

On some new or poorly-known millipedes from Chile and Argentina (Diplopoda)

О некоторых новых и плохоизученных двупарноногих многоножках из Чили и Аргентины (Diplopoda)

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KEY WORDS: Diplopoda, taxonomy, new records, new species, Chile, Argentina.

КЛЮЧЕВЫЕ СЛОВА: Diplopoda, таксономия, новые находки, новые виды, Чили, Аргентина.

ABSTRACT. A fresh collection of Diplopoda from Chile and Argentina appears to contain 16 identifiable species, mostly richly illustrated, among which four are new: *Argentocricus iguazu* **sp.n.** (Rhinocricidae, Spirobolida) from Argentina, as well as *Semnosoma eskovi* **sp.n.**, *Abatodesmus simplicior* **sp.n.** and *Anaulacodesmus bifidus* **sp.n.** (all Dalodesmidae, Polydesmida) from Chile. The following new synonymy is established: *Monenchodesmus inermis* Silvestri, 1903 = *Monenchodesmus inermis nahuelhuapiensis* Schubart, 1954 = *Monenchodesmus tiganus* Chamberlin, 1957, **syn.n.** (the valid name the first). The species *Anaulacodesmus lacustris* Schubart, 1954, previously known only from the Andean parts of Argentina bordering on Chile, is recorded from Chile for the first time.

РЕЗЮМЕ. Свежая коллекция диплопод из Чили и Аргентины содержит 16 определимых видов, большинство из которых снабжены обильными иллюстрациями, включая четыре новых вида: *Argentocricus iguazu* **sp.n.** (Rhinocricidae, Spirobolida) из Аргентины, а также *Semnosoma eskovi* **sp.n.**, *Abatodesmus simplicior* **sp.n.** и *Anaulacodesmus bifidus* **sp.n.** (все Dalodesmidae, Polydesmida) из Чили. Установлена следующая новая синонимия: *Monenchodesmus inermis* Silvestri, 1903 = *Monenchodesmus inermis nahuelhuapiensis* Schubart, 1954 = *Monenchodesmus tiganus* Chamberlin, 1957, **syn.n.** (валидное название первое). Вид *Anaulacodesmus lacustris* Schubart, 1954, ранее известный лишь из приграничных с Чили аргентинских районов Анд, впервые отмечен и из Чили.

Introduction

The millipedes of southern South America, of Argentina and Chile in particular, can most generously be termed as being still poorly known. The fauna of Argentina and adjacent areas of Bolivia, Paraguay, Uruguay

and southern Brazil was reviewed not too long ago [Mauriès, 1998], but the latest synopses of Chilean Diplopoda are old and hopelessly outdated [Silvestri, 1905a; Chamberlin, 1957].

Biogeographically, the region is highly peculiar, long considered as part of the Austral realm. Thus, only one Chilean genus and species of the rather large Southern Hemisphere family Iulomorphidae (Spirostreptida) occurs in South America, the remaining nearly 80 species being known solely in southern Africa, Australia (together with Tasmania) and New Zealand [Korsós & Read, 2012]. The large Austral family Dalodesmidae (Polydesmida) containing about 50 genera and 200+ species is about equally diverse in southern Africa (together with Madagascar), Australia (together with Tasmania and New Caledonia), New Zealand and southern South America [Hoffman, 1980]. Most of the dalodesmids in South America appear to be confined to Chile and the immediately adjacent Andean parts of Argentina, with only one monotypic genus each encountered along the Atlantic coasts of Mar del Plata, Argentina and Santa Catarina, southeastern Brazil [Hoffman, 1979]. The small family Siphonotidae (Polyzoniida) also seems to represent an Austral element in the millipede fauna of South America, but its few species reach as far north as the Mata Atlantica forest habitats in Santa Catarina and São Paulo states, southeastern Brazil [Hoffman, 1971, 1979, 1980]. The small family Eudigonidae (Chordeumatida) (5–6 species in 3 genera) is endemic to the Andes of central Chile and Argentina [Demange, 1963; Shear, 1988], but the superfamily Heterochordeumatoidea it belongs to is basically Australasian, reaching New Zealand in the east [Shear, 2011].

All of the above four families can be seen as ancient Gondwanaic relicts, although these primitive Austral elements are now much reduced and overlain by later and evidently more successful faunal layers of Neotropical origins [Hoffman, 1979]. This pattern agrees quite well with common wisdom, including plant distributions and

fossil evidence [e.g. Weston & Hill, 2013]. The Neotropical components among Diplopoda are mostly represented by such highly species-rich families as Chelodesmidae, Paradoxosomatidae (both Polydesmida), Spirostreptidae (Spirostreptida) and Rhinocricidae (Spirobolida) which only barely reach Chile [e.g. Demange & Silva, 1971a], but dominate the fauna of Argentina in the south [Hoffman, 1980]. Being the newest introductions, several anthropochore species, mostly of European origins, are rather common in South America as well, the southernmost record in the New World belonging to a species of the Euro-Mediterranean genus *Cylindroiulus* Verhoeff, 1894 (Julidae, Julida) in southern Patagonia, Chile [Shelley et al., 2014]. The distributions of Julida millipedes in South America, of course all introduced, have also been summarized by Shelley et al. [2014], but these authors have inadvertently omitted *Blaniulus guttulatus* (Bosc, 1792) (Blaniulidae, Julida) reported from Valparaiso and its environs [Silva & Vivar, 1976].

The present paper is devoted to the taxonomic assessment of a fresh collection of Diplopoda made by several Russian zoologists in Argentina and Chile.

Material and methods

Most of the material treated below is housed in the Zoological Museum of the State University of Moscow (ZMUM + entry number), Russia, with some duplicates donated to the collection of the Museo Nacional de Historia Natural, Santiago, Chile (MNHN). Digital images of the specimens were taken in the laboratory and assembled using the Zerene Stacker software.

Taxonomic part

Order Julida
Family Julidae

Cylindroiulus britannicus (Verhoeff, 1891)

MATERIAL. Numerous ♂♂, ♀♀ & juv. (ZMUM p2358), **Argentina**, Villa la Angostura, National Park Arrayanes, 40°50'S, 71°37'W, ca 800 m a.s.l., *Luma* & *Nothofagus* forest, under logs & stones, 23.12.2013; numerous ♂♂, ♀♀ & juv. (ZMUM p2359), Villa la Angostura, National Park Nahuel Huapi, 40°44'S, 71°39'W,



Fig. 1. Habitus of *Zinagon chilensis* (Silvestri, 1903), ♂ from National Park Puyehue, lateral view. Picture by K. Makarov, not taken to scale.

Рис. 1. Внешний вид *Zinagon chilensis* (Silvestri, 1903), ♂ из национального парка Пухеуэ, сбоку. Фотография К. Макарова, без масштаба.

ca 900 m a.s.l., *Nothofagus* forest, under logs & stones, 25.12.2013; numerous ♂♂, ♀♀ & juv. (ZMUM p2360), Villa la Angostura, 40°47'S, 71°40'W, wet *Carex* meadow, litter, 29.12.2013; 2 ♂♂, 5 ♀♀, 2 juv. (ZMUM p2363), Chile, National Park Alerce Andino, Sargazo Sector, 41°30'S, 72°37'W, ca 350 m a.s.l., *Nothofagus* & *Podocarpus* forest, 5–11.01.2014; 1 ♂ (ZMUM p2370), Chiloe Island, Senda Darwin Biological Station (ca 15 km E of Ancud), 41°53'S, 73°40'W, 25 m a.s.l., under logs & stones, 27–30.12.2013; 1 ♂, 3 ♀♀ (MNHN), same locality, wet gramineous meadow, 02.01.2014; numerous ♂♂, ♀♀ & juv. (ZMUM p2361), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014, all leg. K. Eskov; 1 ♀ (ZMUM p2392), same locality, ca 390 m a.s.l., 14–20.01.2014; 4 ♂♂, 2 ♀♀ (ZMUM p2393, p2455), National Park Huerquehue, near Lake Tinquilco, 39°10'S, 71°44'W, ca 780 m a.s.l., 20–26.12.2013, all leg. D. Shcherbakov.

REMARKS. This anthropochore species of European origin has long been recorded in Chile and Argentina [Shelley et al., 2014]. The above new samples have been taken in various habitats, including natural ones.

Brachyiulus pusillus (Leach, 1814)

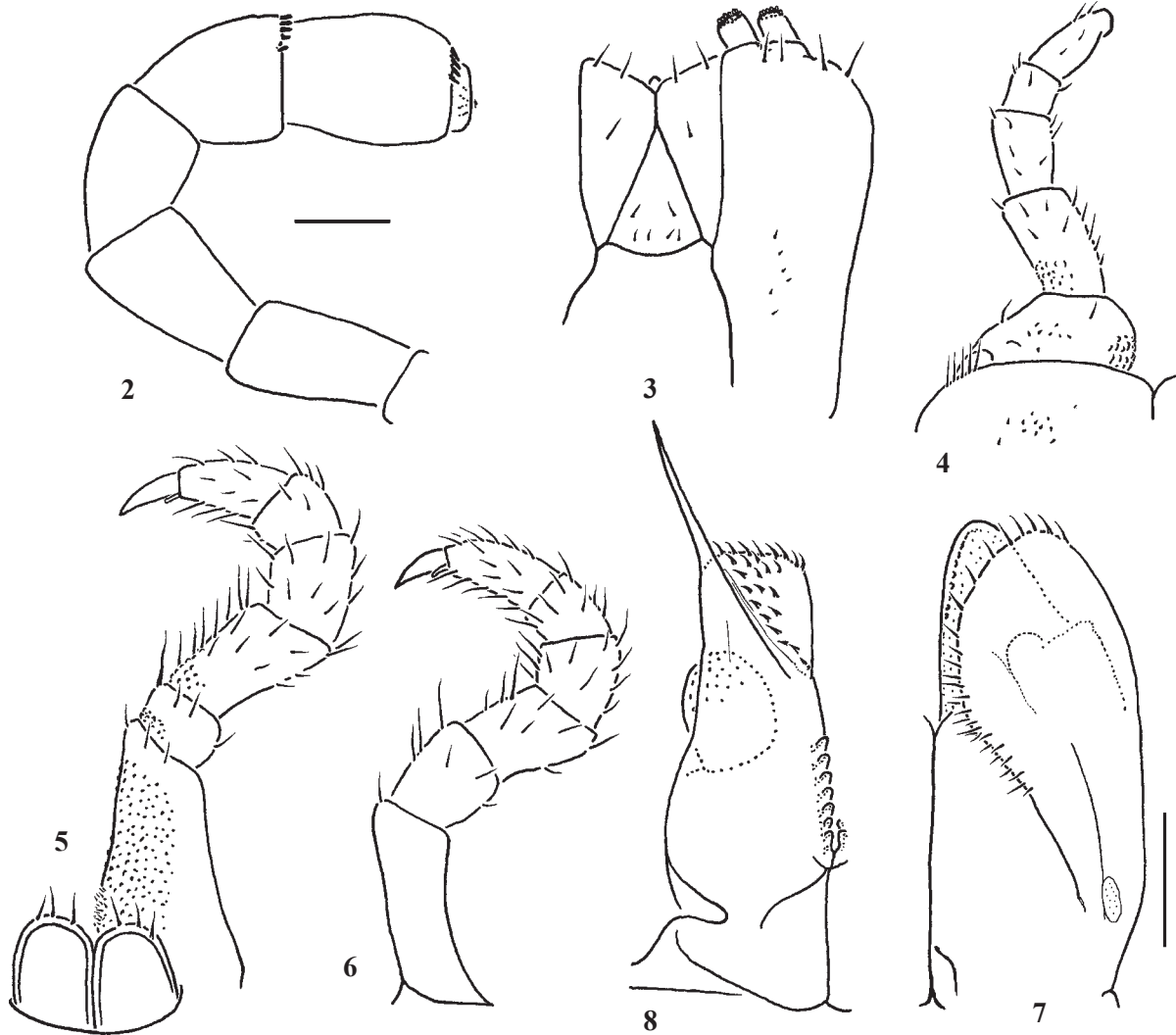
MATERIAL. 1 juv. (ZMUM p2394), Chile, National Park Huerquehue, near Lake Tinquilco, 39°10'S, 71°44'W, ca 780 m a.s.l., *Nothofagus* forest, litter, 24–26.12.2013, leg. R. Rakitov.

REMARKS. This anthropochore species of European origin has long been recorded in Chile and Argentina [Shelley et al., 2014]. It seems noteworthy that the above new sample has been taken from a natural habitat.

Order Chordeumatida
Family Eudigonidae

Gen. spp.

MATERIAL. 1 ♀ (ZMUM p2395), Chile, Chiloe Island, National Park Chiloe, 42°07' S, 74°01' W, matorral, fern litter, 28.12.2013, leg. D. Takiya; 2 ♀♀ (ZMUM p2396), Chiloe Island, Senda Darwin Biological Station (ca 15 km E of Ancud), 41°53'S, 73°40'W, 25 m a.s.l., under logs & stones, 27–30.12.2013; 1 ♀



Figs 2–8. *Zinagon chilensis* (Silvestri, 1903), ♂ from National Park Huerquehue. 2 — antenna, lateral view; 3 — left half of gnathochilarium, ventral view; 4 — leg 1, anterior view; 5 — leg 2 with penes, caudal view; 6 — leg 3, caudal view; 7 — left anterior gonopod, caudal view; 8 — right posterior gonopod, anterior view. Scale bars: 0.2 mm (2–6) & 0.2 mm (7 & 8).

Рис. 2–8. *Zinagon chilensis* (Silvestri, 1903), ♂ из национального парка Huerquehue. 2 — антенна, сбоку; 3 — левая половина гнатохилария, снизу; 4 — нога 1, спереди; 5 — нога 2 с пенисами, сзади; 6 — нога 3, сзади; 7 — левый передний гонопод, сзади; 8 — правый задний гонопод, спереди. Масштаб: 0,2 мм (2–6) и 0,2 мм (7 и 8).

(ZMUM p2397), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014; all leg. K. Eskov

REMARKS. Since the new samples contain no ♂♂, even the genera, let alone species, they belong to cannot be identified. Three genera have hitherto been reported from Chile and the immediately adjacent parts of Argentina: *Eudigona* Silvestri, 1903 and *Ancudia* Shear, 1988, both monotypic, and *Apodigona* Silvestri, 1903 with 3–4 species [Demange, 1963; Shear, 1988]. Of them, *Ancudia chepu* Shear, 1988 has only been known from near Ancud, Chiloe Island, whereas *Apodigona franckei* Shear, 1988 from near Puyehue alone.

Order Spirostreptida
Family Iulomorphidae

Zinagon chilensis (Silvestri, 1903)

Figs 1–8.

MATERIAL. 1 ♂ (ZMUM p2398), Chile, National Park Huerquehue, near Lake Tinquilco, 39°10'S, 71°44'W, ca 780 m a.s.l., stone with moss, 25.12.2013, leg. R. Rakitov; 1 ♀ (MNHN), same locality, *Nothofagus* & *Podocarpus* forest, litter, 15.01.2014; 4 ♂♂, 6 ♀♀ (ZMUM p2399), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 12–20.01.2014; all leg. K. Eskov.

REMARKS. This genus and species endemic to Chile has recently been redescribed in due detail, based both on

type and new material [Korsós & Read, 2012]. *Z. osorno* Chamberlin, 1957 is only a junior synonym of *Z. chilensis*, first synonymized by Mauriès [1998], later the synonymy confirmed by Korsós & Read [2012]. To document the species' identity, as well as to show minor variations in structure and armature of the antennae, gnathochilarium, ♂ legs 1–3 and gonopods compared to the previous descriptions and illustrations [Silvestri, 1903, 1905a, 1905b; Attems, 1903; Chamberlin, 1957; Demange & Silva, 1976b; Korsós & Read, 2012], a habitus picture and new drawings are provided for one of the above fresh samples (Figs 1–8).

Order Spirobolida
Family Rhinocricidae

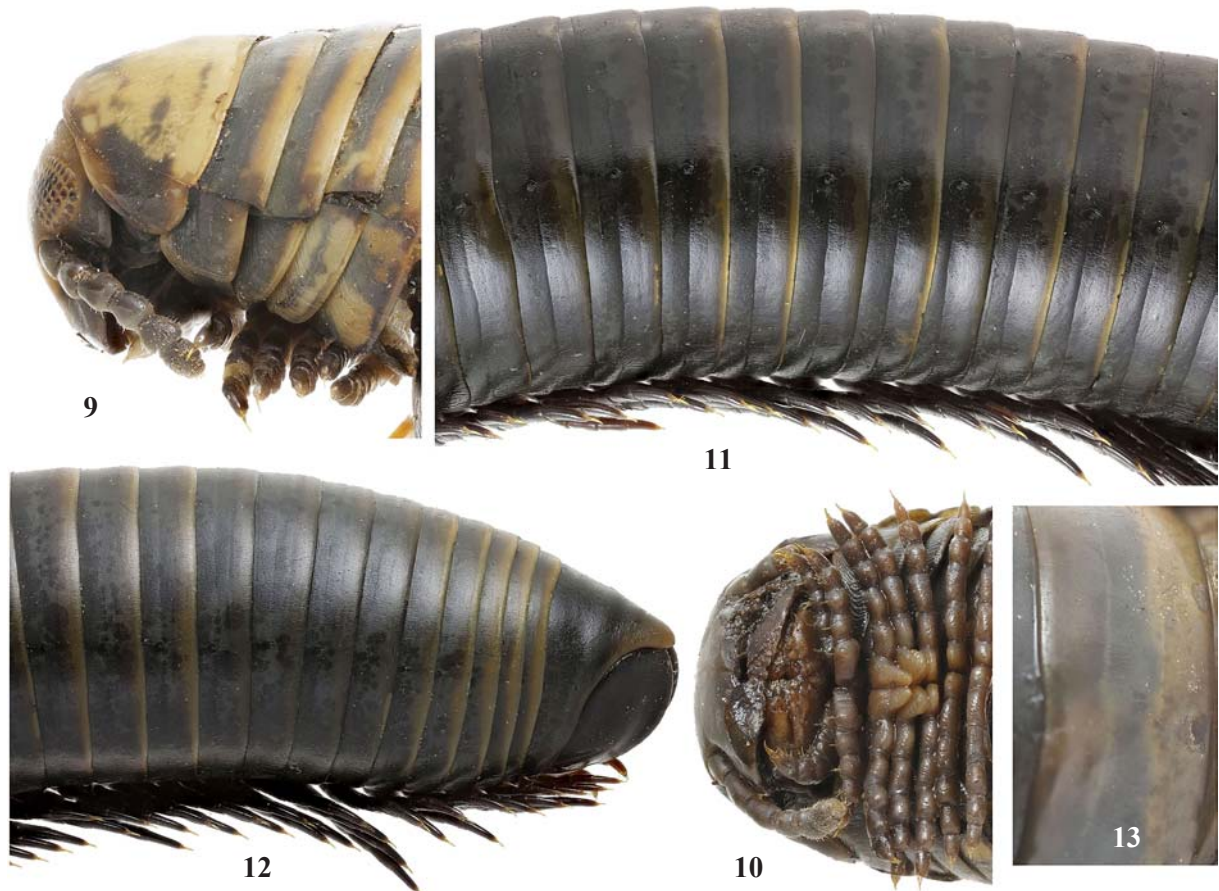
Argentocricus iguazu sp.n.

Figs 9–24.

HOLOTYPE ♂ (ZMUM p2401), Argentina, Misiones Prov., National Park Iguazú, 25°41'25"S, 54°26'22"W, tropical forest, 20.12.2013, leg. K. Eskov.

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

DIAGNOSIS. Using the available key to all known species of *Argentocricus* [Hoffman & Golovatch, 2012], *A. iguazu* sp.n. keys out as *A. nobilis* Verhoeff, 1941, from Santa Fe Province, northern Argentina, but differs in a much smaller body (55 mm versus 86 mm long), the presence of an additional, superficial stria above the deep premarginal sul-



Figs 9–13. *Argentocricus iguazu* sp.n., holotype. 9–10 — anterior part of body, lateral and caudal views, respectively; 11–12 — middle and posterior parts of body, respectively, lateral view; 13 — scobinae, dorsal view. Pictures by K. Makarov, not taken to scale.

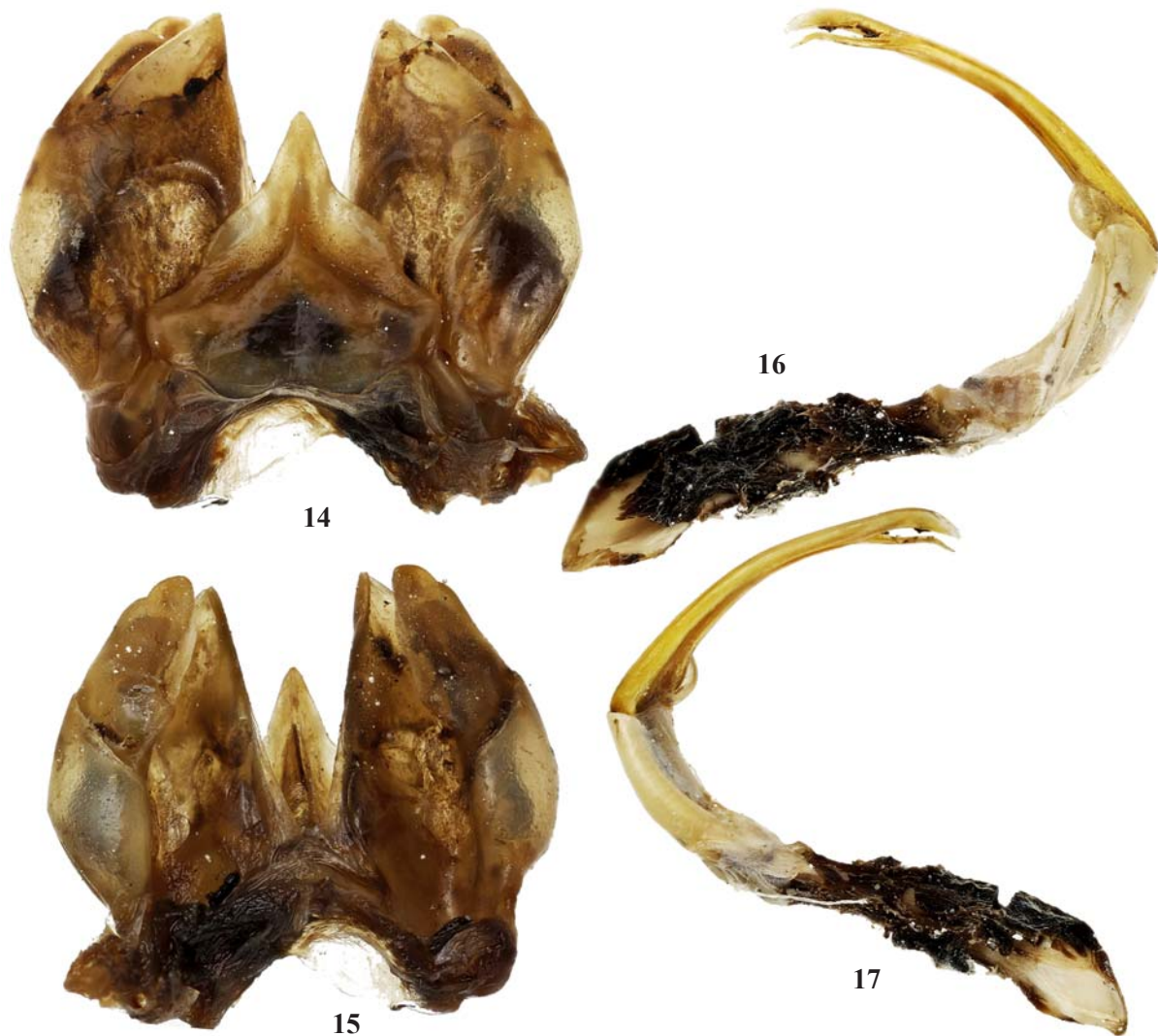
Рис. 9–13. *Argentocricus iguazu* sp.n., голотип. 9–10 — передняя часть тела, соответственно сбоку и снизу; 11–12 — соответственно средняя и задняя части тела, сбоку; 13 — скобины, сверху. Фотографии К. Макарова, без масштаба.

cus on the lateral lobes of the collum, the acuminate sternal projection (**p**) and the much shorter inner coxal folds (**cf**) of the coleopod, a well chitinized bulge (**b**) on the caudal face of the coleopod telopodite, and a slightly longer, blade-like and less narrow branch lying lateral to the solenomere (**sl**).

DESCRIPTION. Holotype with 55(0) segments. Length ca 55 mm, diameter 6.0 mm, segments circular. Coloration in alcohol rather uniformly lead-blackish, pattern rather faintly cingulated due to vague, translucent, yellow-brownish rings covering rear halves or margins of metazonae; most of collum and tip of epiproct also yellow-brownish; only labrum, mouthparts and some anterior legs light brown (Figs 9–13). Darker spots at location of ozopores visible along body as a vague blackish horizontal line.

Texture very delicately leathery. Face typical, ocelli in 6 transverse rows, rounded, blackish, poorly distinguished, black spots over dark background, from back forward 8–8–8–7–6–5 (= 42). Collum subtriangular, very broadly rounded

laterally, margined anteriorly and laterally, but not caudally, with a deep ventrolateral premarginal sulcus and a shorter superficial stria above (Fig. 9). Antennae of normal form, with numerous apical sensory cones (Fig. 9). Ozopores beginning on segment 6, located immediately in front of or touching the meso-metazonal suture, which describes an evident semi-circular emargination just above the pore. Metazonae with fine striations ventrolaterally, reduced in size after segment 7, continuing onto mesozonae to disappear roughly at level of ozopores; prozonae very finely transversely striolate. Pro-, meso- and metazonae subequal in length, divided from each other by very thin line-shaped sutures. Scobinae small (Figs 13–19), starting from segment 6, decreasing in size posteriad from segment 50, disappearing by segment 52, separated by about 2.5X the width of one; arena lunulata with a deep ellipsoidal groove posteriorly; scobinella poorly developed, only half as wide as arena, very finely striolate transversely.



Figs 14–17. *Argentocricus iguazu* sp.n., holotype. 14–15 — anterior gonopods, anterior and posterior views, respectively; 16–17 — left posterior gonopod, anterior and posterior views, respectively. Pictures by K. Makarov, not taken to scale.

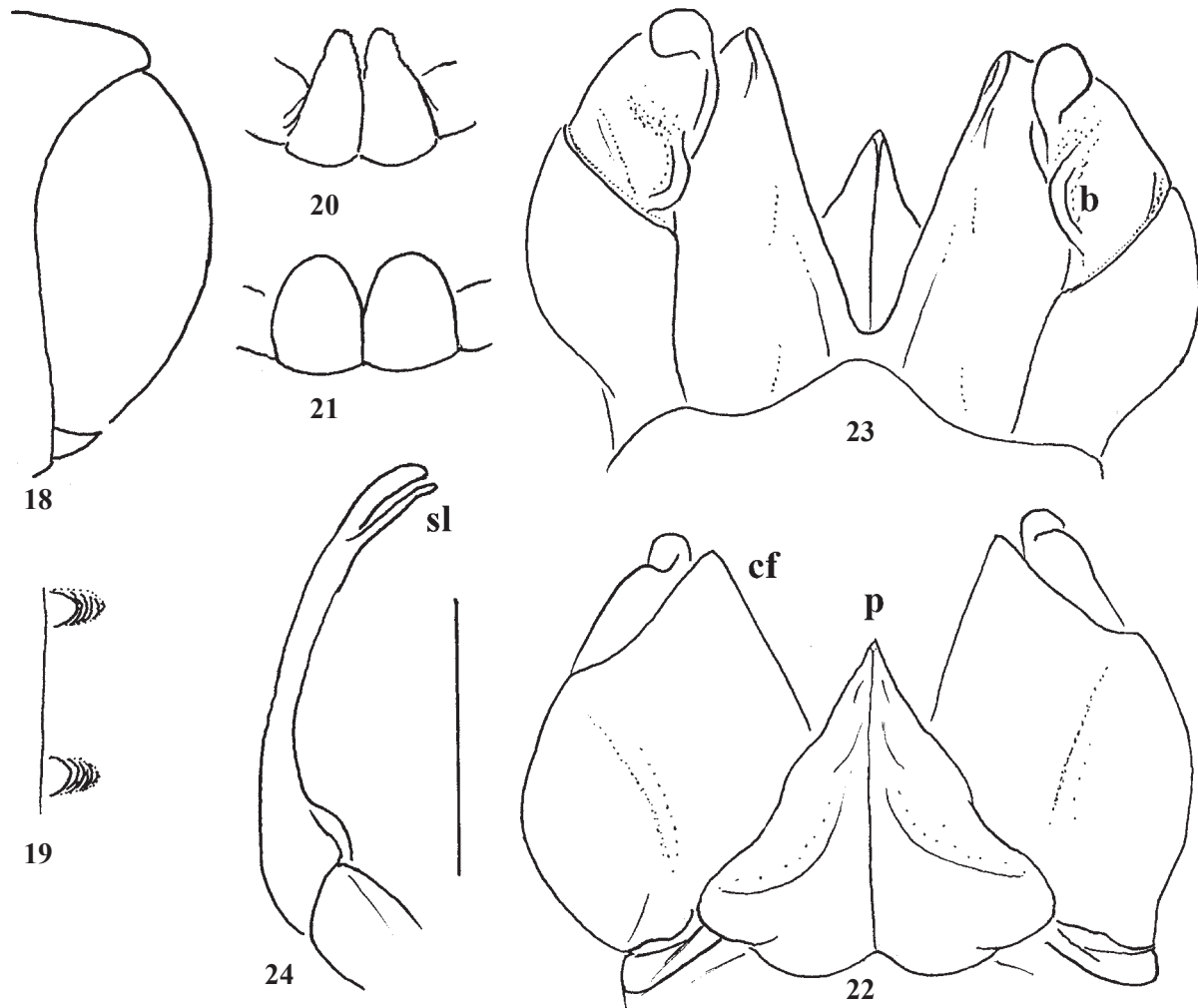
Рис. 14–17. *Argentocricus iguazu* sp.n., голотип. 14–15 — передние гоноподы, соответственно спереди и сзади; 16–17 — левый задний гонопод, соответственно спереди и сзади. Фотографии К. Макарова, без масштаба.

Epiproct very short, rounded, straight, barely overhanging above paraprocts (Figs 12 & 18). Hypoproct transversely semi-circular, paraprocts with only a shallow submarginal depression beside caudal edge, latter rounded, without groove mesally (Fig. 12).

Coxal processes on legs 3 high, coniform, subcontiguous (Figs 10 & 20), subequal round discs on 4th and 5th (Figs 10 & 21), these discs decreasing in size caudad on 6th and 7th (Fig. 20). Podomeres without ventral pads. One or two small spines ventrally, one spine dorsally of claw.

Anterior gonopods, or coleopods (Figs 14, 15, 22 & 23), with a distinct, sharp, subtriangular, median, sternal projection (**p**); inner coxal folds (**cf**) subacuminate apically; caudal face of telopodite with a rather conspicuous rounded bulge (**b**) mesally in basal one-third extent. Posterior gonopod (Figs 16, 17 & 24) with a slightly shorter, simple, blade-like, narrow branch laterally of a longer, distally slightly sinuate, slender solenomere (**sl**).

REMARKS. The genus *Argentocricus* Verhoeff, 1941 has recently been reviewed and shown to encompass eight species confined to southern South America, but ranging only from Bolivia, Paraguay and southern Brazil in the north to northern Argentina in the south [Hoffman & Golovatch, 2012]. The discovery of *A. iguazu* **sp.n.**, a 9th congener, adds little to the known diagnosis and distribution of *Argentocricus*, perhaps except for a chitinized, not membranous, bulge on the caudal face of the coleopod telopodite. A membranous bulge or vesicle is generally diagnostic for *Argentocricus*, whereas a chitinized one is characteristic of only some of 200+ "*Rhinocricus*" species or subspecies occurring throughout the West Indies and South America [Marek et al., 2003; González-Sponga, 2006; Rodrigues et al., 2012]. However, the assignment of *A. iguazu* **sp.n.** to *Argentocricus* is preferred on account of the general structure of both gonopod pairs, including the simple, short and narrow lateral branch of the posterior gonopod, coupled with a coherent distribution pattern [cf. Hoffman & Golovatch, 2012].



Figs 18–24. *Argentocricus iguazu* **sp.n.**, holotype. 18 — telson, lateral view; 19 — scobinae, dorsal view; 20 — processes of coxae 3, anteroventral view; 21 — processes of coxae 4, anteroventral view; 22–23 — anterior gonopods, anterior and posterior views, respectively; 24 — left posterior gonopod, anterior view. Scale bar: 2.0 mm. Designations in text.

Рис. 18–24. *Argentocricus iguazu* **sp.n.**, голотип. 18 — тельсон, сбоку; 19 — скобины, сверху; 20 — отростки тазиков 3, вид одновременно спереди и снизу; 21 — отростки тазиков 4, вид одновременно спереди и снизу; 22–23 — передние гоноподы, соответственно спереди и сзади; 24 — левый задний гонопод, спереди. Масштаб: 2,0 мм. Обозначения в тексте.

Order Polyzoniida
Family Siphonotidae

Burinia parguaensis (Mauriès & Silva, 1971)
Figs 25–29.

MATERIAL. 1 ♂, 1 ♀ (ZMUM p2403), Chile, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014; 1 ♂, 6 ♀♀ (ZMUM p2404), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014, all leg. K. Eskov; 2 ♀♀ (MNHN), same locality,



Figs 25–26. Habitus of *Burinia parguaensis* (Mauriès & Silva, 1971), lateral view: 25 — ♂ from National Park Nahuelbuta; 26 — ♀ from National Park Puyehue.

Рис. 25–26. Внешний вид *Burinia parguaensis* (Mauriès & Silva, 1971), сбоку: 25 — ♂ из национального парка Nahuelbuta; 26 — ♀ из национального парка Puyehue.

16–20.01.2014, leg. R. Rakitov; 1 ♂, 1 ♀ (ZMUM p2402), National Park Puyehue, Antillanca Sector, 40°46'S, 72°12'W, ca 1060 m a.s.l., *Nothofagus* & *Podocarpus* forest, moss, 17.01.2014; 2 ♂♂, 1 juv. (ZMUM p2406), National Park Alerce Andino, Sargazo Sector, 41°30'S, 72°37'W, ca 350 m a.s.l., *Nothofagus* & *Podocarpus* forest, 5–11.01.2014; 2 ♀♀ (ZMUM p2407), Chiloe Island, Senda Darwin Biological Station (ca 15 km E of Ancud), 41°53'S, 73°40'W, 25 m a.s.l., 27–30.12.2013; 1 juv. (ZMUM p2408), same locality, wet gramineous meadow, litter, 2.01.2014, all leg. K. Eskov.

REMARKS. The genus *Burinia* Attems, 1926 is very close if not identical to *Siphonotus* Brandt, 1837. Hoffman [1977, 1980] treated both separately, whereas Mauriès & Silva [1971] and Mauriès [1998] admit only the latter genus as being valid. Here I follow Hoffman in considering all indigenous Chilean species of Polyzoeniida as belonging in *Burinia*. In addition, *Pampiconus* Chamberlin, 1957 is long known as a junior subjective synonym of *Burinia* [e.g. Hoffman, 1980].

Altogether, nine *Burinia* species have hitherto been reported from Chile alone [Chamberlin, 1957; Mauriès & Silva, 1971], including three originally described in *Pampiconus*: *P. mundus* Chamberlin, 1957, *P. ovallenus* Chamber-

lin, 1957 (the type species) and *P. primitivus* Chamberlin, 1957. Mauriès & Silva [1971] treat the latter trio as *nomina dubia*, possibly partly even based on immature specimens and thus remaining unidentifiable. So they considered as fairly well documented only the six species they described and keyed by themselves, all in *Siphonotus*: *S. contulmensis* Mauriès & Silva, 1971, *S. demangei* Mauriès & Silva, 1971, *S. jacqueminae* Mauriès & Silva, 1971, *S. parguaensis* Mauriès & Silva, 1971, *S. roseus* Mauriès & Silva, 1971 and *S. saizi* Mauriès & Silva, 1971. Further *Burinia* species are only known from southern Africa and Brazil [Hoffman, 1980].

Among the Chilean congeners, however, only three colour patterns are easily distinguished: (1) two paramedian, rather sublateral, dark, brown to blackish stripes separated by a broad, pink or yellow, axial stripe along most of or entire body (*B. munda*, *B. parguaensis* and *B. jacqueminae*); (2) an axial, brown to blackish stripe along most of or entire body, with sides remaining pink or yellow (*B. primitiva*, *B. rosea* and *B. contulmensis*); and (3) light yellow to mottled yellow-brown throughout, showing no particular pattern (*B. ovallena*, *B. saizi* and *B. demangei*).



Figs 27–29. *Burinia parguaensis* (Mauriès & Silva, 1971), ♂ from National Park Nahuelbuta. 27–28 — anterior gonopods, anterior and ventrocaudal views, respectively; 29 — left posterior gonopod, anterior view. Scale bar: 0.1 mm.

Рис. 27–29. *Burinia parguaensis* (Mauriès & Silva, 1971), ♂ из национального парка Nahuelbuta. 27–28 — передние гоноподы, соответственно спереди и одновременно сзади и снизу; 29 — левый задний гонопод, спереди. Масштаб: 0,1 мм.

I refer the above new samples from Chile to *B. parguaensis*, because they all show basically the same, only slightly variable colour pattern which ranges from leaving the anterior end of the body completely flavous to entirely fuscous like the sublateral stripes (cf. Figs 25–26), coupled with a particularly convex collum which is nearly as high as head length, very broad, regularly, but moderately strongly attenuating gonapophyses on ♂ coxae 2, probably a quite densely setose tip of the anterior gonopod telopodite which is devoid of a prominent claw, and perhaps a particularly long, flagelloid terminal segment of the posterior gonopod (Figs 27–29). In contrast, the anterior gonopods in *B. munda* show a very prominent terminal claw [Chamberlin, 1957], whereas the collum in *B. jacqueminiae* is considerably less strongly convex while the gonapophyses on ♂ coxae much smaller [Mauriès & Silva, 1971]. Interestingly, the gonopod structure in the *Burinia* species from Chile appears to be rather monoto-

nous, with obviously only very few reliable distinguishing characters being involved.

B. parguaensis appears to be widespread across the southern parts of Chile (Map), ranging from Chiloe Island in the south to Nahuelbuta in the north [see also Mauriès & Silva, 1971]. At Nahuelbuta it occurs sympatrically or even syntopically together with both *B. contulmensis* and *B. saizi*.

Burinia contulmensis (Mauriès & Silva, 1971)
Figs 30–34.

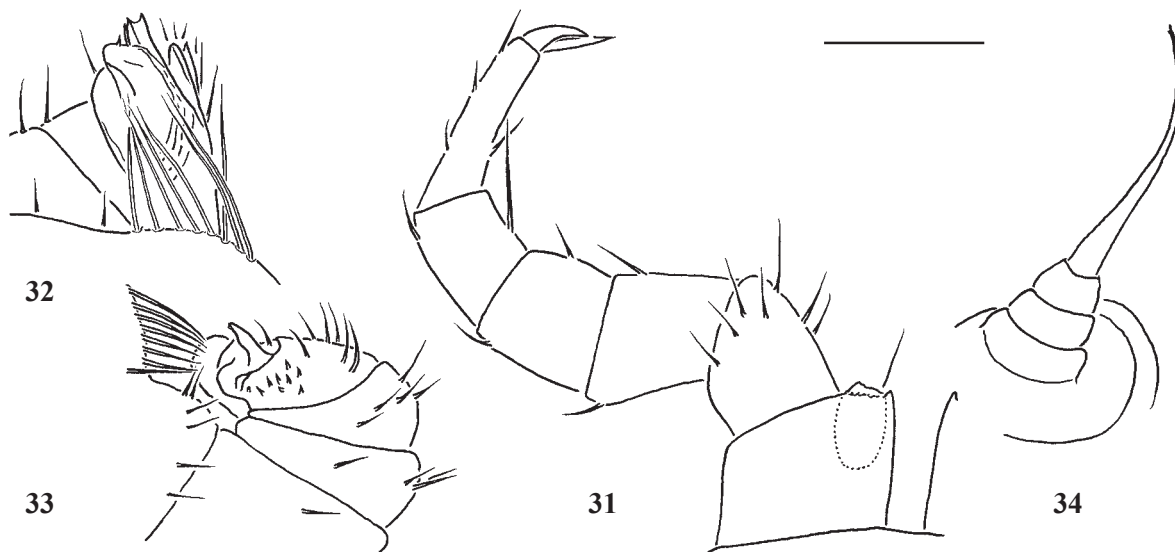
MATERIAL. 2 ♂♂, 3 ♀♀ (ZMUM p2409), Chile, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, leg. K. Eskov.

REMARKS. This species occurs sympatrically if not syntopically together with both *B. parguaensis* and *B. saizi* (see above), being easily recognizable by its colour pattern



Fig. 30. Habitus of *Burinia contulmensis* (Mauriès & Silva, 1971), ♀ from National Park Nahuelbuta, lateral view.

Рис. 30. Внешний вид *Burinia contulmensis* (Mauriès & Silva, 1971), ♀ из национального парка Nahuelbuta, сбоку.



Figs 31–34. *Burinia contulmensis* (Mauriès & Silva, 1971), ♂ from National Park Nahuelbuta. 31 — leg 11, anterior view; 32–33 — anterior gonopods, caudomesal and anterior views, respectively; 34 — left posterior gonopod, subventral view. Scale bar: 0.1 mm.

Рис. 31–34. *Burinia contulmensis* (Mauriès & Silva, 1971), ♂ из национального парка Nahuelbuta. 31 — нога 11, спереди; 32–33 — передние гоноподы, соответственно одновременно сзади и изнутри, а также спереди; 34 — левый задний гонопод, почти снизу. Масштаб: 0,1 мм.

(Fig. 30), coupled with a rather complex structure of legs 11 and gonopods (Figs 31–34). I refer the above new samples to *B. contulmensis*, because the lateral parts of the terga are yellow, not pink as in *B. rosea*, whereas the gonopods are far more complex than in *B. primitiva* where they are probably known only in an underdeveloped, juvenile condition [cp. Chamberlin, 1957; Mauriès & Silva, 1971].

B. contulmensis has hitherto been reported only from central Chile [Mauriès & Silva, 1971], whence also the new samples derive (Map).

Burinia saizi (Mauriès & Silva, 1971)

Figs 35–39.

MATERIAL. 1 ♂, 1 ♀ (ZMUM ρ2410), Chile, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, leg. D. Shcherbakov.

REMARKS. This species is well recognizable [Mauriès & Silva, 1971] through being uniformly light yellow brownish throughout (devoid of a pattern), coupled with quite narrow gonapophyses on ♂ coxae 2 and a rounded apical lobe of the posterior gonopod (Figs 35–39). All previous records are only known from somewhat north of Santiago [Mauriès & Silva, 1971]. At Nahuelbuta this species occurs sympatrically or even syntopically together with both *B. contulmensis* and *B. parguaensis* (Map).

I refer the above new samples to *B. saizi*, because they differ clearly from *B. demangei* in a far less strongly convex collum, from *B. ovallela* by the anterior gonopods being much more complex and non-unciform (again possibly an underdeveloped, juvenile condition so far known in the latter species).

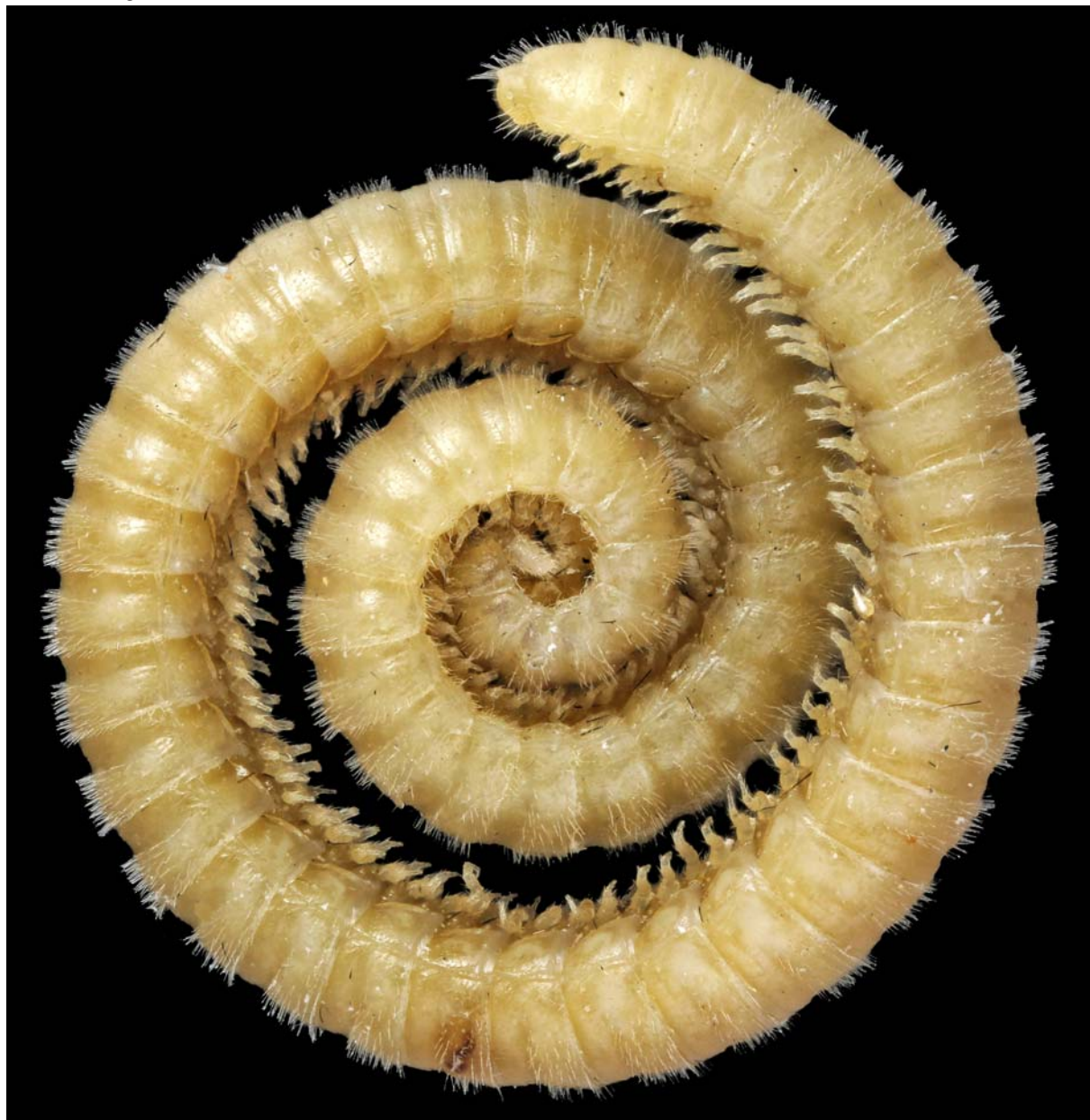


Fig. 35. Habitus of *Burinia saizi* (Mauriès & Silva, 1971), ♀ from National Park Nahuelbuta, lateral view.

Рис. 35. Внешний вид *Burinia saizi* (Mauriès & Silva, 1971), ♀ из национального парка Nahuelbuta, сбоку.



Figs 36–39. *Burinia saizi* (Mauriès & Silva, 1971), ♂ from National Park Nahuelbuta. 36 — leg 11, anterior view; 37–38 — left anterior gonopod, caudal and anterior views, respectively; 39 — right posterior gonopod, subventral view. Scale bar: 0.1 mm.

Рис. 36–39. *Burinia saizi* (Mauriès & Silva, 1971), ♂ из национального парка Nahuelbuta. 36 — нога 11, спереди; 37–38 — левый передний гонопод, соответственно сзади и спереди; 39 — правый задний гонопод, почти снизу. Масштаб: 0,1 мм.

Order Polydesmida
Family Dalodesmidae

Pleonarius omalonotus Silvestri, 1903

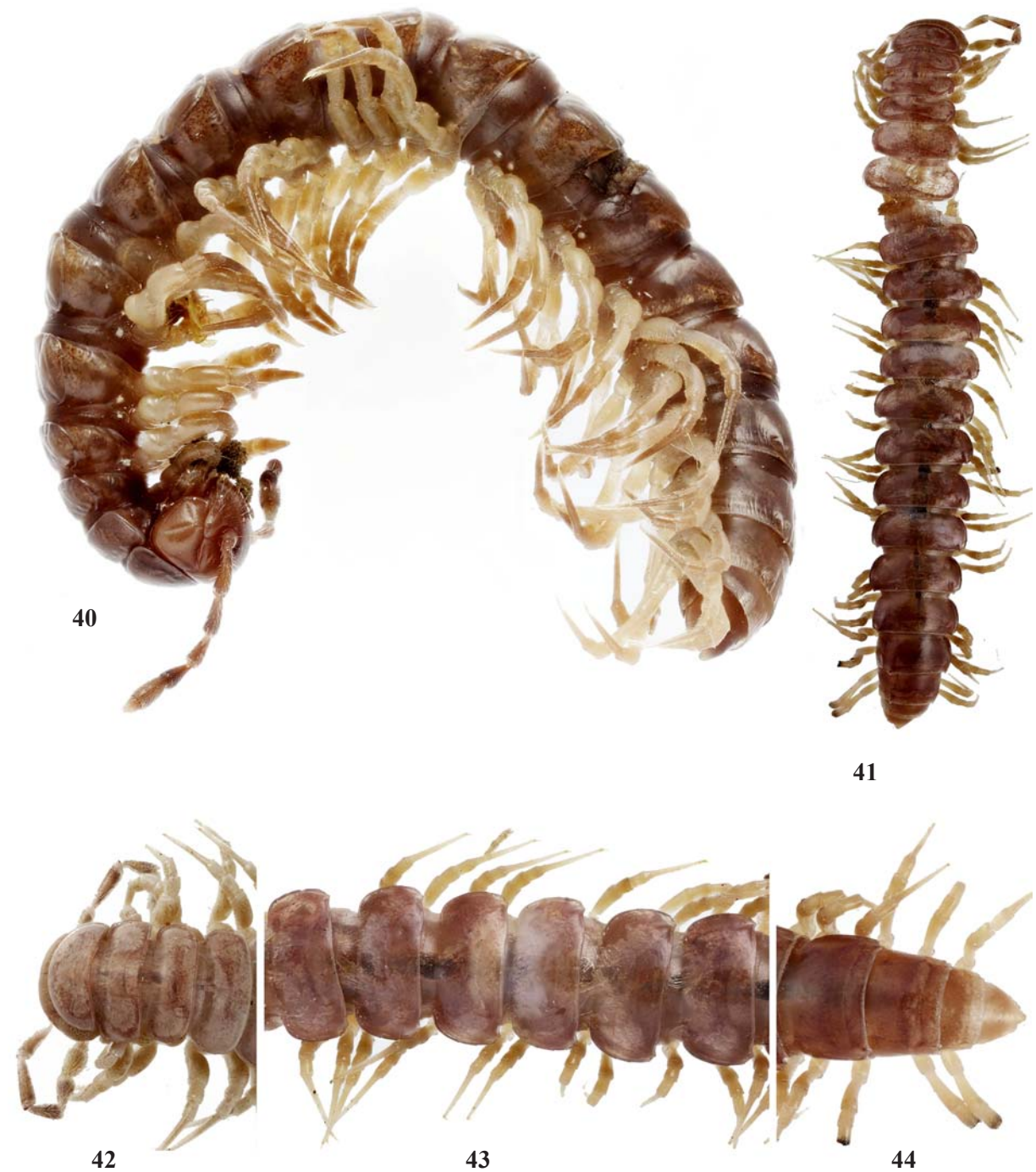
Figs 40–50.

MATERIAL. 3 ♂♂, 1 ♀ (ZMUM p2362), Chile, National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014; 1 ♂ (MNHN), National Park Nahuelbuta, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, all leg. K. Eskov.

REMARKS. *Pleonarius* Attems, 1898 is a small Chilean genus [Attems, 1898, 1914, 1940; Silvestri, 1903, 1905a, b;

Hoffman, 1980] characterized by a peculiar, complex gonopod conformation and a special ozopore formula: 5, 7, 9–19. It contains only two species, of which *P. omalonotus* has sometimes [e.g. Attems, 1940; Chamberlin, 1957] been treated as only a subspecies of the type species *P. pachyskeles* Attems, 1898. Here I follow Demange & Silva [1976b] who, based on type material, depicted the gonopods of both these species in due detail.

New illustrations are provided here to document the identity of the new samples (Figs 40–50), including the peculiar gonopod conformation and smooth metaterga (= absence of metatergal bosses). Both these features are highly characteristic of the species. The gonopods (Figs 45–50)

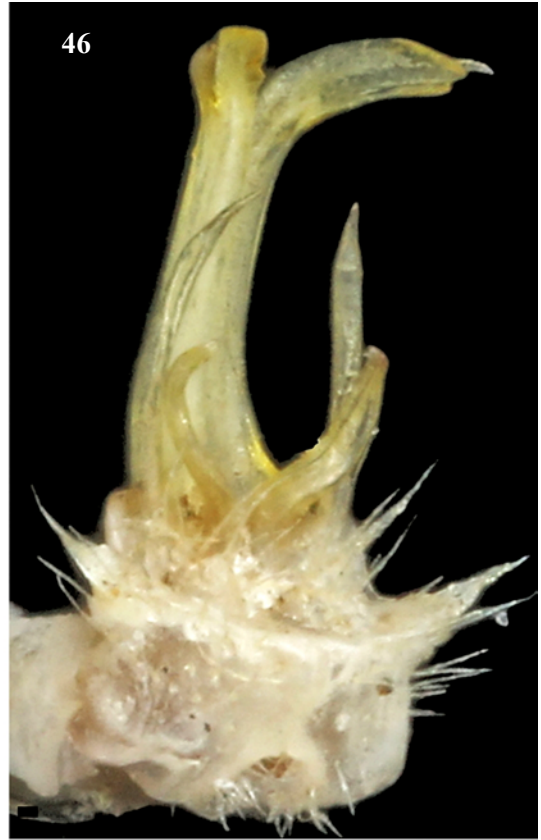
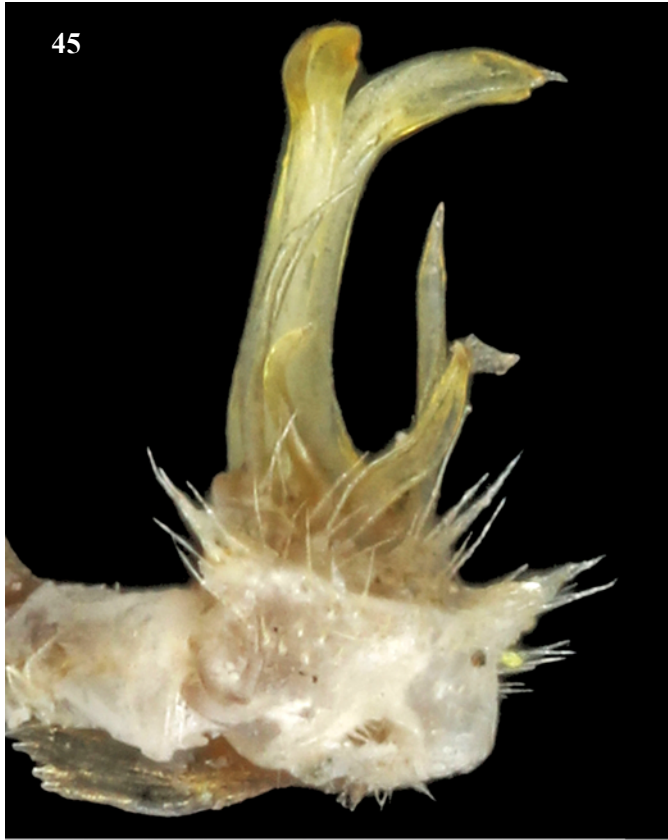


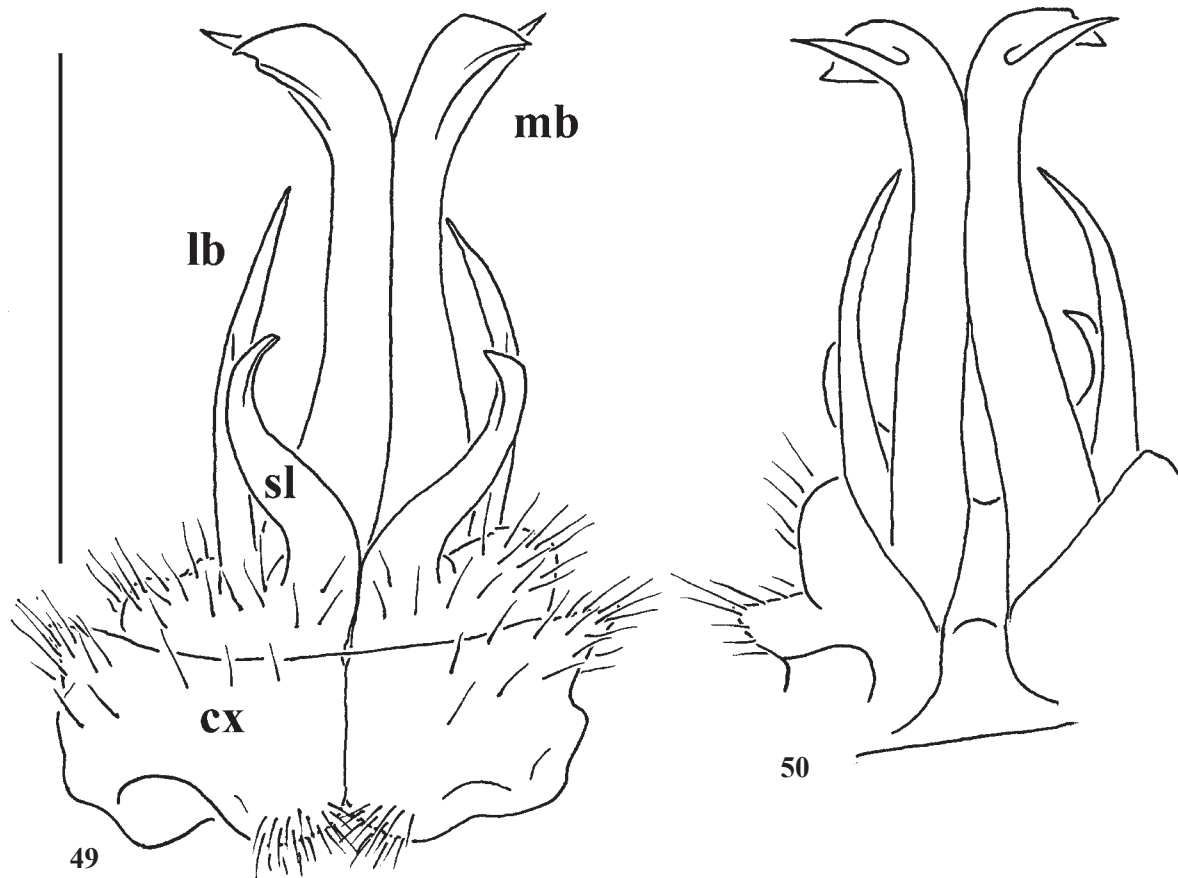
Figs 40–44. *Pleonarius omalonotus* Silvestri, 1903, ♂ from National Park Nahuelbuta (40) and ♂ from National Park Puyehue (41–44). 40–41 — habitus, lateral and dorsal views, respectively; 42, 43–44 — anterior, middle and caudal parts of body, respectively, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 40–44. *Pleonarius omalonotus* Silvestri, 1903, ♂ из национального парка Nahuelbuta (40) и ♂ из национального парка Пуйеhue (41–44). 40–41 — общий вид, соответственно сбоку и сверху; 42, 43–44 — соответственно передняя, средняя и задняя части тела, сверху. Фотографии К. Макарова, без масштаба.

Figs 45–48. Gonopodial block of *Pleonarius omalonotus* Silvestri, 1903, ♂ from National Park Puyehue, lateral or sublateral views. Pictures by K. Makarov, not taken to scale.

Рис. 45–48. Гонаподиальный блок *Pleonarius omalonotus* Silvestri, 1903, ♂ из национального парка Пуйеhue, сбоку или почти сбоку. Фотографии К. Макарова, без масштаба.





Figs 49–50. Gonopodial block of *Pleonarius omalonotus* Silvestri, 1903, ♂ from National Park Puyehue, anterior and posterior views, respectively. Scale bar: 0.5 mm. Designations in text.

Рис. 49–50. Гonoподиальный блок *Pleonarius omalonotus* Silvestri, 1903, ♂ из национального парка Пуйеhue, соответственно спереди и сзади. Масштаб: 0,5 мм. Обозначения в тексте.

are contiguous medially, being fused only in the coxal region (**cx**). Solenomeres (**sl**) are curved, paramedian, contiguous branches lying in front of much higher, similarly simple, but suberect lateral branches (**lb**) flanking particularly strong medial branches (**mb**) with diverging, complex, bifurcate tips.

The species has hitherto been known only from Coipué (35°15' 0"S, 72°4'0"W), Constitución, Talca, central Chile. The new samples derive from southern Chile (Map), demonstrating a far vaster distribution of *P. omalonotus* in the country.

Monenchodesmus inermis Silvestri, 1903
Figs 51–60.

= *Monenchodesmus inermis nahuelhuapiensis* Schubart, 1954, **syn.n.**

= *Monenchodesmus tiganus* Chamberlin, 1957, **syn.n.**

MATERIAL. 1 ♂ (MNHN), Chile, National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014; 1 ♂, 1 ♀ (ZMUM p2400), National Park Alerce Andino, Sargazo Sector, 41°30'S, 72°37'W, ca 350 m a.s.l., *Nothofagus* & *Podocarpus* forest, under logs, 5–11.01.2014; 5 ♀♀, 1 juv. (ZMUM p2411, p2412), National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, all leg. K. Eskov.

REMARKS. The genus *Monenchodesmus* Silvestri, 1903 has hitherto been considered as encompassing six

species or subspecies [Hoffman, 1980] which are mostly confined to Chile. The above new samples unquestionably belong to *M. inermis*, as their gonopods are identical to those which Demange & Silva [1976b] very clearly depicted from a syntype from Coipué (35°15' 0"S, 72°4'0"W), Constitución, Talca, central Chile. Moreover, there is no doubt that, based on the original descriptions and gonopod drawings alone, both *M. tiganus* Chamberlin, 1957 and *M. inermis nahuelhuapiensis* Schubart, 1954 are junior subjective synonyms of *M. inermis*, **syn.n.** [cf. Schubart, 1954; Chamberlin, 1957]. In addition, the *M. tiganus* types (1 ♂, 1 ♀) originated from near Puyehue, thus reinforcing the above synonymy. As a result, *M. inermis*, one of the largest and most conspicuous species of Dalodesmidae in the present collection (Figs 51–60), seems to be quite widespread and common in southern Chile south of Valdivia (Map), as well as in the adjacent Nahuel Huapi National Park, Argentina (40°44'S, 71°39'W). The body is 26–28 mm long, 2.3–2.5 and 3.5–3.8 mm wide on midbody pro- and metazonae, respectively (♂, ♀). Coloration is usually red-brown, with prominent, caudally mostly acute, laterally finely indentated paraterga; the postcollum metaterga are with low, but evident bosses arranged in four transverse rows; ♂ prefemora are not bulged laterally.



Figs 51–55. *Monenchodesmus inermis* Silvestri, 1903, ♂ from National Park Nahuelbuta. 51–52 — habitus, lateral and dorsal view, respectively; 53, 54–55 — anterior, middle and posterior parts of body, respectively, dorsal view. Pictures by K. Makarov, not taken to scale.

Рис. 51–55. *Monenchodesmus inermis* Silvestri, 1903, ♂ из национального парка Nahuelbuta. 51–52 — общий вид, соответственно сбоку и сверху; 53, 54–55 — соответственно передняя, средняя и задняя части тела, сверху. Фотографии К. Макарова, без масштаба.



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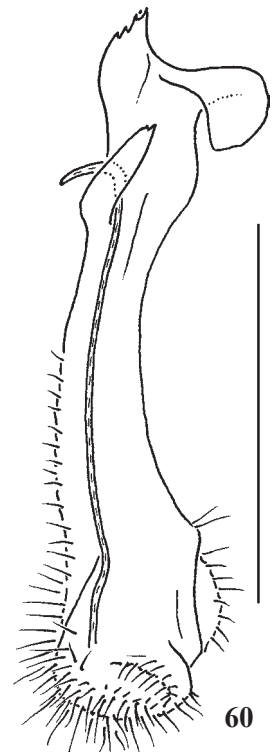
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Figs 56–60. *Monenchodesmus inermis* Silvestri, 1903, ♂ from National Park Park Puhue (56–57) and ♂ from National Alerce Andino (58–60). 56 — anterior part of body, ventral view; 57 — gonopods *in situ*, ventrocaudal view; 58 — both gonopods, mesal and sublateral views, respectively; 59–60 — left gonopod, lateral and anterior views, respectively. Pictures by K. Makarov, not taken to scale (56–59). Scale bar: 1.0 mm (60).

Рис. 56–60. *Monenchodesmus inermis* Silvestri, 1903, ♂ из национального парка Puhue (56–57) и ♂ из национального парка Alerce Andino (58–60). 56 — передняя часть тела, снизу; 57 — гоноподы *in situ*, одновременно снизу и сзади; 58 — оба гонопода, соответственно изнутри и почти сбоку; 59–60 — левый гонопод, соответственно сбоку и спереди. Фотографии К. Макарова, без масштаба (56–59). Масштаб: 1,0 мм (60).

Tsagonus nahuelbutae Chamberlin, 1957

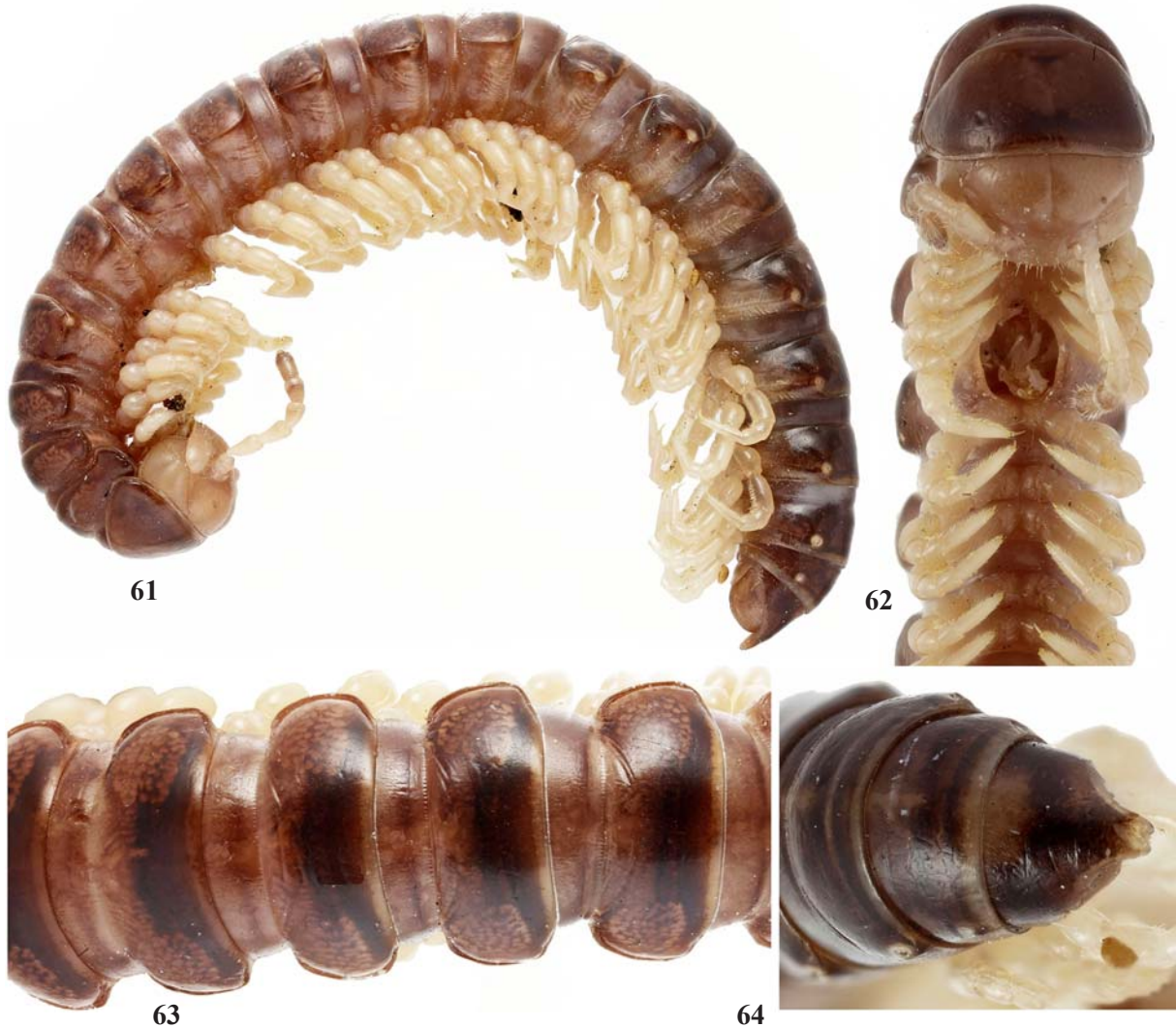
Figs 61–68.

MATERIAL. 1 ♂, 1 ♀ (MNHN), Chile, National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, 14–20.01.2014, leg. D. Shcherbakov; 10 ♂♂, 7 ♀♀, 5 juv., 1 fragm. (ZMUM p2413), National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014; 1 ♂, 1 ♀ (ZMUM p2414), National Park Alerce Andino, Sargazo Sector, 41°30'S, 72°37'W, ca 350 m a.s.l., *Nothofagus* & *Podocarpus* forest, 5–11.01.2014, all leg. K. Eskov; 1 ♂, 1 ♀ (ZMUM p2415), National Park Huerquehue, near Lake Tinquilco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* forest, litter, 24–26.12.2013, leg. R. Rakitov.

REMARKS. The genus *Tsagonus* Chamberlin, 1957 has hitherto been considered to contain seven nominate species [Hoffman, 1980], all from Chile and the adjacent parts of Argentina. The above samples, partly strictly topotypic, definitely belong to *T. nahuelbutae*, as the new illustrations clearly document (Figs 61–68). Coloration of adults is rather uniform, ranging from marbled pinkish to pinkish (grey-) brown. The body is ca 25–27 mm in length, 2.5–2.7 and 2.8–

3.0 mm in width on midbody pro- and metazonae, respectively (♂, ♀). Paraterga are small, broadly rounded, narrowly rimmed only dorsally. Most of ♂ prefemora are distinctly bulged laterally. The gonopods (Figs 65–68) are characterized by prominent, caudally or mediocaudally curved, lateral branches (**lb**), each bearing a mesal spinicle near the curvature point; the solenomeres (**sl**) are rather long, slender, suberect, paramedian branches bearing a paramedian pair of short, thin, contiguous spines caudally (**c**), being also flanked by similarly short, slightly curved, anterolateral prongs (**a**) [cf. Chamberlin, 1957; Demange & Silva, 1976a].

Because the remaining congeners of *T. nahuelbutae*, i.e. *T. muermo* Chamberlin, 1957, *T. osorno* Chamberlin, 1957 (the type species), *T. puconus* Chamberlin, 1957, *T. valdiviae* Chamberlin, 1957, *T. silvestrii* (Demange & Silva, 1976) and *T. silvestrii solervicensi* (Demange & Silva, 1976), are all so similar to one another, their statuses require verification. Demange & Silva [1976a] treated all these taxa as belonging to group A, or the *silvestrii*-group, of the genus *Semnosoma* Silvestri, 1903, also providing a key for their identification.



Figs 61–64. *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ from National Park Nahuelbuta. 61 — habitus, lateral view; 62–64 — anterior, middle and posterior parts of body, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 61–64. *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ из национального парка Nahuelbuta. 61 — общий вид, сбоку; 62–64 — передняя, средняя и задняя части тела, соответственно снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.

However, variation in gonopod structure is generally so minor that *Tsagonus* seems to represent a nice model for future molecular studies, bar-coding in particular.

Demange [1963] reported "*Anaulacodesmus*" *concolor* (Gervais, 1847) from Nahuel Huapi (40°44'S, 71°39'W), Argentina, apparently relying on Attems' [1898, 1940] (mis)identification. Later, based on a revision of the ♀ holotype of *Strongylosoma concolor* Gervais, 1847, Demange & Silva [1976a] found this species to be different from what Attems [1898, 1940] and Silvestri [1905] had identified as *Anaulacodesmus concolor* or *Semnosoma concolor*, respectively, and renamed the latter species as *S. silvestrii* Demange & Silva, 1976. Hoffman [1980], following Chamberlin's [1957] assignment of "*concolor*" in the sense of Attems [1898, 1940] and Silvestri [1905], treated *S. silvestrii* within *Tsagonus*, resurrecting the latter genus from synonymy under *Semnosoma* and restricting it to some three species from

Chile. Here I follow Hoffman's [1980] classification, also adding a new *Semnosoma*.

In addition, Demange & Silva [1976a] corrected Demange's [1963] earlier misidentification and referred the Nahuel Huapi sample to *T. valdiviae* Chamberlin, 1957, albeit still assigning it to "*Anaulacodesmus*".

Semnosoma eskovi sp.n.

Figs 69–78.

HOLOTYPE ♂ (ZMUM p2416), Chile, National Park Puyehue, Antillanca Sector, 40°46'S, 72°12'W, ca 1060 m a.s.l., *Nothofagus* & *Podocarpus* forest, moss, 16.01.2014, leg. K. Eskov.

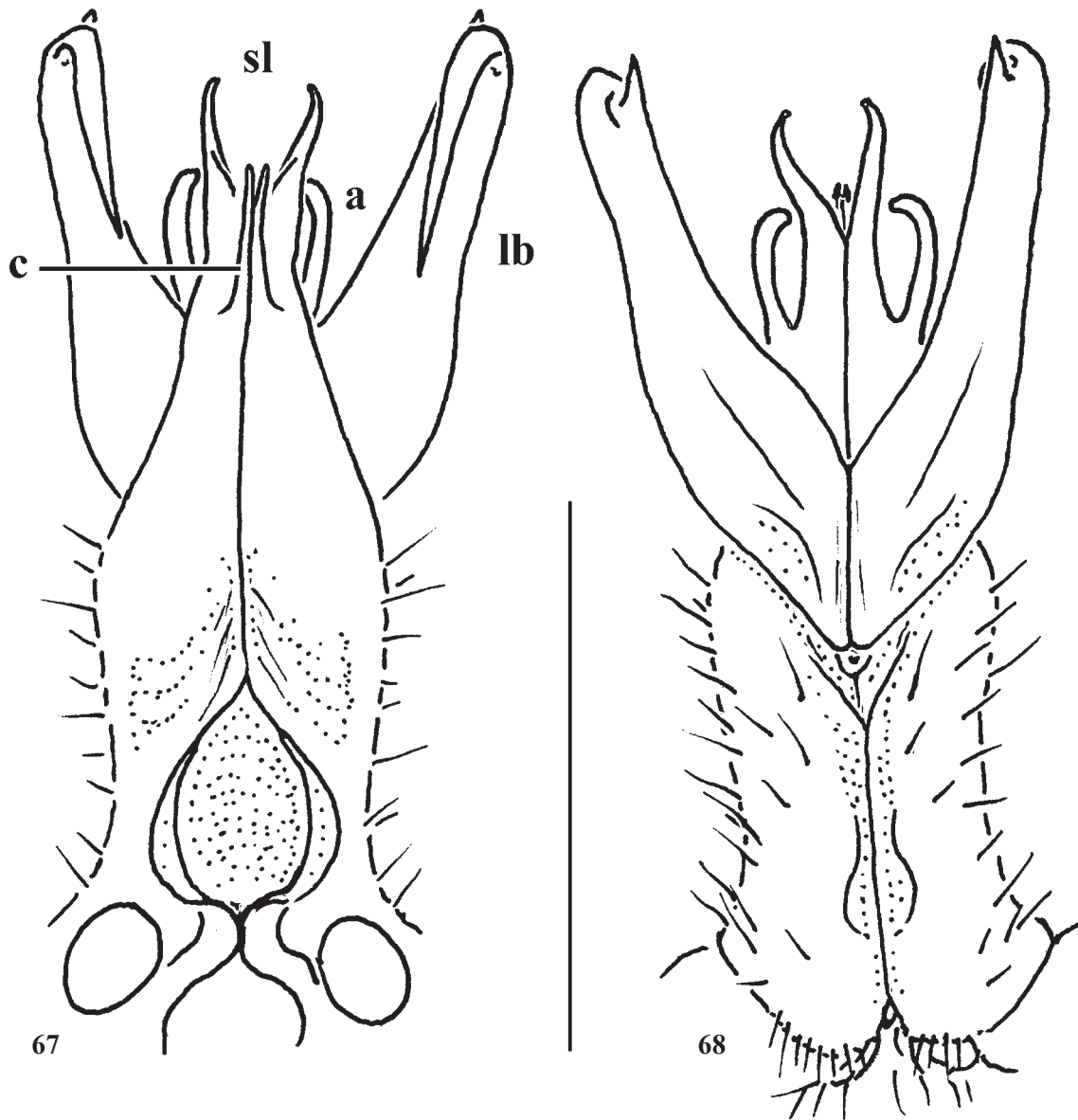
PARATYPES. 1 subad. ♀ (ZMUM p2417), same data, together with holotype; 2 ♂♂, 1 ♀ (ZMUM p2418), same locality, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014, leg. K. Eskov.

NAME. Honours Kirill Y. Eskov, the main collector.



Figs 65–66. Gonopodial block of *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ from National Park Nahuelbuta, caudolateral and caudal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 65–66. Гोनоподальный блок *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ из национального парка Nahuelbuta, соответственно одновременно сзади и сбоку, а также сзади. Фотографии К. Макарова, без масштаба.



Figs 67–68. Gonopodial block of *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ from National Park Nahuelbuta, posterior and anterior views, respectively. Scale bar: 1.0 mm. Designations in text.

Рис. 67–68. Гонаподиальный блок *Tsagonus nahuelbutae* Chamberlin, 1957, ♂ из национального парка Nahuelbuta, соответственно сзади и спереди. Масштаб: 1,0 мм. Обозначения в тексте.

DIAGNOSIS. Differs from all three known congeners, *S. concolor* (Gervais, 1847) (the type-species, according to Hoffman [1980], = *Chilorus ovalenus* Chamberlin, 1957, the type species of *Chilorus* Chamberlin, 1957), *S. permittatus* Attems, 1940 (nom.n. pro *Chiliosoma porteri* Brölemann, 1916, nom.praeoccup.) and *S. zapallar* Chamberlin, 1957, by the rather small, single, caudomedially curved solenomere (**sl**), coupled with the deeply split apicocaudal branch (**cb1** and **cb2**).

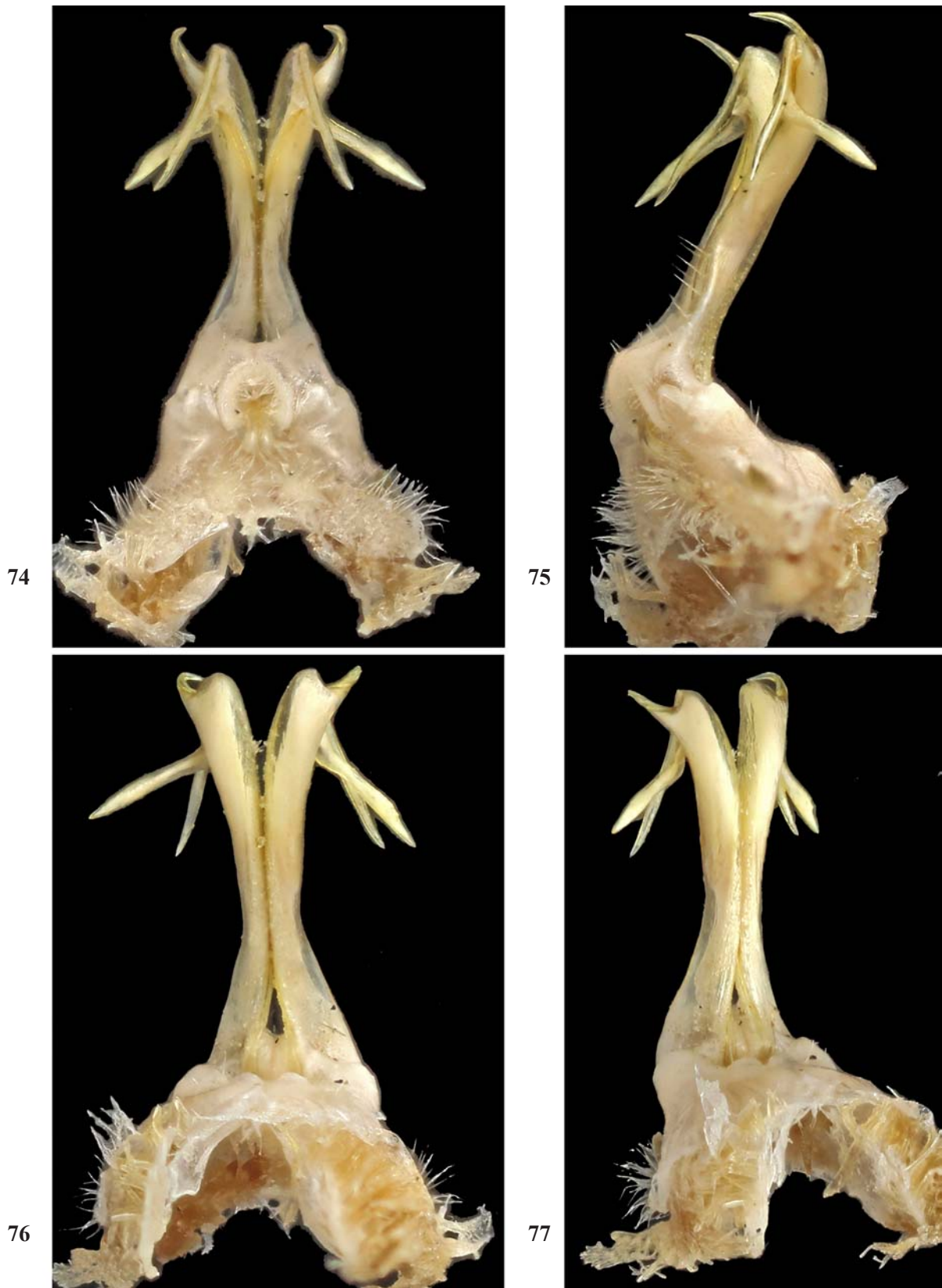
DESCRIPTION. Length ca 14–16 mm, width of midbody pro- and metazonae 1.4–1.6 and 1.7–1.9 mm, respectively (♂, ♀). Holotype ca 15 mm long, 1.5 and 1.9 mm wide on midbody pro- and metazonae, respectively. General coloration in alcohol light marbled grey brown to grey-brown usually with a vague pattern of darker sides and a central, more or less triangular spot on metaterga (Figs 69–73); legs light grey to nearly pallid.

Body with 20 segments, slightly moniliform. In width, segment 2 = 3 < head = collum = segment 5 < 6–16; thereafter

Figs 69–73. *Semnosoma eskovi* sp.n., ♂ paratype. 69 — habitus, lateral view; 70–73 — anterior, anterior, middle and posterior parts of body, dorsal, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 69–73. *Semnosoma eskovi* sp.n., паратип ♂. 69 — общий вид, сбоку; 70–73 — передняя, передняя, средняя и задняя части тела, соответственно сверху, снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.





Figs 74–77. Gonopodial block of *Semnosoma eskovi* sp.n., ♂ paratype: 74–75 — posterior and lateral views, respectively; 76–77 — anterior and nearly anterior views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 74–75. Гोनоподальный блок *Semnosoma eskovi* sp.n., паратип ♂: 74–75 — соответственно сзади и сбоку; 76–77 — соответственно спереди и почти спереди. Фотографии К. Макарова, без масштаба.

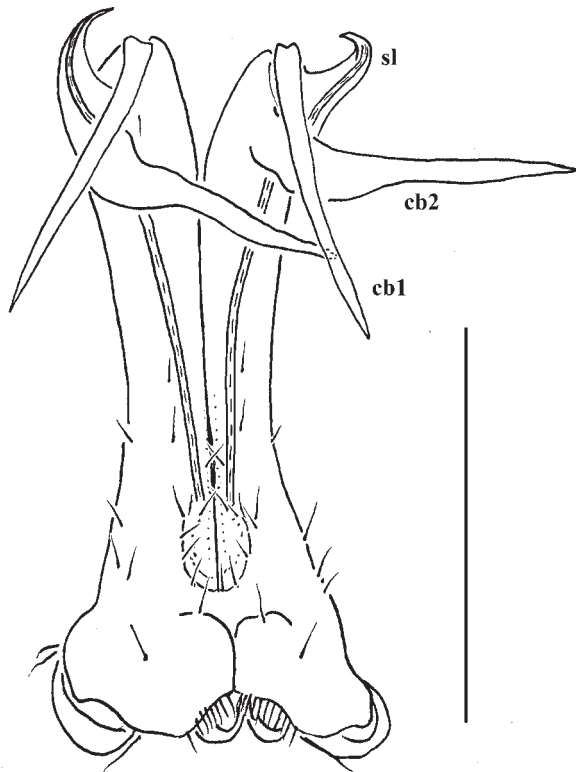


Fig. 78. Gonopodial block of *Semnosoma eskovi* sp.n., ♂ holotype, nearly posterior view. Scale bar: 0.5 mm. Designations in text.

Рис. 78. Гонаподиальный блок *Semnosoma eskovi* sp.n., голотип ♂, почти сзади. Масштаб: 0,5 мм. Обозначения в тексте.

body gradually tapering. Clypeolabral region rather sparsely setose, vertigial region bare. Antennae long, extending back behind segment 3 when stretched dorsally, a little shorter in ♀ than in ♂, somewhat clavate; in length, antennomeres 2 = 3 = 6 > 4 = 5 > 1; 5th and 6th each with a small distodorsal group of minute bacilliform sensilla. Paraterga very poorly developed (Figs 69–73), invariably broadly rounded, narrowly rimmed only dorsally, never produced behind tergal margin, set low, mostly lying at ca 1/3 of midbody height. Pore formula normal (5, 7, 9, 10, 13, 15–19), ozopores dorsolateral, lying slightly in front of caudal corner. Body surface shining and mostly smooth throughout, texture microalveolate. Limbus microspiculate. Axial line, tergal setae and pleurosternal carinae wanting. Stricture dividing pro- and metazonae rather broad and shallow, very finely striolate dorsally and dorsolaterally. Epiproct long, subtruncate, subapical lateral papillae very small. Hypoproct subtrapeziform, caudal 1+1 setae borne on small knobs and well separated.

Sternites without modifications, poorly setose; cross-impressions evident. Legs long, in ♂ obviously incrassate, ca 1.4–1.5 times as long as body height, prefemora 3–7 particularly strongly swollen laterally, increasingly poorly bulged thereafter; ♂ telopodites very densely setose ventrally, with abundant sphaerotrichomes, in ♀ slender, unmodified, only ca 1.1 times as long as body height.

Gonopods (Figs 74–78) with short, medially fused, basally densely setose coxites, the latter with curved, medially contiguous cannulae; telopodites contiguous medially, held

subrectangular to coxae, suberect, each bearing a seminal groove on caudal face alone; prefemoral part sparsely setose, about as long as acropodite; the latter crowned by a lateral, unciform, inward curved solenomere (sl) and a distinct geniculation turning into a long, slender, caudal branch split into two spines (cb1 & cb2) at its very base.

Abatodesmus simplicior sp.n.
Figs 79–86.

HOLOTYPE ♂ (ZMUM ρ2419), Chile, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, leg. K. Eskov.

PARATYPES: 3 ♂♂ (ZMUM ρ2420), 1 ♂ (MNHN), same data, together with holotype.

NAME. To emphasize a gonopod conformation somewhat simpler than in other congeners.

DIAGNOSIS. Differs from both hitherto known congeners, *A. chilensis* Silvestri, 1903 (the type species), from Coipué (35°15' 0"S, 72°4' 0"W), Constitución, Talca, central Chile, and *A. velosoi* Demange & Silva, 1971, from Nahuelbuta, southern Chile, by the shape of the various outgrowths (sl, c, a and ib) of the gonopod tip [cf. Demange & Silva, 1971b].

DESCRIPTION. Length ca 21–22 mm, width of midbody pro- and metazonae 1.8–1.9 and 2.0–2.1 mm, respectively (♂). Holotype ca 21 mm long, 1.8 and 2.0 mm wide on pro- and metazonae, respectively. Coloration generally marbled pinkish brown to dark brown, legs yellowish (Figs 79–83).

All characters as in *Semnosoma eskovi* sp.n., except as follows.

Antennae short, extending back only behind collum (♂). Paraterga very poorly developed (Figs 79–83), broadly rounded, very narrowly rimmed only dorsally, never produced behind tergal margin. Surface below paraterga with a few arcuated striae. Stricture dividing pro- and metazonae thin, rather shallow, ribbed dorsally and dorsolaterally. Hypoproct roundly subtriangular, caudal 1+1 setae borne on small knobs and rather poorly separated.

Legs short, obviously incrassate, ca 1.1–1.2 times as long as body height, prefemora mostly strongly swollen laterally, increasingly poorly bulged until posterior 1/3 body.

Gonopods (Figs 84–86) especially complex; prefemoral (= setose) part of telopodites contiguous medially; acropodites somewhat longer and divergent, bearing seminal grooves on anterior face and divided distally into paramedian pairs of lateral solenomeres (sl), smaller digits (c), longer inner branches (ib) and caudal spines (a).

REMARKS. The genus *Abatodesmus* Silvestri, 1903 has been revised by Demange & Silva [1971b] and is known to contain only two species [Hoffman, 1980], both from Chile and both showing especially complex gonopod tips. The new species is sympatric with *A. velosoi* (see Map), but differs very clearly in a somewhat less complex gonopod structure.

Anaulacodesmus angolus Chamberlin, 1957
Figs 87–95.

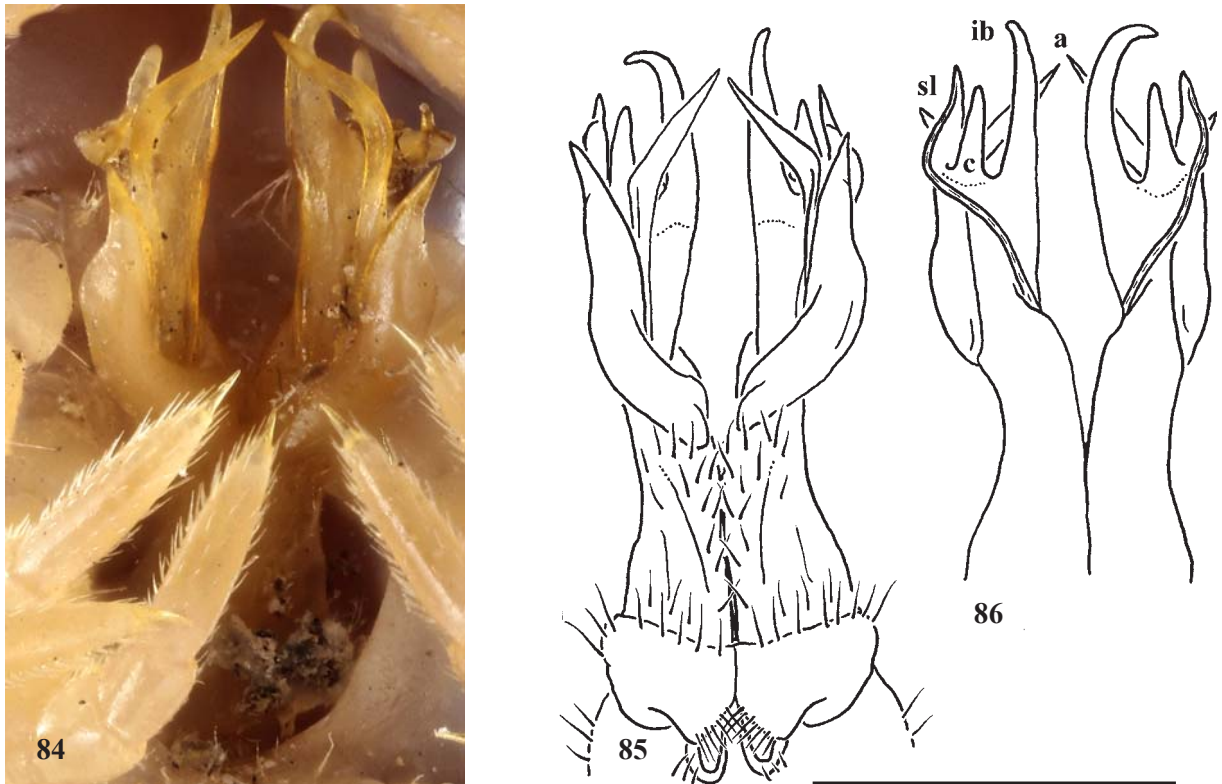
MATERIAL. 10 ♂♂, 3 ♀♀, 3 juv. (ZMUM ρ2405), 1 ♂ (MNHN), Chile, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., low *Nothofagus* forest with gramineous tussocks, litter, 26.01.2014, leg. K. Eskov.

REMARKS. The genus *Anaulacodesmus* Attems, 1898 is certainly the largest and most widespread among the Dalodesmidae of Chile and Argentina, counting 16 species [Hoffman, 1980]. The gonopods of *Anaulacodesmus* are quite uniform, each gonopod normally being characteristically tri-



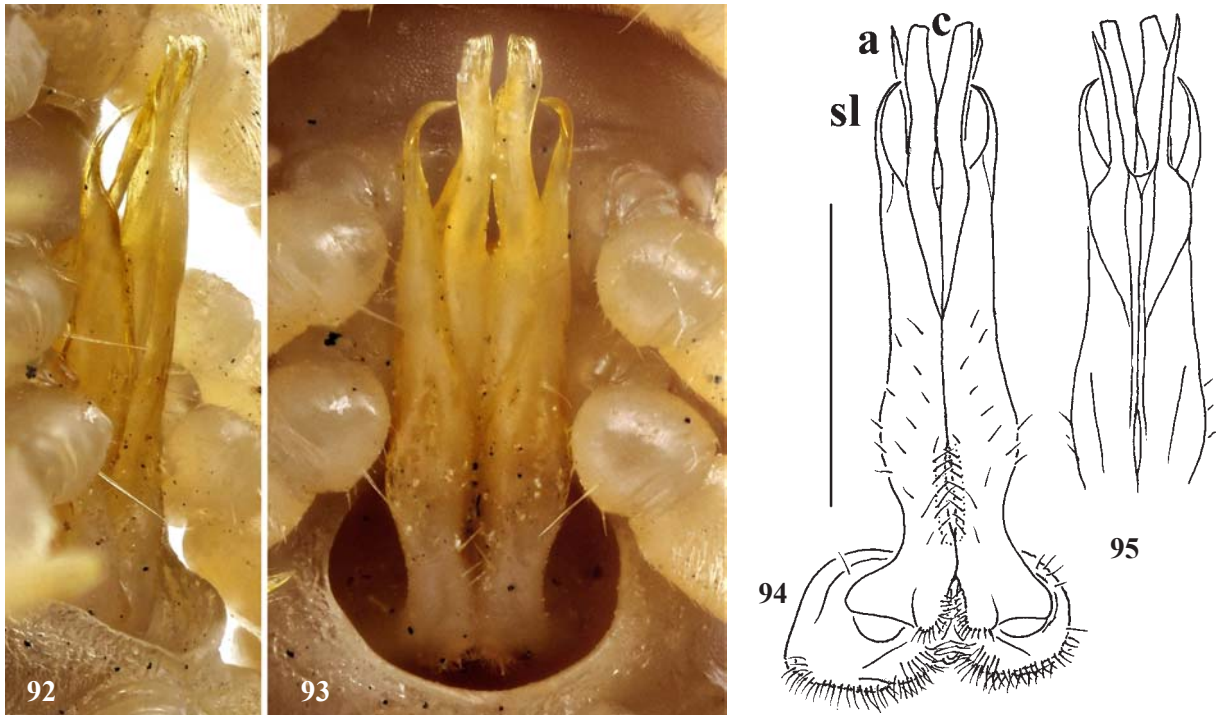
Figs 79–83. *Abatodesmus simplicior* sp.n., ♂ paratype. 79–80 — habitus, lateral and dorsal views, respectively; 81–83 — anterior, middle and posterior parts of body, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 79–83. *Abatodesmus simplicior* sp.n., паратип ♂. 79–80 — общий вид, соответственно сбоку и сверху; 81–83 — передняя, средняя и задняя части тела, соответственно снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.



Figs 84–86. Gonopodial block of *Abatodesmus simplicior* sp.n., ♂ paratypes, posterior, posterior and anterior views, respectively. Picture by K. Makarov, not taken to scale (84); scale bar: 1.0 mm (85–86). Designations in text.

Рис. 84–86. Гonoподиальный блок *Abatodesmus simplicior* sp.n., паратипы ♂♂, соответственно сзади, сзади и спереди. Фотография К. Макарова, без масштаба (84); масштаб: 1,0 мм (85–86). Обозначения в тексте.



Figs 92–95. Gonopodial block of *Anaulacodesmus angolus* Chamberlin, 1957, ♂♂, lateral, posterior, posterior and anterior views, respectively. Pictures by K. Makarov, not taken to scale (92–93); scale bar: 1.0 mm (94–95). Designations in text.

Рис. 92–95. Гonoподиальный блок *Anaulacodesmus angolus* Chamberlin, 1957, ♂♂, соответственно сбоку, сзади, сзади и спереди. Фотографии К. Макарова, без масштаба (92–93); масштаб: 1,0 мм (94–95). Обозначения в тексте.



Figs 87–91. *Anaulacodesmus angolus* Chamberlin, 1957, ♂. 87 — habitus, lateral view; 88–91 — anterior, anterior, middle and posterior parts of body, dorsal, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 87–91. *Anaulacodesmus angolus* Chamberlin, 1957, ♂. 87 — общий вид, сбоку; 88–91 — передняя, передняя, средняя и задняя части тела, соответственно сверху, снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.

fid, showing a lateral, usually somewhat curved and helicoid solenomere (**sl**), as well as paramedian caudal (**c**) and anterior (**a**) branches. Their shapes and relative proportions are deemed to be species-characteristic, although intraspecific variations are also observed.

The above samples unquestionably represent *A. angolus*, as described and depicted by Chamberlin [1957]. Moreover, they are strict topotypes (Map). The new illustrations (Figs 87–95) are provided to document the identity of the new material. The body is 17–19 mm long, 1.8–1.9 and 2.1–2.2 mm wide on midbody pro- and metazonae, respectively. Coloration light grey-brown to grey-brown, often with an indistinct pattern of central darker spots on metaterga. Paraterga are small, narrowly rimmed only dorsally, in rear body half small caudal spinicles. ♂ prefemora 3–7 are especially distinctly bulged laterally, increasingly poorly so towards the rear body half. The gonopods show a pair of lateral, slender and rather long solenomeres (**sl**), both curved mesad, and two paramedian pairs of considerably higher branches, the caudal pair (**c**) being flattened/thicker and subtruncate, as opposed to a similarly high anterior pair of spiniform branches (**a**).

Anaulacodesmus lacustris Schubart, 1954

Figs 96–101.

MATERIAL. 5 ♂♂, 1 ♀ (ZMUM p2421, p2431), **Argentina**, Villa la Angostura, National Park Arrayanes, 40°50'S, 71°37'W, ca 800 m a.s.l., *Luma* & *Nothofagus* forest, under logs & stones, 23.12.2013; 7 ♂♂, 12 ♀♀, 2 juv. (ZMUM p2422), Villa la Angostura, 40°47'S, 71°40'W, wet *Carex* meadow, litter, 26.12.2013, all leg. K. Eskov; 1 ♂, 1 ♀, 1 subad. ♂ (ZMUM p2423), **Chile**, National Park Huerquehue, near Lake Tinquilco, 39°10'S, 71°44'W, ca 780 m a.s.l., 20–26.12.2013, leg. D. Shcherbakov; 1 ♂, 2 ♀♀, 1 juv., (ZMUM p2457), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014; 2 ♂♂ (MNHN), National Park Puyehue, Antillanca Sector, 40°46'S, 72°12'W, ca 1060 m a.s.l., wet *Juncus* & *Carex* meadow, litter, 16.01.2014; 1 ♂ (ZMUM p2425), same locality, Anticura Sector, *Nothofagus* forest, under logs, 12–20.01.2014; all leg. K. Eskov.

REMARKS. This species has hitherto been known from some two localities in the Andes of Argentina [Schubart, 1954; Demange, 1963], i.e. the Nahuel Huapi (40°44'S, 71°39'W) and Lanín (39°38'S, 71°30'W) national parks. The above samples document it from the adjacent parts of Chile as well, thus providing the first Chilean records (Map). The new illustrations (Figs 96–101) are given to document the identity of the new material. The body is 17–18 mm long, 1.6–1.8 and 1.8–2.0 mm wide on pro- and metazonae, respectively (♂, ♀). Coloration is generally pale grey to dark grey-brown, the pattern is often vague central triangular darker spots visible on metaterga. ♂ prefemora 3–7 are especially distinctly bulged laterally, thereafter increasingly poorly so until about caudal 1/2–1/3 body. The solenomeres (**sl**) are unusually small and rod-shaped, whereas the caudal (**c**) and anterior (**a**) branches are subequal in form and height.

Anaulacodesmus levissimus Attems, 1898

Figs 102–118.

MATERIAL. 3 ♂♂, 1 ♀, 4 juv., 1 fragm. (ZMUM p2425–2427), **Chile**, National Park Nahuelbuta, Pehuenco, 37°50'S, 73°01'W, ca 1120 m a.s.l., low *Nothofagus* forest with gramineous tussocks, litter, 26.01.2014; 1 ♂ (MNHN), same locality, *Nothofagus* & *Araucaria* forest, under logs & stones, 22–26.01.2014, all leg. K. Eskov; 1 ♂, 5 juv. (ZMUM p2428), Chiloe Island, National Park Chiloe, 42°07'S, 74°01'W, matorral, fern litter, 28.12.2013, leg. D. Takiya; 1 ♂ (ZMUM p2429), Chiloe Island, Senda Darwin Biological Station (ca 15 km E of Ancud), 41°53'S, 73°40'W, 25 m

a.s.l., wet gramineous meadow, litter, 2.01.2014; 1 ♂ (ZMUM p2430), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014, all leg. K. Eskov.

REMARKS. This seems to be the most polymorphous species of *Anaulacodesmus*, with several morphs long delimited, mainly based on gonopod structure [e.g. Demange & Silva, 1976b]. The new samples seem to represent a few morphs as well. Thus, adults from Nahuelbuta (Figs 102–108) are 16–19 mm long, 1.7–1.9 and 2.0–2.4 mm wide on midbody pro- and metazonae, respectively; coloration is marbled grey-brown to dark brown, usually with a distinct pattern of darker central spots on metaterga; legs lighter, grey to yellowish; paraterga are poorly developed, very narrowly rimmed laterally, faintly produced behind tergal margin and dentiform only in segments 17–19; metaterga on each side above paraterga with a rather deep sublateral sulcus which is increasingly deep caudad and usually abbreviated/obliterated in anterior 1/2–2/3; areation is normally strongly obliterated, better visible only in several caudal segments and above paraterga in 1–3 transverse caudal rows; sides below paraterga are typically with several arcuated striae; ♂ prefemora 3–7 are especially strongly bulged laterally, thereafter increasingly poorly so until legs of caudal 1/2–1/3 body; legs are clearly incrassate, beset with ventral sphaerotrichomes and 1.4–1.5 times as long as body height in ♂, versus slender, unmodified and only 1.1–1.2 times as long as body height in ♀ (Figs 102–105); gonopods (Figs 106–108) are with very slender, spiniform, anterior (**a**) and caudal (**c**) paramedian branches flanked by strong, clearly divergent solenomeres (**sl**). In the samples from Chiloe and Puyehue (Figs 109–118), most paraterga are dentiform caudally and slightly produced behind the rear tergal margin, whereas the solenomeres (**sl**) are rather convergent, also being much lower than both pairs of paramedial branches (**a** and **c**).

It seems most advisable to apply bar-coding to check if *A. levissimus* is indeed a single species. In general, the taxonomy of *Anaulacodesmus* is still quite confused, remaining much to desire [cf. Attems, 1940; Chamberlin, 1957; Demange & Silva, 1976b].

Anaulacodesmus bifidus sp.n.

Figs 119–127.

HOLOTYPE ♂ (ZMUM p2432), **Chile**, National Park Alerce Andino, Sargazo Sector, 41°30'S, 72°37'W, ca 350 m a.s.l., *Nothofagus* & *Podocarpus* forest, under logs, 5–11.01.2014, leg. K. Eskov.

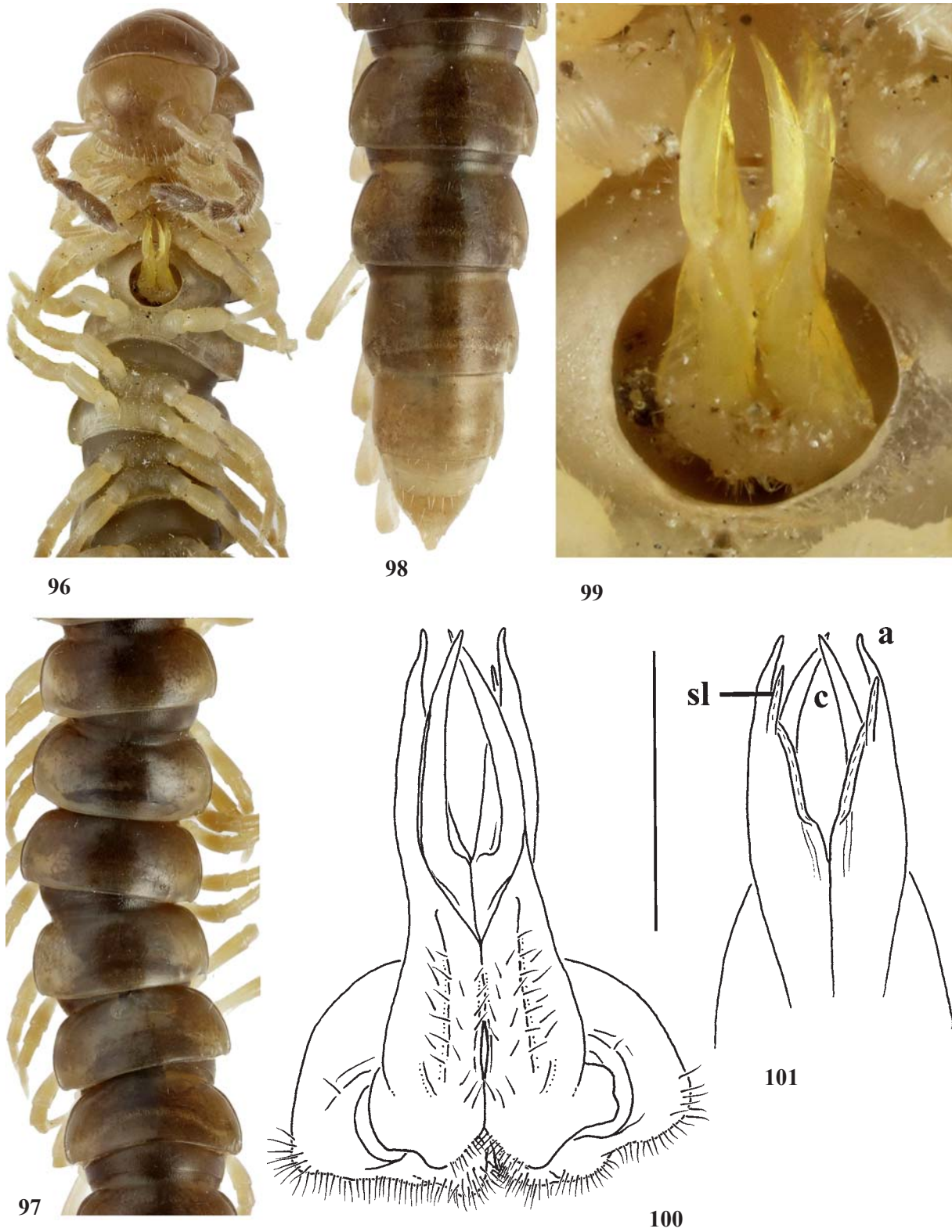
PARATYPE: 1 ♂ (ZMUM p2433), National Park Puyehue, Anticura Sector, 40°40'S, 72°10'W, ca 390 m a.s.l., *Nothofagus* forest, under logs, 14–20.01.2014, leg. K. Eskov.

NAME. To emphasize the bifid gonopod tip.

DIAGNOSIS. Differs clearly from all congeners by a bifid, not trifid, gonopod tip.

DESCRIPTION. Length ca 16–17 mm, width of midbody pro- and metazonae 1.3 and 1.7 (♂ paratype) or 1.5 and 1.8 mm (♂ holotype), respectively. General coloration in alcohol marbled grey brown with a vague pattern of darker sides and a central, more or less triangular spot on metaterga (Figs 119–123); legs light grey.

Body with 20 segments, slightly moniliform. In width, head = segment 2 = 3 < collum = 4 < segment 5–16; thereafter body gradually tapering. Clypeolabral region sparsely setose, vertical region bare. Antennae very long and slender, extending back behind segment 3 or 4 when stretched dorsally; in length, antennomeres 2 = 3 > 6 > 4 = 5 > 1; 5th and 6th each with a small distodorsal group of minute bacilliform sensilla. Paraterga very poorly developed (Figs 119–123), mostly



Figs 96–101. *Anaulacodesmus lacustris* Schubart, 1954, ♂ from National Park Puyehue. 96–98 — anterior, middle and posterior parts of body, ventral, dorsal and dorsal views, respectively; 99–101 — gonopodial block, posterior, posterior and anterior views, respectively. Pictures by K. Makarov, not taken to scale (96–99); scale bar: 0.5 mm (100–101). Designations in text.

Рис. 96–101. *Anaulacodesmus lacustris* Schubart, 1954, ♂ из национального парка Пуйеhue. 97 — общий вид, сбоку; 98–101 — передняя, средняя и задняя части тела, соответственно сверху, снизу, сверху и сверху. Фотографии К. Макарова, без масштаба (96–99); масштаб: 0,5 мм (100–101). Обозначения в тексте.



Figs 102–105. *Anaulacodesmus levissimus* Attems, 1898, ♂ from National Park Nahuelbuta. 102 — habitus, lateral view; 103–105 — anterior, middle and posterior parts of body, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 102–105. *Anaulacodesmus levissimus* Attems, 1898, ♂ из национального парка Nahuelbuta. 102 — общий вид, сбоку; 103–105 — передняя, средняя и задняя части тела, соответственно снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.

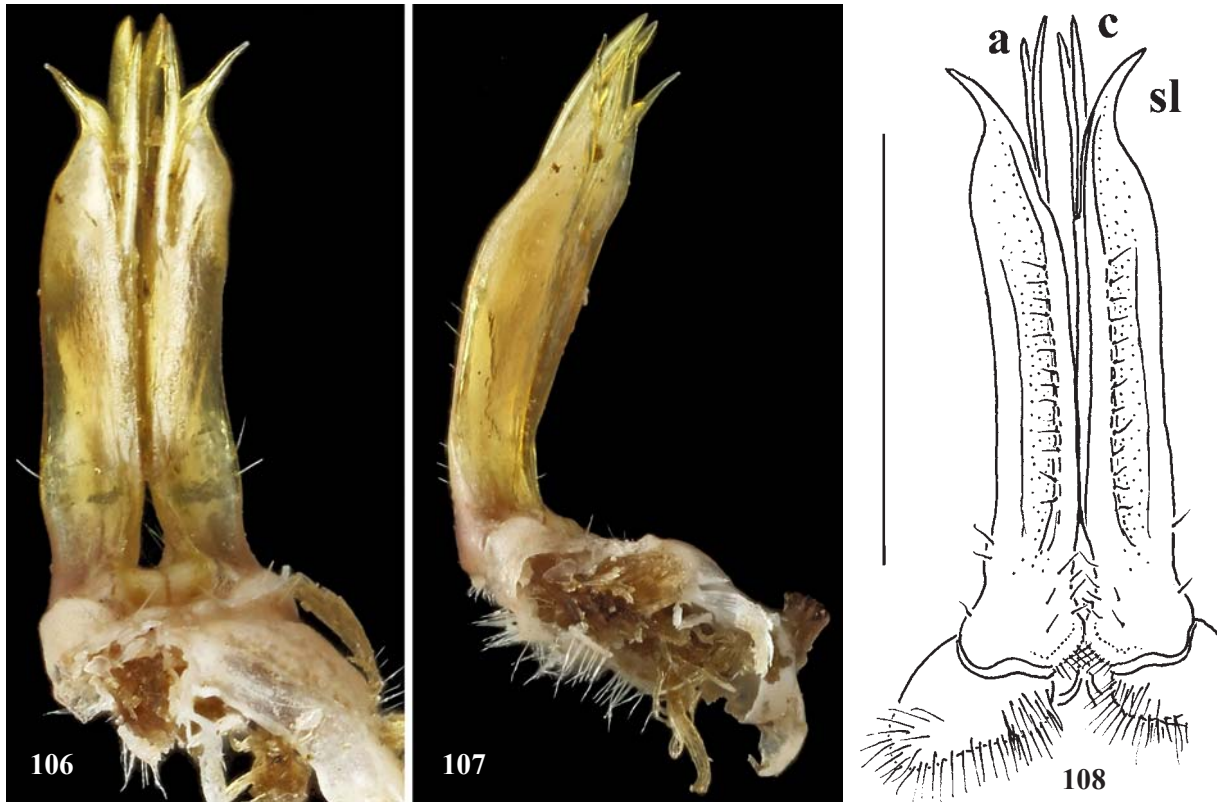
broadly rounded, narrowly rimmed only dorsally, dentiform and slightly produced behind tergal margin only in segments 17 and 18, set low, mostly lying at ca 1/3 of midbody height. Metatergal areation strongly obliterated, increasingly well visible towards telson as three transverse rows of polygonal, setiferous fields, sublateral sulcus being especially evident. Tergal setae very short, mostly abraded. Pore formula normal (5, 7, 9, 10, 13, 15–19), ozopores dorsolateral, lying slightly in front of caudal corner. Body surface shining, below paraterga occasionally with a few arcuate striolae; texture microalveolate. Limbus microspiculate. Axial line and pleurosternal carinae wanting. Stricture dividing pro- and metazonae rather broad and shallow, very finely striolate dorsally and dorsolaterally. Epiproct long, subtruncate, subapical lateral papillae very small. Hypoproct linguiform, caudal edge broadly rounded, 1+1 setae borne on minute knobs well separated.

Sternites without modifications, sparsely setose; cross-impressions evident. Legs rather long, obviously incrassate (♂), ca 1.2–1.3 times as long as body height, prefemora 3–7 particularly strongly swollen laterally, increasingly poorly

bulged thereafter; ♂ telopodites very densely setose ventrally, with abundant sphaerotrichomes.

Gonopods (Figs 124–127) with short, medially fused, basally densely setose coxites, the latter with curved, medially contiguous cannulae; telopodites contiguous medially, held subrectangular to coxae, suberect, each bearing a seminal groove on caudal face alone; prefemoral part sparsely setose, about as long as acropodite; the latter bifid, composed of a lateral, spiniform, inward curved solenomere (sl) and a very prominent, posterobasally bulged, caudal branch (c). No trace of an anterior branch.

ACKNOWLEDGEMENTS. I am most grateful to all collectors who entrusted me their material for treatment and who allowed most of it to be deposited in ZMUM. Their collecting trip was supported by RFBR grant 13–04–01839. Special thanks go to Kirill Makarov (Moscow, Russia), who so skillfully took the pictures, as well as to Dmitry Shcherbakov, Moscow, Russia, who kindly provided not only some material, but also a map showing the collecting localities.



Figs 106–108. Gonopodial block of *Anaulacodesmus levissimus* Attems, 1898, ♂ from National Park Nahuelbuta, posterior, lateral and anterior views, respectively. Pictures by K. Makarov, not taken to scale (106–107); scale bar: 1.0 mm (108). Designations in text.

Рис. 106–108. Гोनоподальный блок *Anaulacodesmus levissimus* Attems, 1898, ♂ из национального парка Nahuelbuta, соответственно сзади, сбоку и спереди. Фотографии К. Макарова, без масштаба (106–107); масштаб: 1,0 мм (108). Обозначения в тексте.



Figs 109–113. *Anaulacodesmus levissimus* Attems, 1898, ♂ from National Park Chiloe, anterior, anterior, middle and posterior parts of body, lateral, dorsal, dorsal, lateral and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 109–113. *Anaulacodesmus levissimus* Attems, 1898, ♂ из национального парка Chiloe, передняя, передняя, средняя, задняя и задняя части тела, соответственно сбоку, сверху, сверху, сбоку и сверху. Фотографии К. Макарова, без масштаба.

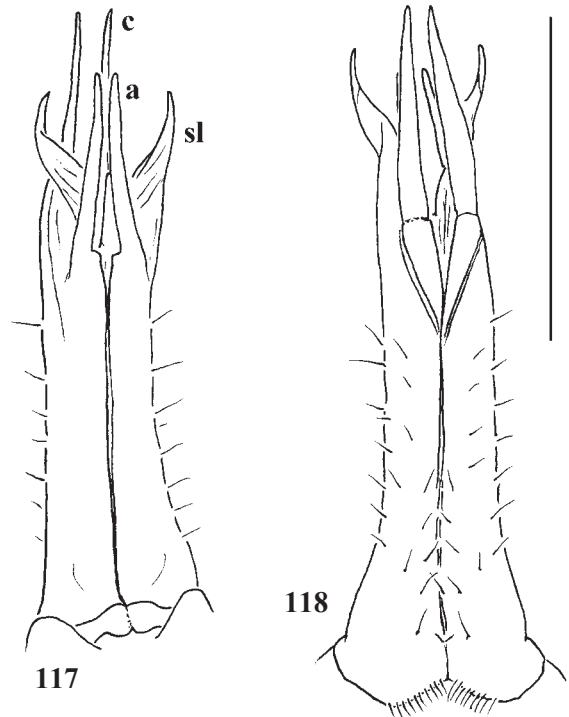


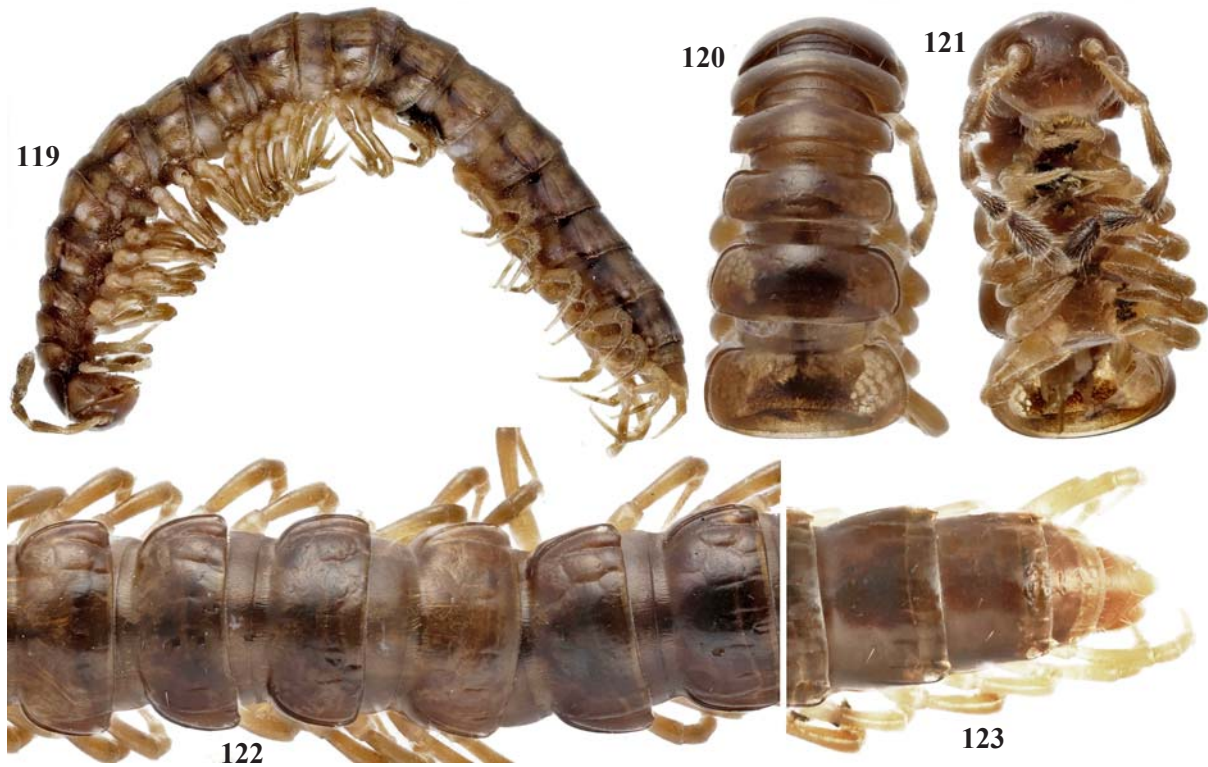
Рис. 114–116. Gonopodial block of *Anaulacodesmus levissimus* Attems, 1898, ♂ from National Park Chiloe, subcaudal, lateral and anterior views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 114–116. Гоподиальный блок *Anaulacodesmus levissimus* Attems, 1898, ♂ из национального парка Chiloe, соответственно почти сзади, сбоку и спереди. Фотографии К. Макарова, без масштаба.

Figs 117–118. Gonopodial block of *Anaulacodesmus levissimus* Attems, 1898, ♂ from National Park Chiloe, anterior and posterior views, respectively. Scale bar: 0.5 mm. Designations in text.

Рис. 117–118. Гоподиальный блок *Anaulacodesmus levissimus* Attems, 1898, ♂ из национального парка Chiloe, соответственно спереди и сзади. Масштаб: 0,5 мм. Обозначения в тексте.





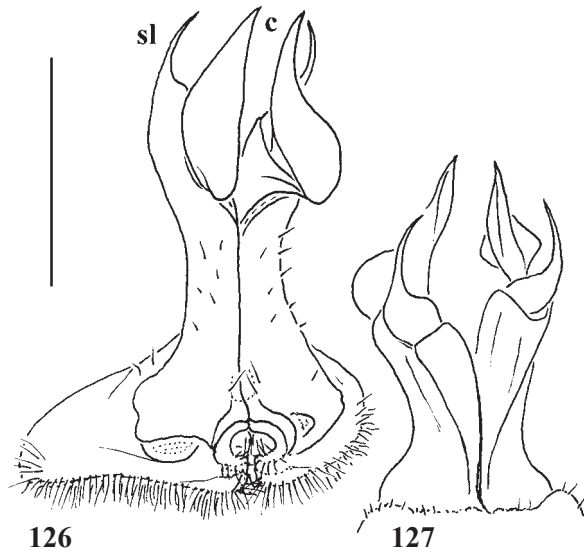
Figs 119–123. *Anaulacodesmus bifidus* sp.n., ♂ holotype. 119 — habitus, lateral view; 120–123 — anterior, anterior, middle and posterior parts of body, dorsal, ventral, dorsal and dorsal views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 119–123. *Anaulacodesmus bifidus* sp.n., голотип ♂. 119 — общий вид, сбоку; 120–123 — передняя, передняя, средняя и задняя части тела, соответственно сверху, снизу, сверху и сверху. Фотографии К. Макарова, без масштаба.



Figs 124–125. Gonopodial block of *Anaulacodesmus bifidus* sp.n., ♂ holotype, subcaudal and lateral views, respectively. Pictures by K. Makarov, not taken to scale.

Рис. 124–125. Гonoподиальный блок *Anaulacodesmus bifidus* sp.n., голотип ♂, соответственно почти сзади и сбоку. Фотографии К. Макарова, без масштаба.



Figs 126–127. Gonopodial block of *Anaulacodesmus bifidus* sp.n., ♂ holotype, posterior and anterior views, respectively. Scale bar: 0.5 mm. Designations in text.

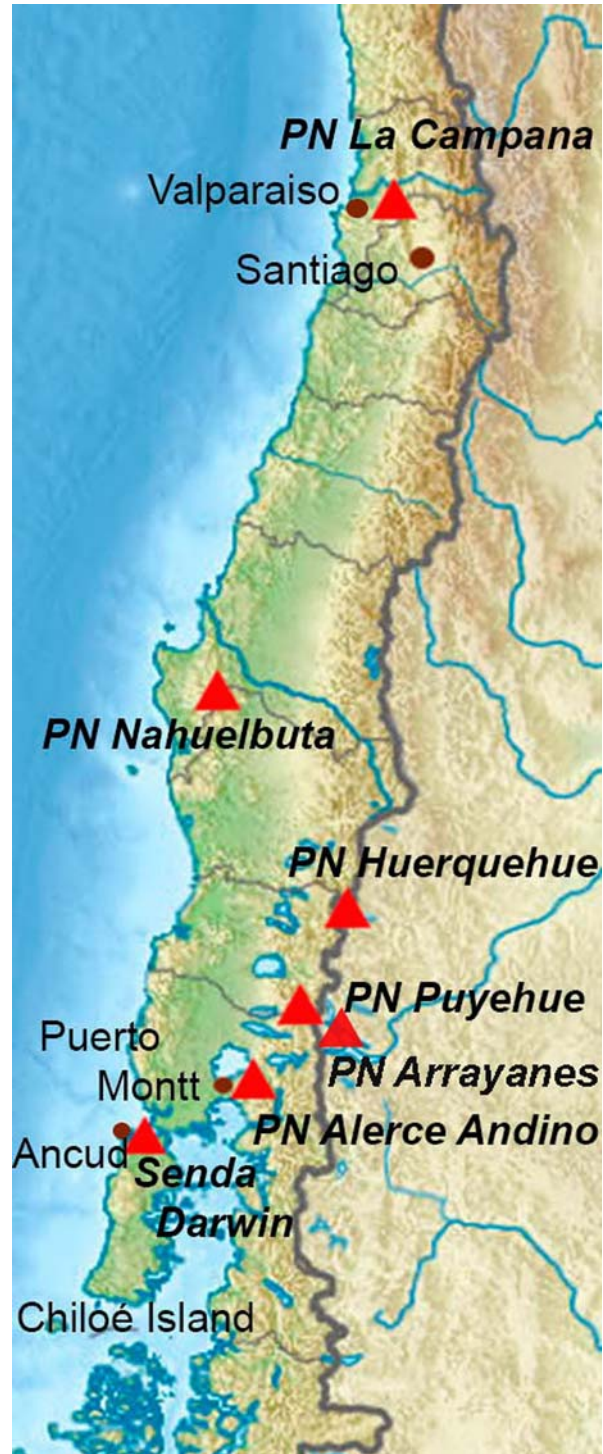
Рис. 126–127. Гonoподиальный блок *Anaulacodesmus bifidus* sp.n., голотип ♂, соответственно сзади и спереди. Масштаб: 0,5 мм. Обозначения в тексте.

Elena Kudryavtseva and Kirill Mikhailov (both Moscow, Russia) helped to incorporate this material into the ZMUM collection.

The collectors are deeply indebted to Mario Elgueta (National Museum of Natural History, Santiago) and the CONAF staff of the relevant national parks for facilitating their field work in Chile.

References

- Attems C. 1898. System der Polydesmiden. I. Theil // Denkschriften der Kaiserlichen Akademie der Wissenschaften zu Wien, Mathematisch-Naturwissenschaftliche Classe. Bd.67. S.221–482.
- Attems C. 1903. Beiträge zur Myriopodenkunde // Zoologische Jahrbücher, Abteilung für Systematik, Geographie und Biologie der Thiere. Bd.12. S.63–154.
- Attems C. 1914. Die indo-australischen Myriopoden // Archiv für Naturgeschichte. Bd.80A. H.4. S.1–398.
- Attems C. 1940. Myriopoda 3. Polydesmoidea III. Fam. Polydesmidae, Vanhoeffeniidae, Cryptodesmidae, Oniscodesmidae, Sphaerotrachopidae, Peridotodesmidae, Rhachidesmidae, Macellolophidae, Pandirodesmidae // Das Tierreich. Lfg.70. S.1–577.
- Chamberlin R.V. 1957. The Diplopoda of the Lund University and California Academy of Sciences expeditions. Reports of the Lund University Chile Expedition 1948–49, 30// Lunds Universitets Årsskrift. N.F. Avd.2. Bd.53. No.8. S.1–44.
- Demange J.-M. 1963. Myriapodes p.101–108. // Cl. Delamare Deboutteville & E. Rapoport (Eds). Biologie de l'Amérique australe. Etudes sur la faune du sol. T.2. Editions du CNRS: Paris.
- Demange J.-M., Silva F.G. 1971a. Nouvelle espèce chilienne du genre *Autostreptus* Silvestri et description du matériel type de *Iulus chilensis* Gervais, 1847, type du genre (Myriapode, Diplopode, Spirostreptoidea, Spirostreptidae, Spirostreptinae) // Bulletin du Muséum national d'Histoire naturelle, Sér.2. T.42. No.4. P.708–715 (for 1970).
- Demange J.-M., Silva F.G. 1971b. *Abatodesmus velosoi* nov. sp., nouvelle espèce chilienne de la famille des Sphaerotrachopidae



Map. The main collecting localities in Chile.
Карта. Основные точки сборов в Чили.

(Myriapode, Diplopode : Polydesmoidea) // Bulletin du Muséum national d'Histoire naturelle. Sér.2. T.42. No.5. P.881–886 (for 1970).

- Demange J.-M., Silva F.G. 1976a. Etudes de quelques genres chiliens de la famille des Sphaerotrachopidae (Myriapode, Diplopode, Polydesmoidea) // Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" di Portici. Vol.33. P.15–33.

- Demange J.-M., Silva F.G. 1976b. Contribution à la connaissance des espèces originaires du Chili décrites par F. Silvestri en 1902 // Bollettino del Laboratorio di Entomologia Agraria "Filippo Silvestri" di Portici. Vol.33. P.34–43.
- González-Sponga M.Á. 2006. Miriápodos de Venezuela. Diez nuevas especies del género *Rhinocricus* (Spirobolida: Rhinocricidae) // Revista de Investigación. No.57. P.13–48 (for 2005).
- Hoffman R.L. 1977. On the status of *Siphonotus brasiliensis* Brandt, and of the diplopod family Siphonotidae (Polyzoniida) (Diplopoda) // Deutsche Entomologische Zeitschrift. N.F. Bd.24. H.4/5. S.425–431.
- Hoffman R.L. 1979. A dalodesmid milliped from southeastern Brasil // Revue Suisse de Zoologie. T.86. Fasc.3. P.625–630.
- Hoffman R.L. 1980. Classification of the Diplopoda // Muséum d'histoire naturelle. Genève. 237 p. (for 1979).
- Hoffman R.L., Golovatch S.I. 2012. The millipede genus *Argentocricus* Verhoeff, 1941 (Diplopoda: Spirobolida: Rhinocricidae) // Arthropoda Selecta. Vol.21. No.3. P.211–215.
- Korsós Z., Read H. 2012. Redescription of *Zinagon chilensis* (Silvestri, 1903) from Chile, with a species list of Iulomorphae from the Southern Hemisphere (Diplopoda: Spirostreptida: Epinannolenidea) // Zootaxa. No.3493. P.39–48.
- Marek P., Bond J.E., Sierwald P. 2003. Rhinocricidae systematics II. A species catalog of the Rhinocricidae (Diplopoda: Spirobolida) with synonymies // Zootaxa. No.308, P.1–108.
- Mauriès J.-P. 1998. Diplopoda p. 475–484. // J.J. Morrone & S. Coscarón (Eds). Biodiversidad de Artrópodos Argentinos: Una Perspectiva Biotaxonómica. Ediciones SUR: La Plata, Argentina. 599 p.
- Mauriès J.-P., Silva F.G. 1971. Colobognathes du Chili I. Espèces nouvelles du genre *Siphonotus* Brandt (Diplopoda) // Bulletin du Muséum national d'Histoire naturelle, Sér.2. T.42. No.5. P.887–902 (for 1970).
- Rodrigues P.E.S., Ott R., Rodrigues E.N.I. 2012. New species and new records of millipedes of the genus *Rhinocricus* Karsch, 1881 (Spirobolida: Rhinocricidae) from southern Brazil // Zootaxa. No.3172. P.55–64.
- Schubart O. 1954. Diplópodos argentinos del Museo de la Ciudad Eva Perón. II. Familia «Sphaerotrichopidae» // Notas del Museo. Universidad Nacional de Eva Perón. T.17. Zoología. No.154. P.309–327.
- Shear W.A. 1988. The chordeumatid millipedes of Chile (Diplopoda, Chordeumatida) // American Museum Novitates. No.2912. P.1–10.
- Shear W.A. 2011. Class Diplopoda de Blainville in Gervais, 1844. // Z.-Q. Zhang (Ed.). Animal biodiversity: An outline of higher-level classification and survey of taxonomic richness. Zootaxa. No.3148. P.159–164.
- Shelley R.M., Morrill E.D., Faber D.A. 2014. A julid milliped in Chilean Patagonia, and a compilation of ordinal representatives in South America and associated islands (Diplopoda: Julida) // Insecta Mundi. No.0366. P.1–8.
- Silva F., Saiz F. 1978. Analyse phénologique de Myriapodes Diplopodes du Parc National "Fray Jorge", Chili // Abhandlungen und Verhandlungen des Naturwissenschaftlichen Vereins in Hamburg, N.F. No.21/22. S.167–175.
- Silva F., Vivar C. 1976. *Blaniulus guttulatus* Bosc, en Valparaíso y región // Anales del Museo de Historia Natural de Valparaíso. T.9. P.173–175.
- Silvestri F. 1903. Note diplopodologica // Bollettino dei Musei di Zoologia ed Anatomia Comparata della R. Università di Torino. T.18. P.1–31.
- Silvestri F. 1905a. Myriapoda. // J.W. Spengel J.W. Fauna Chilensis. Abhandlungen zur Kenntnis der Zoologie Chiles nach den Sammlungen von Dr. L. Plate. Bd.3 // Zoologische Jahrbücher. Suppl.-Bd.6. S.715–772.
- Silvestri F. 1905b. Nuovi diplopodi del Chile // Revista chilena de Historia natural. Apo 9. No.5. P.225–236.
- Weston P.H., Hill R.S. 2013. Southern (austral) ecosystems // S.A. Levin (Ed.). Encyclopedia of Biodiversity, second edition, Vol.6. P.612–619. Academic Press: Waltham, MA, USA.