs 20–22. *Phaneromerium eskovi* sp.n., ♂ paratype, habitus, dorsal, lateral and ventral views, respectively. Photographs by K.V. Makarov, taken not to scale.

Рис. 20–22. *Phaneromerium eskovi* sp.n., паратип ♂, общий вид, соответственно сверху, сбоку и снизу. Фотографии К.В. Макарова, сняты без масштаба.

24), coupled with 20 body rings (Figs 20–22) and slender tripartite gonotelopodites regularly curved cephalad (Figs 23, 25–30).

**DESCRIPTION.** Length ca 12 mm, width of midbody pro- and metazonae 1.0 and 1.5 mm, respectively (♂). Colouration in alcohol uniformly light to dark red-brown with lighter yellowish to red-brown venter and legs (Figs 20–22). Body with 20 rings.

In width, collum = head < ring 2 = 3 = 4 < 5=15, thereafter body gradually tapering towards telson (Fig. 20–22). Paraterga strongly developed, set high (at about upper ¼ midbody height), starting with collum, mostly slightly upturned, leaving dorsum largely slightly convex to subhorizontal. Anterior ♂ prefemora with lateral bulges (Fig. 24).



Figs 23–27. *Phaneromerium eskovi* sp.n., ♂ paratype. 23 — both gonopods *in situ*, ventral view; 24 — leg 7, lateral view; 25–27 — right gonopod, mesal, caudal and lateral views, respectively. Abbreviations: **ca** — cannula; **cx** — coxite; **te** — telopodite. Photographs by K.V. Makarov, taken not to scale.

Рис. 23–27. *Phaneromerium eskovi* sp.n., паратип ♂. 23 — оба гонопода на месте, снизу; 24 — нога 7, сбоку; 25–27 — правый гонопод, соответственно изнутри, сзади и сбоку. Обозначения: **ca** — канюля; **cx** — коксит; **te** — телоподите. Фотографии К.В. Макарова, сняты без масштаба.

Gonopods (Figs 23, 25–30) with relatively small coxites (**cx**), these being stout and shorter than telopodites (**te**), each **cx** with a long, simple and unciform cannula (**ca**) as usual. Telopodite (**te**) slender, clearly and regularly curved cephalad, tripartite, consisting of three subequally long and tightly adjacent branches: a lateral branch (**lb**), a slightly longer and flagelliform branch (**fb**), and a solenomere (**sl**), the latter densely barbed in distal half; a lateral, rounded, hyaline lobe (**lo**) distal to a short parabasal tooth (**t**); seminal groove largely borne by **sl**, the latter starting near **t**.

*Phaneromerium carpish* sp.n.  
Figs 31–36.

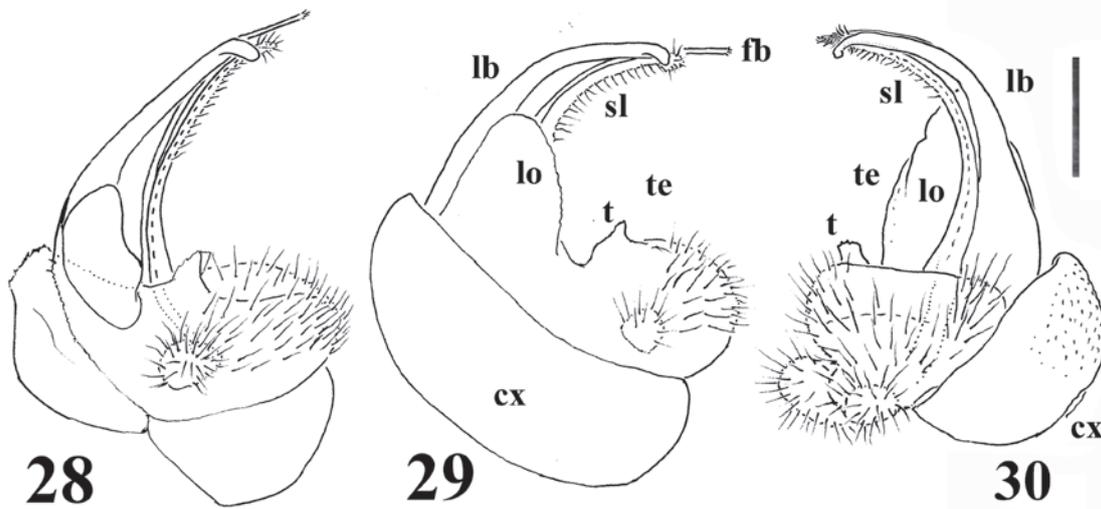
HOLOTYPE ♂ (ZMUM), Peru, Huanuco Region, Carpish Pass, 2400 m a.s.l., S 09°41'34", W 76°05'06", cloud forest, in epiphytes, 9.IX.2017, K.Yu. Eskov leg.

NAME. To emphasize the type locality; a noun in apposition.

DIAGNOSIS. Differs from congeners by the body being composed of 20 body rings (Figs 31–33), coupled with a slender unipartite gonotelopodite, the sole branch of which is long, slender, rather regularly curved cephalad and carries a mesal denticle at distal third; a solenomere is wanting, the seminal groove (**sg**) being relatively short and terminating near a basal tooth (**t**) (Figs 34–36).

DESCRIPTION. Length ca 12 mm, width of midbody pro- and metazonae 1.1 and 2.0 mm, respectively (♂). Colouration in alcohol uniformly light pinkish brown with lighter venter and legs (Figs 31–33). Body with 20 segments. Antennae medium-sized, slender (Figs 31–33), *in situ* reaching past ring 3 dorsally (♂).

In width, collum < head < ring 2 < 3 < 4 < 5=15, thereafter body gradually tapering towards telson (Figs 31–33). Paraterga



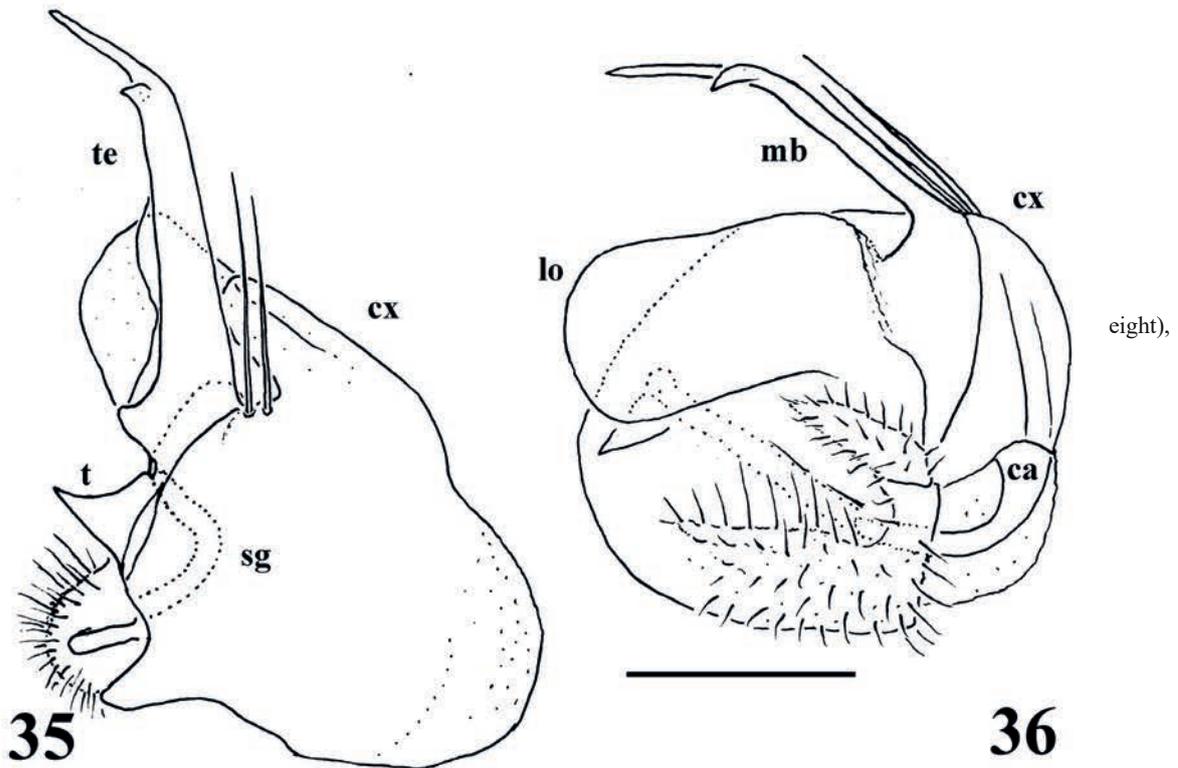
Figs 28–30. *Phaneromerium eskovi* sp.n., ♂ paratype, left gonopod, suboral, lateral and mesal views, respectively (cannula invisible). Abbreviations: cx — coxite; fb — flagelliform branch; lb — lateral branch; lo — lateral lobe; sl — solenomere; t — basal tooth; te — telopodite. Scale bar: 0.2 mm.

Рис. 28–30. *Phaneromerium eskovi* sp.n., паратип ♂, левый гонопод, соответственно почти спереди, сбоку и изнутри (канюля не видна). Обозначения: cx — коксит; fb — жгутиковидная ветвь; lb — боковая ветвь; lo — боковая пластина; sl — соленомер; t — базальный зуб; te — телоподите. Масштаб: 0,2 мм.



Figs 31–33. *Phaneromerium carpish* sp.n., ♂ holotype, habitus, dorsal, lateral and ventral views, respectively. Photographs by K.V. Makarov, taken not to scale.

Рис. 31–33. *Phaneromerium carpish* sp.n., голотип ♂, общий вид, соответственно сверху, сбоку и снизу. Фотографии К.В. Макарова, сняты без масштаба.



Figs 34–36. *Phaneromerium carpish* sp.n., ♂ holotype. 34 — both gonopods *in situ*, sublateral view; 35, 36 — right gonopod, caudomesal and mesal views, respectively. Abbreviations: **ca** — cannula; **cx** — coxite; **lo** — mesal lobe; **mb** — mesal branch; **sg** — seminal groove; **t** — basal tooth; **te** — telopodite. Photograph by K.V. Makarov (34), taken not to scale; scale bar: 0.2 mm (35, 36).

Рис. 34–36. *Phaneromerium carpish* sp.n., голотип ♂. 34 — оба гонопода на месте, почти сбоку; 35, 36 — правый гонопод, соответственно одновременно сзади и изнутри и изнутри. Обозначения: **ca** — канюля; **cx** — коксит; **mb** — main branch; **sg** — семенной канал; **t** — базальный зуб; **te** — телоподит. Фотография К.В. Макарова (34), снята без масштаба; масштаб: 0,2 мм (35, 36).

starting with collum, mostly subhorizontal to slightly upturned, leaving dorsum largely only slightly convex to subhorizontal.

Gonopods (Figs 34–36) with moderately large and roundish coxites (**cx**) about as high as telopodites (**te**), and a shallow gonocoel; each **cx** with two strong distolateral setae and a usual, strongly unciform cannula (**ca**) at base. Telopodite (**te**) basically unipartite, with a single, long, acuminate, mesal branch (**mb**) rather regularly curved cephalad and carrying a mesal denticle at distal one-third; a prominent, subovoid, mesal lobe (**lo**) near base of **mb** and a sharp basal tooth (**t**) terminating a short and curved seminal groove (**sg**), the latter being totally devoid of a solenomere.

### On the identity of *Phylacomerium* Verhoeff, 1941

Regrettably, *Phylacomerium* Verhoeff, 1941 has been totally omitted from the latest reviews of South American Trichopolydesmidae [Golovatch, 1992, 1994, 1996; Golovatch *et al.*, 2022]. However, as it appears to represent but a junior subjective synonym, the earlier estimate of only nine genera recognized as representing the South American fauna persists [Golovatch, 1994].

*Phylacomerium* Verhoeff, 1941 is a monobasic genus proposed for a single, and type, species, *P. album* Verhoeff, 1941, from southern Peru. Based on the original description alone, including an original drawing of the right gonopod [Verhoeff, 1941], there can be little doubt that *Phylacomerium* Verhoeff, 1941 = *Brachycerodesmis* Carl, 1914, **syn.n.**, this also implying *B. albus* (Verhoeff, 1941), **comb.n. ex Phylacomerium**.

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