

New records of the water mite genus *Arrenurus* Dugès, 1834 from South America (Acari: Hydrachnidia: Arrenuridae), with the description of five new species and one new subspecies

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Original research

ABSTRACT

New records are presented of the water mite genus *Arrenurus* from Argentina, Bolivia and Surinam. Five new species are described, *i.e.* *Arrenurus mansoensis* n. sp., *A. niger* n. sp., *A. stagnalis* n. sp., *A. surinamensis* n. sp. and *A. tempelmani* n. sp., and one new subspecies, *i.e.* *A. tenuicollis lacustris* n. subsp. *Arrenurus soesilae* Makan, 2005 is synonymized with *A. epimerosus* Marshall, 1919.

Keywords Neotropics; Argentina; Bolivia; Surinam; *Arrenurus*; new species

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Introduction

The water mites genus *Arrenurus* Dugès, 1834 is the most species-rich of the Hydrachnidia, with worldwide nearly 1000 species described (Joel Hallan pers. comm.). A list of South American water mites species was published by Rosso de Ferradás & Fernández (2005) who listed 150 *Arrenurus* species. However, *Arrenurus* (*Micruracarus*) *incurvatus* K. Viets, 1954, *Arrenurus* (*Micruracarus*) *perspicillatus* K. Viets, 1954 and *Arrenurus* (*Dadayella*) *nanus* K. Viets, 1954 were not included. Since then, two more *Arrenurus* species were published from South America, though based on females only (Rosso de Ferradás 2006a, Makan 2005, but see below). The number of *Arrenurus* species from South America tallies now 153 species. Besseling (1949) described *Dadayella hirtipalpis* from Surinam and K. Viets (1954a) described *Arrenurus* (*Dadayella*) *guttifera* from Brazil. These species are listed by Rosso de Ferradás & Fernández (2005) as *Arrenurus* (*Dadayella*) *hirtipalpis* and *Arrenurus* (*Dadayella*) *guttifera*, respectively, but I agree with Cramer & Cook (1992) that these species do not belong to *Dadayella*. However, as these two species are known in the female sex only, they cannot be accurately assigned to a subgenus.

Based on previous information, the arrenurids of South America are assigned to the following subgenera: *Arrenurus* s.s. 19 species, *Megaluracarus* 91 species, *Micruracarus* 2 species, *Truncaturus* 4 species, *Arrhenuropsides* 2 species, *Arrhenuropsis* 2 species, *Brevicaudaturus* 2 species, *Dadayella* 6 species and 25 species from the female only that cannot be attributed to a subgenus.

The study of the genus *Arrenurus* in South America is hampered by descriptions of species based on either males or females only. It must be stressed that new species should not be described based on females only. Females often show a large variation in characteristics (shape of idiosoma and genital plates), and identification of females is notoriously difficult.

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The water mite fauna of South America is insufficiently known. Given the vastness of the continent, large parts remain unexplored. This applies especially to northern countries like the Guianas. This paper deals with collections from Argentina, Bolivia and Surinam. New records are given, and five new species and one new subspecies are described.

Materials and methods

Unless stated otherwise, all material is collected by the author. All non-type material and some holotypes and paratypes are lodged in Naturalis Biodiversity Center, Leiden (RMNH). Holotypes from Argentina are deposited in Museo Argentino de Ciencias Naturales “Bernardino Rivadavia”, Buenos Aires (MBR). For the terminology of the glandularia Jin & Wiles (1996) is followed. Abbreviations used: asl = above sea level; Cx-I = first coxae; Cx-IV = fourth coxae; Dgl-3 = dorsoglandularia 3; Lgl-4 = lateroglandularia 4; MfN = Museum für Naturkunde, Berlin; NP = National Park; P1-5 = palp segments 1-5; IV-leg-4-6 = fourth to sixth segments of the fourth leg, SMF = Senckenberg Museum, Frankfurt am Main. The material is given as male/female/nymph. Measurements are given as µm. Measurements of the palp and leg segments are of the dorsal margin, ventral length is measured from the anterior tip of Cx-I to the posterior idiosoma margin. The coordinates are taken with a GPS, but those given as degrees, minutes and seconds are taken only from Google Earth and are by approximation. In the distribution section only those references are given with new records.

Results

Family Arrenuridae Thor, 1900

Genus *Arrenurus* Dugès, 1834

Subgenus *Arrenurus* s.s.

Arrenurus oxyurus Ribaga, 1902

Material examined — **Argentina**. Río Negro Province: 1/2/0, Río Negro near General Conesa, 40°5'19,19" S, 64°29,6' 6,11" W, 9-xii-1999.

Distribution — Previously known from Argentina (Ribaga 1902, 1903, Rosso de Ferradás *et al.* 1987, Rosso de Ferradás 1987) and Paraguay (Lundblad 1944).

Arrenurus trichophorus Daday, 1905

Material examined — **Argentina**. Buenos Aires Province: 1/0/0, pond next to Ruta 76, 2 km S of crossing with Ruta 86, 37°23'22,64" S, 61°0'14,81" W, 10-xii-1999.

Distribution — Previously known from Paraguay (Daday 1905, Lundblad 1944) and Argentina (Rosso de Ferradás 2006a).

Arrenurus valdiviensis K.O. Viets, 1964

Material examined — **Argentina**. Río Negro Province: 1/1/0, Manso River, Nahuel Huapi NP, 41°20.858 S, 71°36.300 W, alt. 817 m asl, 17-ii-2018.

Distribution — Previously known from Chile (K.O. Viets 1964, 1968) and Argentina (Cook 1980, Rosso de Ferradás *et al.* 1987).

Subgenus *Arrhenuropsides* K. Viets, 1954

Arrenurus parviscutatus (K. Viets, 1954)

(Figure 1)

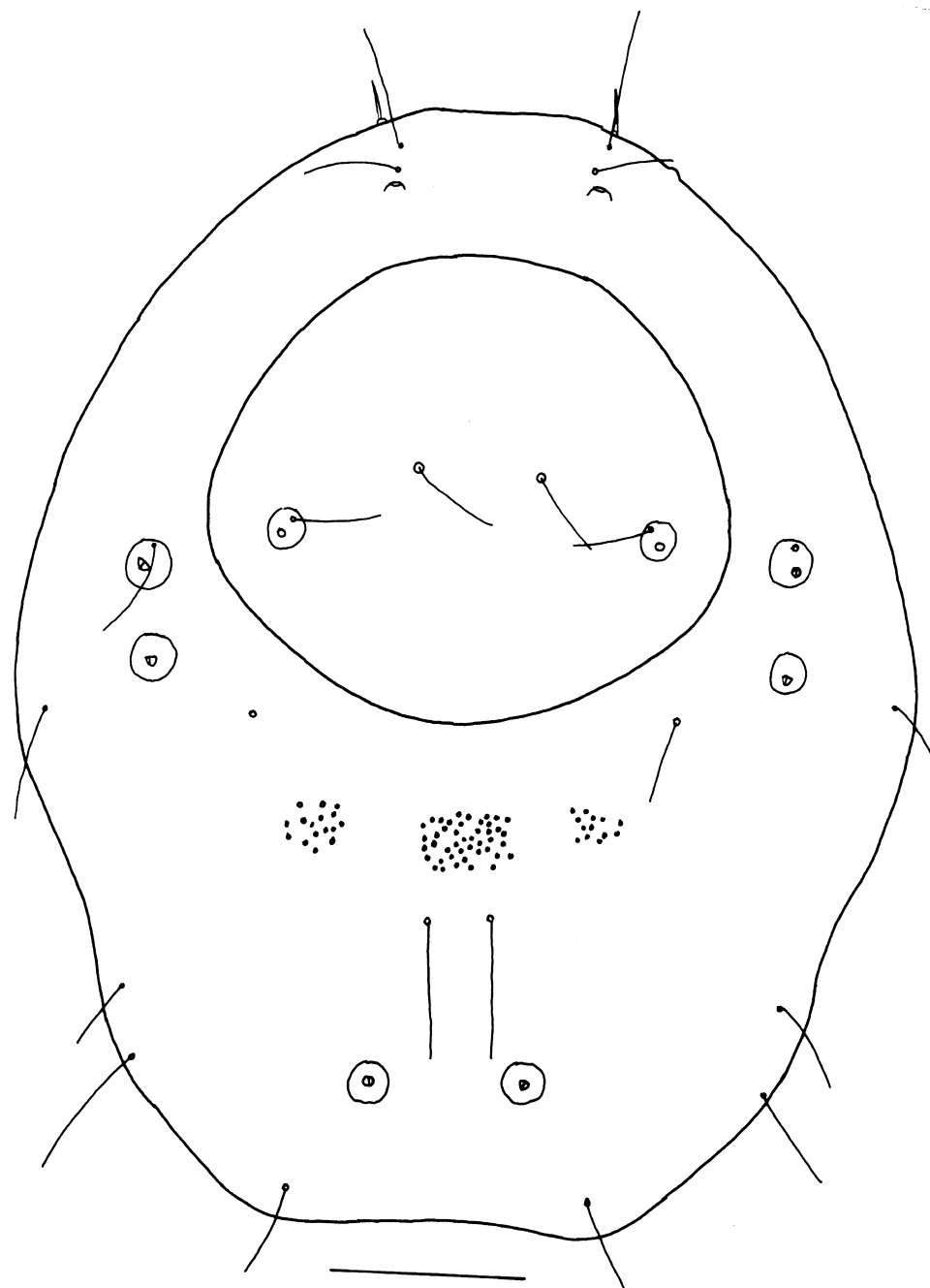


Figure 1 *Arrenurus parviscutatus* K. Viets, male, dorsum. Scale bar = 100 μ m.

Material examined — **Argentina**. Entre Ríos Province: 1/2/0, ditch at Brazo Largo, N of Zarate, 33°54'37,21" S, 58°51'9,24" W, 6-xi-1999.

Description — Male: Idiosoma dorsally 721 long and 583 wide, ventrally 713 long. Dorsal shield complete, 300 long and 340 wide. Posterior to dorsal shield three irregularly shaped areas with a finer porosity.

Remarks — Male and female are well-described by Rosso de Ferradás (2006b) and therefore only some measurements are given and an illustration of the male dorsum is presented. The only difference with her illustration of the male is that the associated setae of

Dgl-3 are located medially and distanced of these glandularia. The areas with finer porosity are not mentioned in the original description of *K. Viets* (1954b).

Distribution — Known from Brazil (1954b) and Argentina (Rosso de Ferradás 2006b).

Subgenus *Dadayella* Koenike, 1907

Arrenurus rotundus (Daday, 1905)

(Figure 2)

Material examined — **Surinam**. 12/9/0, ditch along Weg naar de Peperpot, 5°46.857'N 55°08.327'W, alt. 3 m asl, 18-xi-2019. **Argentina**. Entre Ríos Province: 0/2/0, ditch at Brazo Largo, N of Zarate, 33°54'37.21" S, 58°51'9.24" W, 6-xi-1999.

Description — Male: Idiosoma dorsally 360 long and 300 wide, ventrally 373 long. Gnathosomal bay shallow. Dorsal shield incomplete, 247 wide; distance dorsal shield – anterior idiosoma margin 48. Dorsum posterolaterally with small, rounded extensions. Cauda very short, not set off from anterior part of idiosoma; one pair of glandularia on cauda with short, forked setae. Medial margins of fourth coxae reduced to angles. Gonopore 28 long; genital plates long, extending to lateral idiosoma margin. Posterior to genital plates a pair of glandularia. Lengths of P1-5: 20, 64, 40, 64, 24. Palp rotated, P2 with two setae near ventral margin, P4 with a stout ventral seta ending in a hook-like tip. Length of I-leg-4-6: 60, 70, 80. Length of IV-leg-4-6: 74, 84, 86.

Remarks — According to Lundblad (1930), who examined the types of *A. minimus* (Daday, 1905) and *A. rotundus* (Daday, 1905), the two species can be separated based on the pair of glandularia anterior and posterior of the genital plates. In *minimus* the anterior pair is more separated than the posterior pair, in the *rotundus* it's the other way around. In my collection from Surinam, the *Dadayella* females show a large variation in the distance of these pairs of glandularia. In my opinion this characteristic is not suitable for species delimitation. The holotype of *A. rotundus* is lodged in the Naturhistorisches Museum in Basel, but unfortunately the slide does not contain the specimen (Hänggi pers. comm.). Daday's (1905) illustrations are too sketchy or even erroneous to draw any conclusions. K. Viets (1954b) came to the same conclusion as Lundblad (1930) about the glandularia anterior and posterior to the genital plates. According to Viets (1954b) the palp of *A. minimus* has P5 with a distinctly downturned claw and the ventral seta of P4 is without a hook, while the palp of *A. rotundus* has the claw of P5 more obliquely orientated and the ventral seta of P4 is with a hook. Based on these differences it is clear that my specimens from Surinam belong to *A. rotundus*.

Rosso de Ferradas (1981a) reported *A. nanus* from Argentina, but according to Cramer & Cook (1992) the males must be assigned to *A. rotundus*. However, the males reported by Rosso de Ferradas (1981a) have a different configuration of the dorsal glandularia and setae (e.g. postocularia much closer to each other), differently shaped genital plates and antagonistic bristle without a hook, therefore they might belong to a different species. Unfortunately, I have not been able to examine these specimens.

Distribution — Known from Paraguay (Daday 1905, Rosso de Ferradás & Böttger 1997), Brazil (K. Viets 1954a, b) and Argentina (Rosso de Ferradas 1981a).

Subgenus *Megaluracarus* K. Viets, 1911

Arrenurus consanguineus K. Viets, 1954

Arrenurus gladiiferus Rosso de Ferradás, 2006b (erron., non Lundblad, 1944)

(Figure 3)

Material examined — **Bolivia**. 1/5/0, pond Hotel Flora y Fauna, 3 km SE of Buena Vista, 17°29.949' S 63°38.152' W, 10-iii-1999, leg. D. Tempelman.

Description — Male: Idiosoma dorsally 616 long and 454 wide, ventrally 648 long. Dorsal shield incomplete (but dorsal furrow continues ventrally); dorsal shield 340 wide, distance dorsal shield – anterior idiosoma margin 109. Medial margin of fourth coxae longer than

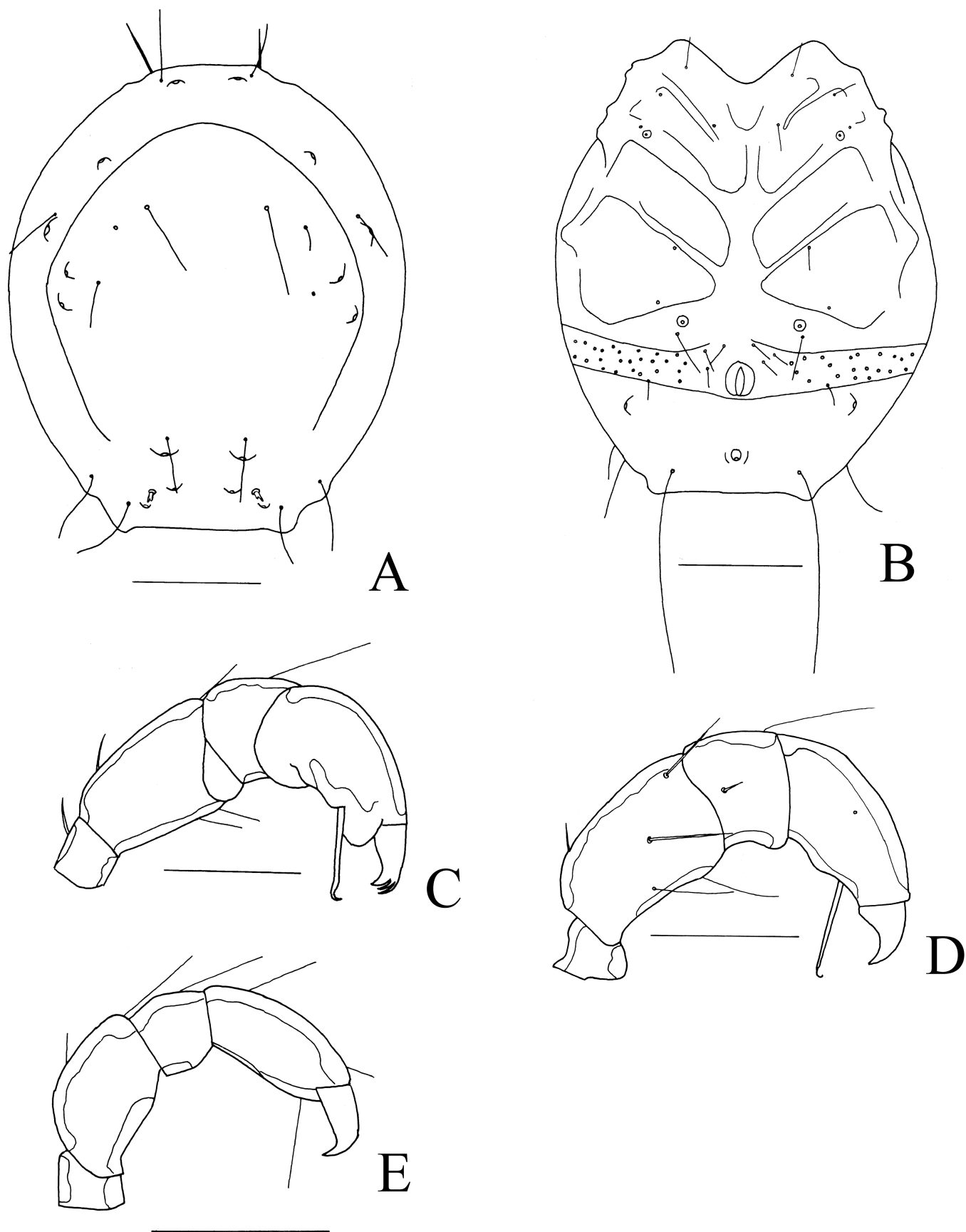


Figure 2 *Arrenurus rotundus* (Daday), male. A – dorsum; B – venter; C – palp; D – palp. *Arrenurus minimus* (Daday), female, Rio Cuminá, Brazil, slide 7343 Viets coll. (slide 43137 SMF). E – palp. Scale bars: A, B = 100 μ m, C-E = 50 μ m.

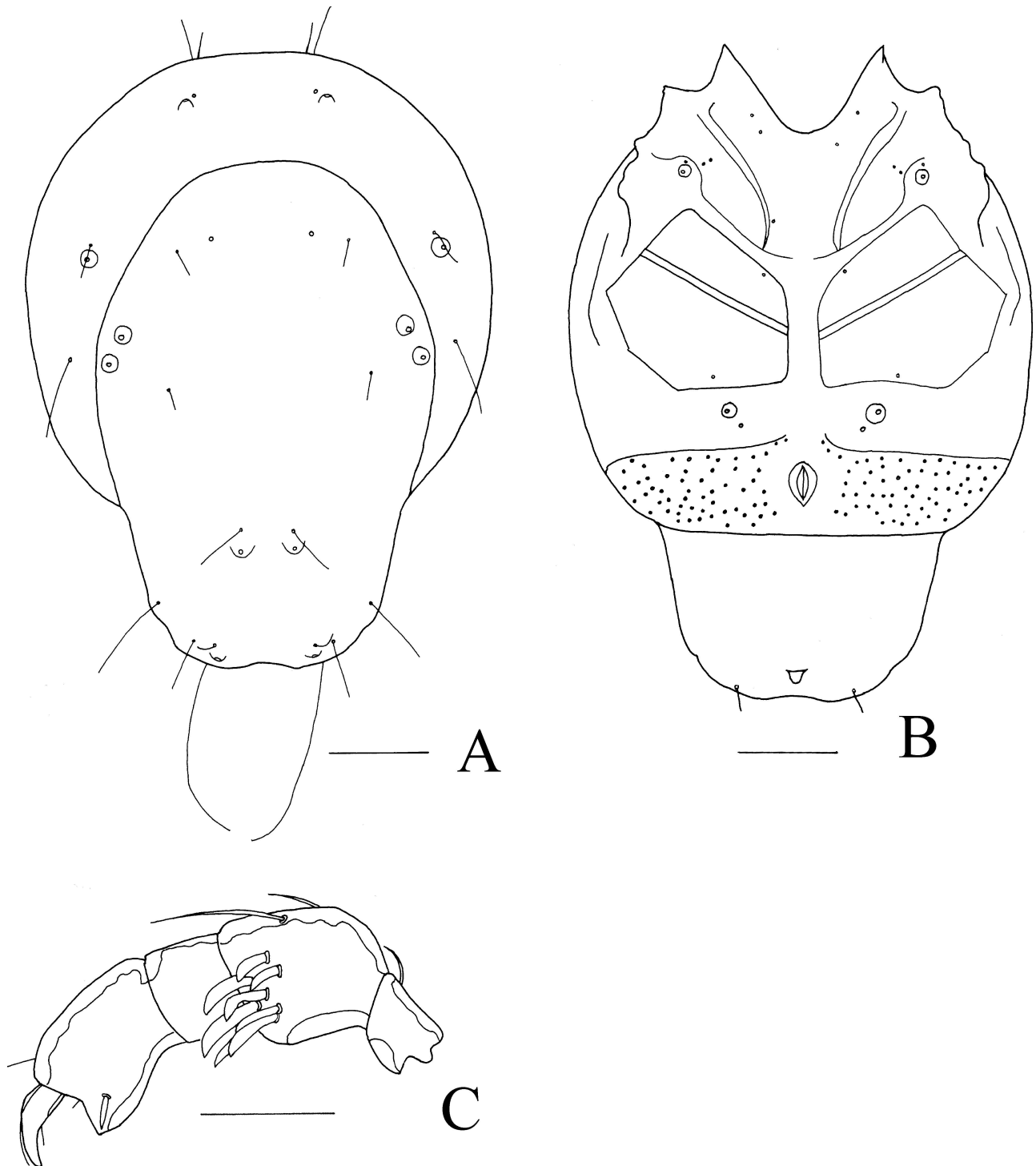


Figure 3 *Arrenurus consanguineus* K. Viets, male. A – dorsum; B – venter; C – palp. Scale bars: A-B = 100 µm, C = 50 µm.

medial margin of third coxae. Gonopore 42 long, genital field 365 wide, rather broad. Length of P1-5: 30, 64, 40, 60, 32. P2 with 7-8 large, sword-like setae.

Remarks — My male specimen matches the description of K. Viets (1954b). Viets didn't illustrate the setae associated with Dgl-2 and -3, but these setae are very small and easily overlooked. The specimen reported from Argentina by Rosso de Ferradás (2006b) as *A.*

gladiiferus doesn't belong to that species but to *A. consanguineus*. *Arrenurus gladiiferus* has a convex posterior margin of the cauda without an indentation, and the setae of P2 are gradually tapering and not sword-like as in *A. consanguineus*.

Distribution — Previously known from Brazil (K. Viets 1954b) and Argentina (Rosso de Ferradás 2006b, as *A. gladiiferus*).

***Arrenurus corniger* Koenike, 1894**

Material examined — **Argentina**. Entre Ríos Province: 3/6/0, ditch at Brazo Largo, N of Zarate, 33°54'37,21" S, 58°51'9,24" W, 6-xi-1999.

Distribution — Known from Brazil (Koenike 1894, Viets 1936, 1954a, Lundblad 1944) and Argentina (Rosso de Ferradás 1981b). Marshall (1903) reported this species from North America, but these specimens do not belong to *A. corniger* as the dagger-like petiole is lacking, the hump of the cauda is more pointed and the posterior end of cauda has a different shape.

***Arrenurus deltensis* Rosso de Ferradas, 1984**

(Figure 4)

Material examined — **Argentina**. Entre Ríos Province: 1/0/0, ditch at Brazo Largo, N of Zarate, 33°54'37,21" S, 58°51'9,24" W, 6-xi-1999.

Description — Male: Idiosoma brownish, dorsally 745 long and 429 wide; ventrally 788 long. Anterior idiosoma margin straight, posterolateral corners angular. Distance anterior idiosoma margin-dorsal shield 105, the latter 340 wide. Cx-I and Cx-II anterolaterally pointed. Cauda 373 wide, relatively long with a pointed hump, somewhat widened at level of hump, posteriorly truncated; posterior margin with a shallow indentation. Genital plates relatively short, 227 wide, swollen and visible as well in dorsal view.

Remarks — The male specimen of this study differs from the description of Rosso de Ferradas (1984) in the somewhat larger distance between the postocularia and the less truncated posterior margin of the cauda. However, it has similar angular posterolateral corners of the idiosoma, relatively short genital plates and the cauda with a pointed hump. Therefore, I assigned this specimen to *A. deltensis*. The female remains unknown.

Distribution — Known from Argentina only (Rosso de Ferradas 1984).

***Arrenurus epimerosus* Marshall, 1919**

Arrenurus (Arrenurus) soesilae Makan, 2005 – **new syn.**

Material examined — **Argentina**. Entre Ríos Province: 1/3/0, ditch at Brazo Largo, N of Zarate, 33°54'37,21" S, 58°51'9,24" W, 6-xi-1999. **Surinam**: 3/0/0, ditch along Weg naar de Peperpot, 5°46.857 N 55°08.327 W, alt. 3 m asl, 18-xi-2019.

Remarks — *Arrenurus soesilae*, known in the female sex only, is insufficiently described as the genital plates and the suture lines between the coxae are not illustrated. Nevertheless, based on the peculiar pointed posterior end of the idiosoma, it is clear that Makan (2005) illustrated the female of *A. epimerosus*. The female of the latter species is the only South American *Arrenurus* species known with such a pointed posterior idiosoma.

Distribution — Known from Brazil (Marshall 1919, 1944, K. Viets 1936, 1954a,b), Argentina (Rosso de Ferradas 1973), Paraguay (K.O. Viets & Böttger 1986) and Surinam (Makan 2005).

***Arrenurus ludificator* Koenike, 1905**

(Figure 5)

Material examined — **Brazil**. Male, syntype, Rio Grande do Sul, Brasilien, Prof. v. Iherring coll., slide 822 (MfN). **Bolivia**. 1/11/0, pond Hotel Flora y Fauna, 3 km SE of Buena Vista, Bolivia, 17°29.949 S 63°38.152 W, 10-iii-1999, leg. D. Tempelman.

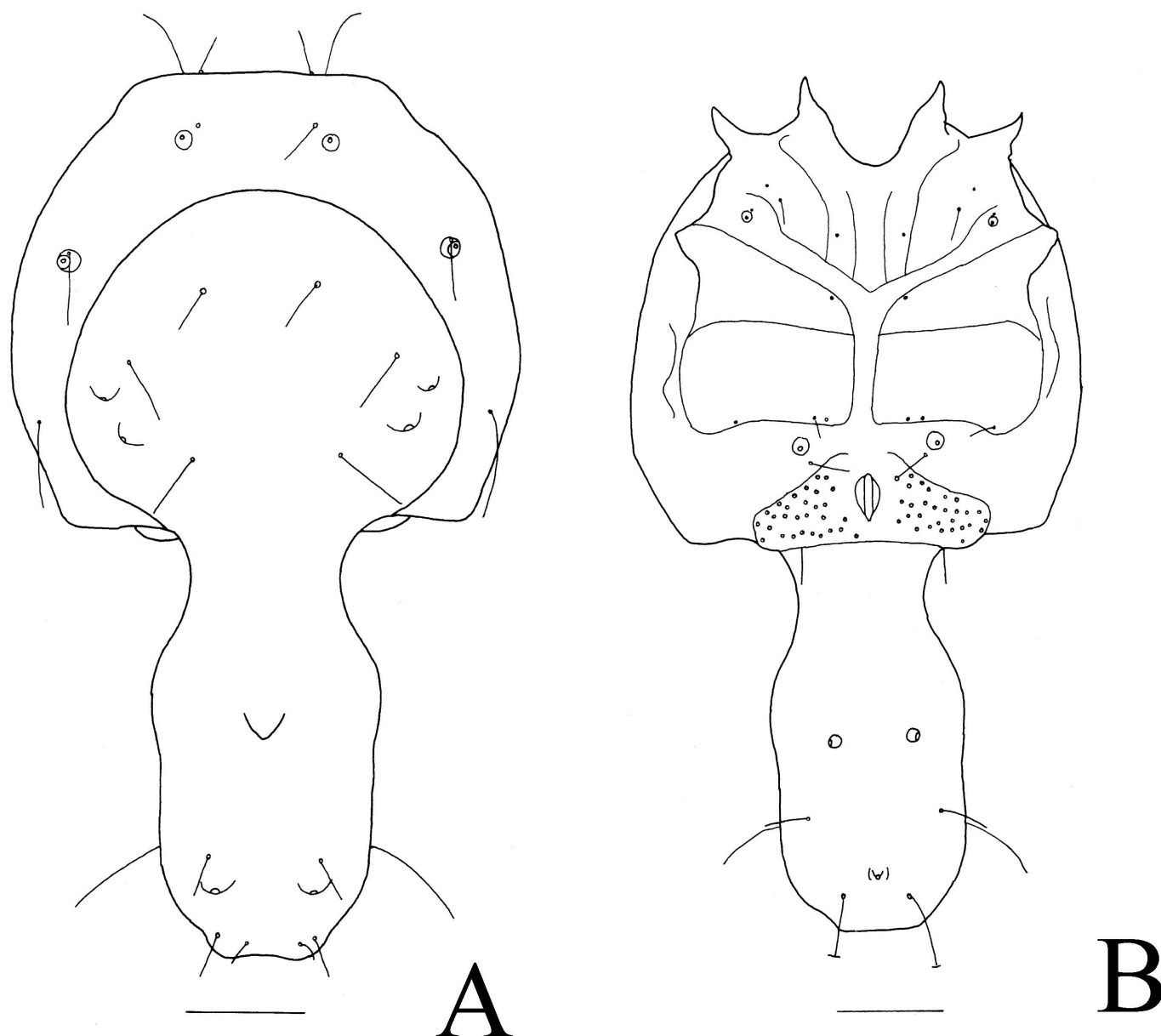


Figure 4 *Arrenurus deltensis* Rosso de Ferradas, male. A – dorsum; B – venter. Scale bars = 100 μ m.

Description — Male: Idiosoma dorsally 761 long and 425 wide, ventrally 773 long. Distance anterior idiosoma margin – dorsal shield 144. Gonopore 42 long, genital field 284 wide. Length of P1-5: 24, 48, 27, 58, 36.

Female: Idiosoma dorsally 761 long and 632 wide, ventrally 753 long. Dorsal shield complete, 583 long and 458 wide.

Remarks — The slide with the syntype is partly dried, the type is squashed and positioned laterally. Only the cauda and part of the dorsal shield are well visible. Lundblad (1944) gave a very complete description of the species, and therefore only some measurements are given and some illustrations are presented. There is only one small difference with the description of Lundblad (1944) and the male specimen of the present paper in the configuration of the setae on the ventral side of the cauda. Lundblad illustrated the setae associated with Vgl-3 further posteriorly.

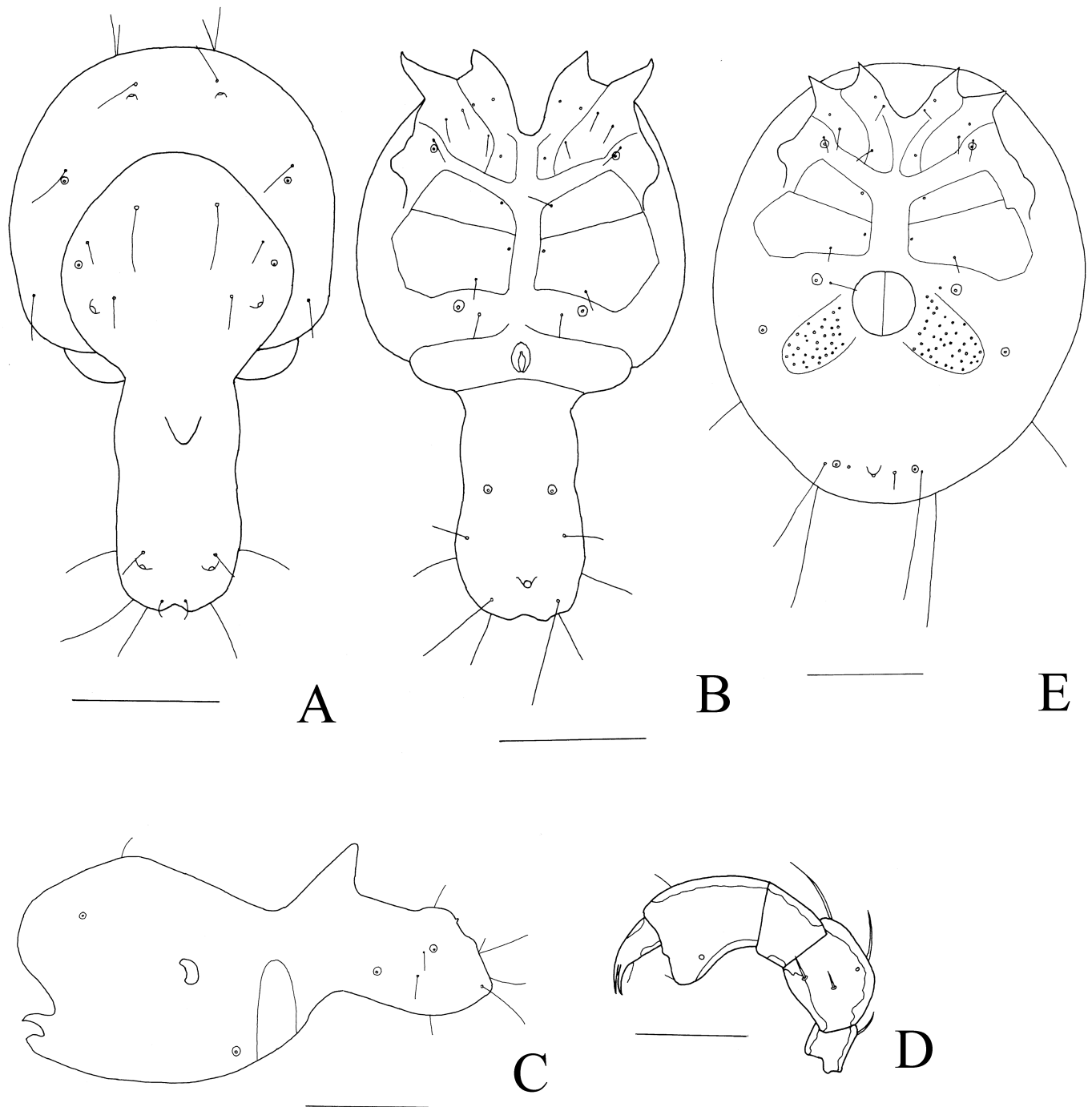


Figure 5 *Arrenurus ludificator* Koenike, A-D male, E female. A – dorsum; B – venter; C – lateral view; D – palp; E – venter. Scale bars: A-C, E = 200 μ m, D = 50 μ m.

***Arrenurus mansoensis* n. sp.**

Zoobank: [B5945CB6-D357-4ED4-BF63-9D9191F4CE43](https://zoobank.org/B5945CB6-D357-4ED4-BF63-9D9191F4CE43)

(Figure 6)

Material examined — Holotype male, Manso River, Nahuel Huapi National Park, Río Negro Province, Argentina, 41°20.858 S 71°36.300 W, alt. 817 m asl, 17-ii-2018 (MBR).

Diagnosis — Male: Cauda relatively short, Lgl-4 on small humps, posterior margin of

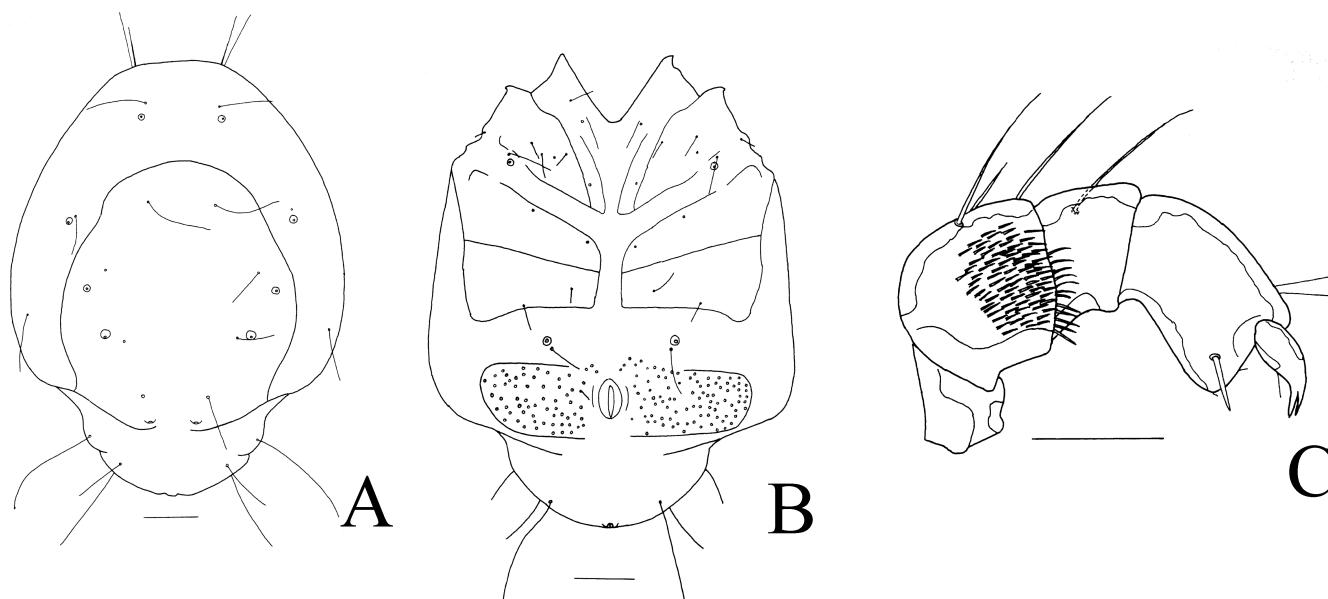


Figure 6 *Arrenurus mansoensis* n. sp., holotype male. A – dorsum; B – venter; C – palp. Scale bars: A, B = 100 μ m, C = 50 μ m.

cauda convex, P2 with a large patch of setae.

Description — Idiosoma yellowish, dorsally 754 long and 599 wide, ventrally 786 long. Dorsal shield incomplete, 421 wide, distance dorsal shield – anterior idiosoma margin 182. Cauda distinctly set off from anterior idiosoma with Lgl-4 on small humps, posterior margin convex. Gonopore 52 long, genital field 454 wide, relatively broad, not extending to lateral idiosoma margin. Lengths of P1-5: 38, 70, 48, 72, 26. P2 with a large patch of setae, the setae of the anterior row larger than the more posterior setae; near dorsal margin two long setae and one smaller seta. Length of I-leg-4-6: 110, 114, 100. Length of IV-leg-4-6: 146, 192, 190. Legs with numerous swimming setae.

Etymology — Named after the type locality, the Manso River.

Remarks — The new species is close to *Arrenurus neuquenensis* Rosso de Ferradás, 1987. The latter species is larger (842-909) and has a shorter and broader cauda, especially the part posterior to the humps of Lgl-4. Moreover, the idiosoma of the new species is more elongated compared to *A. neuquenensis*.

***Arrenurus neuquenensis* Rosso de Ferradás, 1987**

Material examined — **Argentina.** Province Neuquén: 1/0/0, Río Collon Curá, 30 km E of Junín de las Andes, 39°59'50,00" S, 70°50,6'45" W, 12-xi-1999.

Distribution — Known from Argentina only (Rosso de Ferradás 1987).

***Arrenurus niger* n. sp.**

Zoobank: [6594C44B-779D-49E2-9883-C94264877A36](https://zoobank.org/6594C44B-779D-49E2-9883-C94264877A36)

(Figure 7)

Material examined — Holotype male, Río Negro near General Conesa, Río Negro Province, Argentina, 40°5'19,19" S, 64°29,6'6, 11" W, 9-xii-1999 (MBR). Paratypes: one female (MBR), 2 males (juveniles), eight females (RMNH), same data as holotype.

Diagnosis — P2 with a patch of setae. Male: Cauda short, distinctly set off from idiosoma; dorsal shield incomplete. Female: genital plates short and broad.

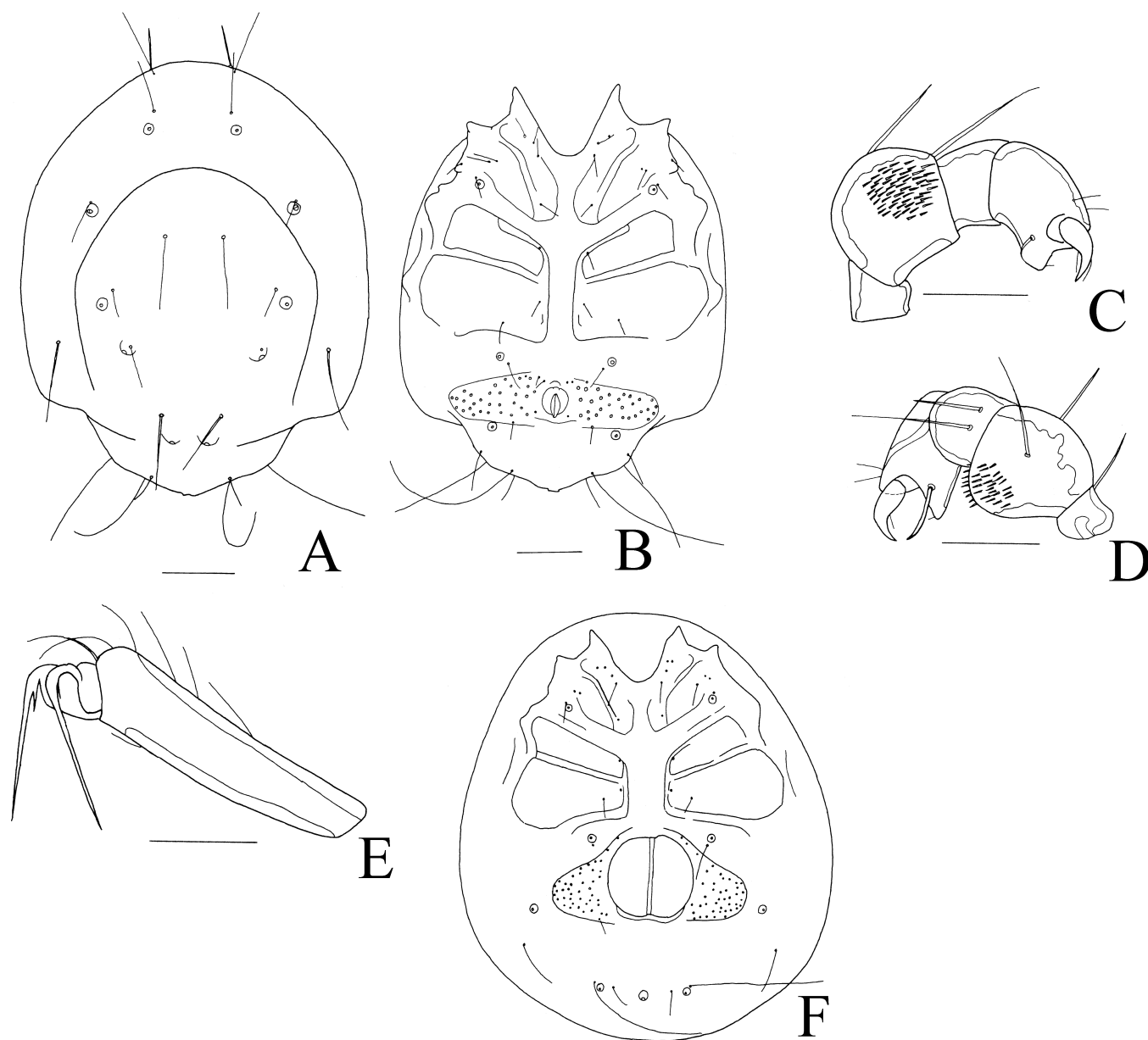


Figure 7 *Arrenurus niger* n. sp. A-E holotype male, F paratype female. A – dorsum; B – venter; C – right palp; D – left palp (segments rotated); E – IV-leg-6; F = venter. Scale bars: A-B, F = 100 μ m, C-E = 50 μ m.

Description — Male: Idiosoma yellowish, dorsally 599 long and 478 wide, ventrally 624 long; distance of dorsal shield till anterior idiosoma margin 146. Dorsal shield incomplete, 330 wide; between Dgl-4 a finer porosity present, in dorsal view appearing as a series of short, irregular structures. Cauda short, distinctly set off from idiosoma, excretory pore at posterior margin. Genital field 332 wide, with numerous acetabula, not extending to lateral idiosoma margin; gonopore 38 long. Length of P1-5: 30, 60, 36, 68, 30. P2 with a patch of setae and medially one long seta. Length of I-leg-4-6: 108, 110, 104. Length of IV-leg-4-6: 108, 160, 142; IV-leg-4 with a short spur, claws of IV-leg-6 large. Legs with numerous swimming setae.

Female: Idiosoma almost circular, dorsally 761 long and 680 wide, ventrally 753 long. Dorsal shield complete, 616 long and 535 wide. Anterior coxae not extending beyond the anterior idiosoma margin. Medial distance of Cx-IV slightly shorter than width of one

gonopore valve. Medial margin of Cx-IV longer than medial margin of Cx-III. Gonopore 146 long and 152 wide. Genital plates short and broad. Length of P1-5: 30, 64, 48, 68, 34; palp as in male. Length of I-leg-4-6: 98, 104, 84. Length of IV-leg-4-6: 104, 170, 148; claws of IV-leg-6 not as large as in male.

Etymology — Named after the Río Negro (Black River).

Remarks — The male is more or less similar to *Arrenurus scopularis* Lundblad, 1938, *A. diversisetus* K. Viets, 1940 and *A. neuquenensis* Rosso de Ferradás, 1987. From *A. scopularis* the new species differs in a shorter dorsal shield. Moreover, Lgl-3 has shifted anteriorly and is lying close to the dorsal shield in *A. scopularis*, in the new species these glandularia are not visible in dorsal view. *Arrenurus diversisetus* has a smaller dorsal shield compared to the new species, and the dorsal cauda margin is undulating. *Arrenurus neuquenensis* has the cauda perpendicularly set off from the anterior idiosoma (obliquely in the new species), with lateral lobe-like extensions (without lobe-like extensions in the new species). The female doesn't match the description of other females with a patch of setae in P2 in the short and broad genital plates.

***Arrenurus quadrituberculatus* K. Viets, 1937**

Material examined — Surinam. 1/1/0, roadside pond along Afobakaweg, 5°36.266 N 55°05.988 W, alt. 13 m asl, 19-xi-2019.

Distribution — Known from Brazil (K. Viets 1937, 1954a), Paraguay (Lundblad 1938, 1944, as *A. expansiformis* Lundblad, 1938), Surinam (K. Viets 1954a) and Argentina (Rosso de Ferradás 1977).

***Arrenurus stagnalis* n. sp.**

Zoobank: 9621332F-ED4F-4069-9DE2-3362C251D86B

(Figure 8)

Material examined — Holotype male, roadside pond along Afobakaweg, Surinam, 5°36.266 N 55°05.988 W, alt. 13 m asl, 19-xi-2019 (RMNH). Paratypes: one male, three females, same data as holotype (RMNH); one male, ditch along Weg naar de Peperpot, 5°46.857 N 55°08.327 W, alt. 3 m asl, 18-xi-2019 (RMNH).

Diagnosis — Dorsal shield relatively wide, cauda relatively long with a medial pointed hump, posterior margin of cauda with a shallow indentation; palp without a patch of setae.

Description — Male: Idiosoma yellowish, dorsally 778 (810-842) long and 445 (462-470) wide, ventrally 818 (850-858) long. Dorsal shield incomplete, 328 (332-348) wide, 150 (162-170) distanced from anterior idiosoma margin. Cauda relatively long and slender with a pointed hump, posterior margin of cauda with a shallow indentation; in dorsal view two pairs of glandularia visible in posterior part of cauda. Anterior pair of coxae anterolaterally pointed. Gonopore 34 long, genital field 235 wide, not extending to lateral idiosoma margin. Length of P1-5: 22, 43, 34, 59, 36. P5 slender, P4 expanding anteroventrally, P2 medially with one long and two short setae (P2 is a bit rotated in Figure 7D). Length of I-leg-4-6: 84, 82, 116. Length of IV-leg-4-6: 146, 94, 86; IV-leg-4 without a spur.

Female: Idiosoma dorsally 656 (640-648) long and 551 (531-543) wide, ventrally 656 (672-688) long. Dorsal shield complete, 510 long and 405 wide. Medial margin of Cx-IV longer than medial margin of Cx-III. Medial distance of Cx-IV slightly smaller than width of one genital valve. Gonopore 106 long, genital field 373 wide. Genital plates longer than broad. Length of P1-5: 23, 55, 40, 62, 33; palp as in male. Length of I-leg-4-6: 96, 90, 100. Length of IV-leg-4-6: 126, 116, 112.

Etymology — Named for its occurrence in pools.

Remarks — The male of the new species is most similar to *Arrenurus ludificator* Koenike, 1905 from Paraguay, *A. thomsoni* K. Viets, 1993 from Uruguay, *A. clavipes* Lundblad, 1941 and *A. undulatus* Lundblad, 1937, both from Brazil. From *A. thomsoni* the new species differs in a wider and shorter dorsal shield and a more pointed hump on the cauda. *Arrenurus ludificator*

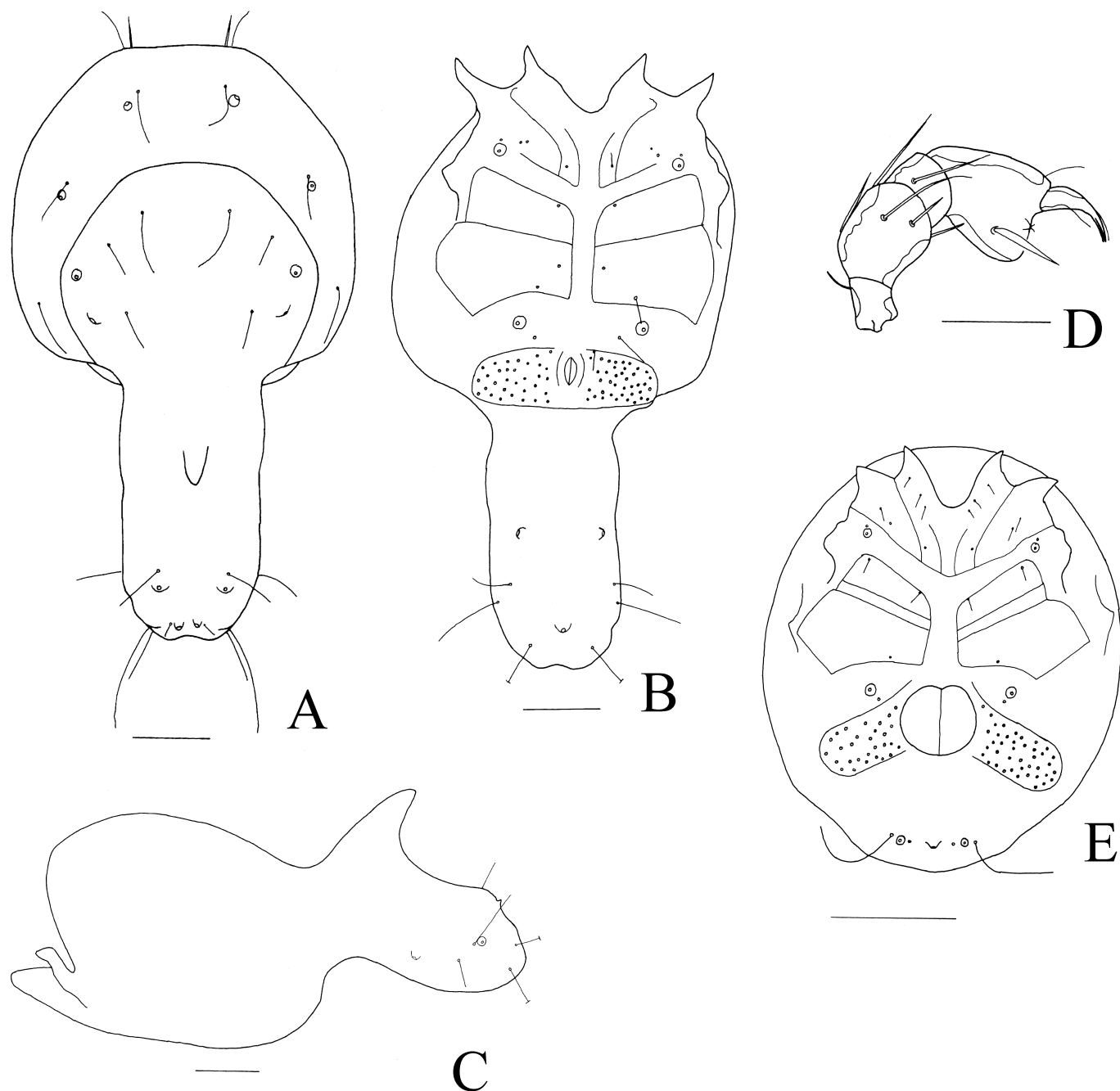


Figure 8 *Arrenurus stagnalis* n. sp., A-D holotype male, E paratype female. A – dorsum; B – venter; C – lateral view (not all details shown); D – palp; E – venter. Scale bars: A-C = 100 µm, D = 50 µm, E = 200 µm.

and *A. clavipes* have a more slender dorsal shield, the cauda of *A. ludificator* is slightly widening posteriorly (not in the new species) with a smaller posterior indentation. *Arrenurus undulatus* has a straight posterior margin of the cauda and Lgl-4 is visible in dorsal view (not visible in the new species). The paratype males are much larger, but morphologically similar, and are, therefore, assigned to the new species.

***Arrenurus surinamensis* n. sp**

Zoobank: [1890056E-62CD-4357-A995-E030C560AA77](https://doi.org/10.1111/1365-3113.124349)

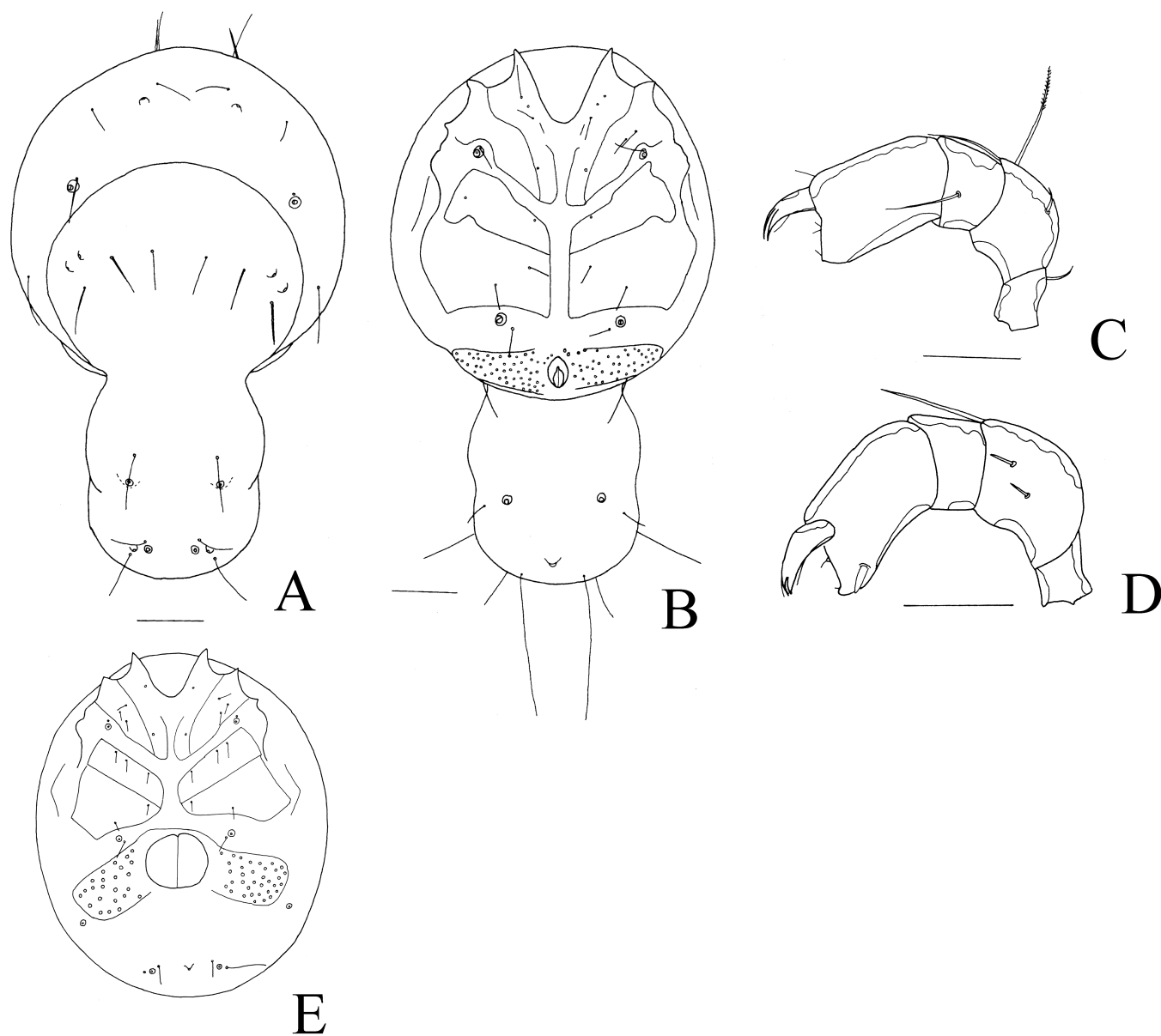


Figure 9 *Arrenurus surinamensis* n. sp., A-D holotype male, E paratype female. A – dorsum; B – venter; C – left palp; D – right palp; E – venter. Scale bars: A-B = 100 μ m, C-D = 50 μ m.

(Figure 9)

Material examined — Holotype male, roadside pond along Afobakaweg, Surinam, 5°36.266 N 55°05.988 W, alt. 13 m asl, 19-xi-2019 (RMNH). Paratypes: three females, same data as holotype (RMNH).

Diagnosis — Male: Anterior part of idiosoma wide, dorsal shield distanced from anterior idiosoma margin, with Dgl-2 and Dgl-3 close together. Cauda relatively short, with a rounded posterior margin. Female: Cx-IV without medial margin.

Description — Male: Idiosoma yellowish, dorsally 794 long and 492 wide, ventrally 818 long. Dorsal shield 388 wide, Dgl-2 and Dgl-3 close together, postocularia more or less between accompanying setae of Dgl-2. Distance dorsal shield – anterior idiosoma margin 178. Cauda relatively short, with a rounded posterior margin; Dgl-4 on small humps. Gonopore 40 long, genital field swollen, extending to lateral idiosoma margin; genital field 324 wide Length

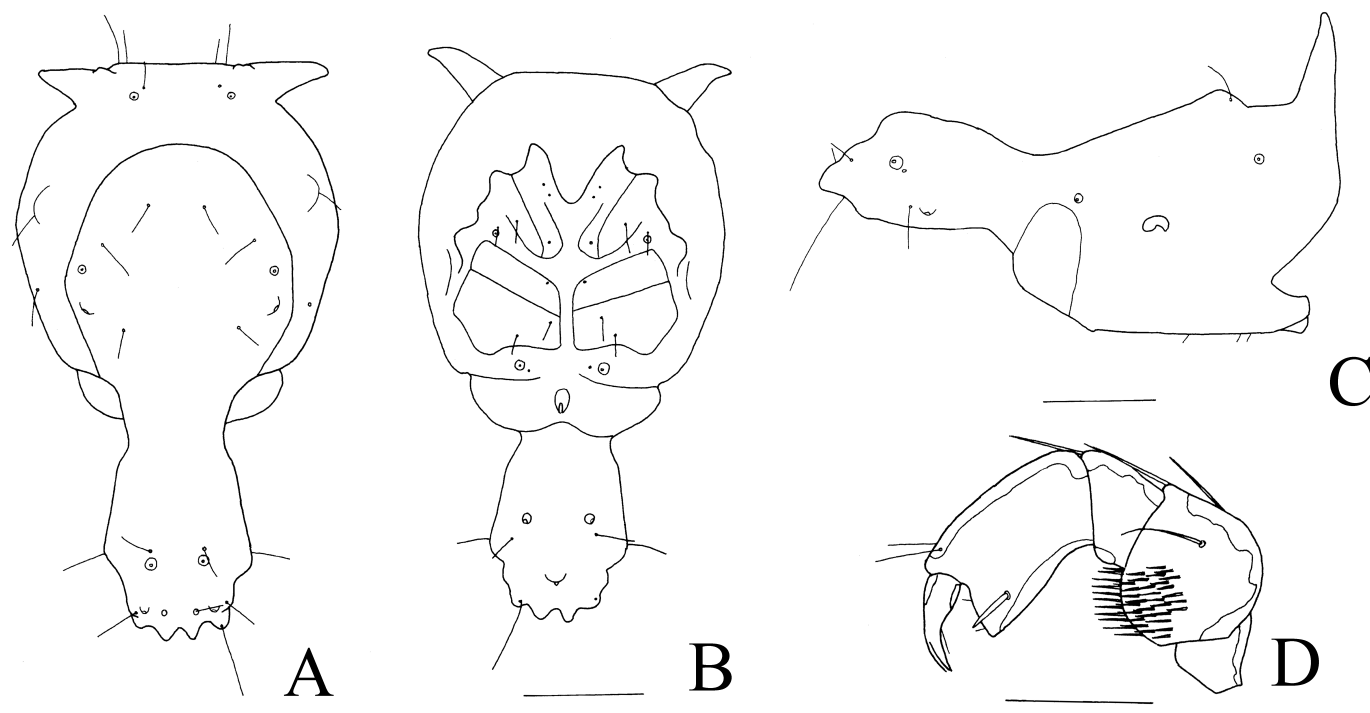


Figure 10 *Arrenurus tempelmani* n. sp., holotype male. A – dorsum; B – venter; C – lateral view; D – palp. Scale bars: A-C = 200 μm, D = 50 μm.

of P1-5: 28, 62, 34, 68, 38; P2 medially with two small setae, antagonistic bristle of P4 short. Lengths of I-leg-4-6: 90, 88, 90. Length of IV-leg-4-6: 152, 138, 140; IV-leg-4 without spur. Legs with numerous swimming setae.

Female: Idiosoma dorsally 697 (697-713) long and 603 (603-624) wide, ventrally 713 (697-729) long. Dorsal shield complete, 575 (567-575) long and 470 (470-494) wide. Cx-I slightly extending beyond anterior idiosoma margin, Cx-IV without medial margin. Gonopore 112 long, genital field 458 wide. Genital plates relatively broad. Length of P1-5: 24, 42, 70, 30; palp as in male. Length of I-leg-4-6: 86, 84, 82. Lengths of IV-leg-4-6: 114, 98, 96. Legs with numerous swimming setae.

Etymology — Named after the country of the type locality.

Remarks — The new species is most close to *Arrenurus nitidus* K. Viets, 1937 from Brazil, known from the male only. The latter species differs in a less wide anterior idiosoma (including the dorsal shield), a different configuration of the glandularia and associated setae of the dorsal shield (compare Figure 179 of K. Viets (1954a) with Figure 9A) and a straight posterior margin of the cauda. Unfortunately, Viets (1954a) didn't illustrate the postocularia of *A. nitidus*.

***Arrenurus tempelmani* n. sp.**

Zoobank: [1805C05C-B97E-4E17-98C3-6C6C15D256C4](https://zoobank.org/1805C05C-B97E-4E17-98C3-6C6C15D256C4)

(Figure 10)

Material examined — Holotype male, pond Hotel Flora y Fauna, 3 km SE of Buena Vista, Bolivia, 17°29.949 S 63°38.152 W, 10-iii-1999, leg. D. Tempelman (RMNH).

Diagnosis — Idiosoma anterolaterally with prominent, pointed humps, Dgl-1 on small humps, cauda laterally expanded, P2 with a patch of setae on a lateral extension.

Description — Male: Idiosoma yellowish, dorsally 899 long and 502 wide, ventrally 786 long. Anterior idiosoma with prominent, pointed humps, Dgl-1 on small humps. Dorsal

shield incomplete, 348 wide; distance dorsal shield – anterior idiosoma margin 121. Cauda long, distinctly set off from anterior idiosoma, laterally widened, posteriorly with four rounded extensions, the middle pair larger than the lateral pairs. Anterior coxae far distanced from anterior idiosoma margin. Gonopore 25 long, genital field swollen, 308 wide. Length of P1-5: 24, 52, 36, 62, 36. P2 with a large patch of setae on a lateral extension, these are straight (not with a hook-like tip); P2 medially with a long seta. Length of I-leg-4-6: 80, 84, 90. Length of IV-leg-4-6: 162, 130, 112; IV-leg-4 without a spur. Legs with numerous swimming setae.

Etymology — Named after David Tempelman (Amsterdam), collector of the material.

Remark — The new species is similar to *A. cornifrons* Lundblad, 1938, but differs in that *Arrenurus tempelmani* has a more rounded anterior idiosoma, Dgl-1 lie on small humps (not on humps in *A. cornifrons*) and a more posteriorly widened cauda. Moreover, the setae associated with the Dgl-3 are located more posteriorly and the genital plates are more swollen compared to *A. cornifrons*.

***Arrenurus tenuicollis acornutus* K.O. Viets, 1968**

Material examined — **Argentina**. Buenos Aires Province: 1/4/0, pond along Ruta 76, 2 km S of crossing with Ruta 86, 37°23'22,64" S, 61°0'14,81" W, 10-xii-1999.

Remarks — The male specimen agrees well with the description of K.O. Viets (1968) in the large size, the anterior part of the idiosoma is distinctly set off from the idiosoma and IV-leg-4 has a short, rounded spur. The humps near the anterior idiosoma margin are a bit more pointed in the specimen from Argentina. An almost similar species, *A. tenuicollis orthocercus* Lundblad, 1944, is described from Brazil. The latter species has larger posterior extensions of the cauda and the anterior part of the idiosoma is not set off from the idiosoma. The female of this subspecies have not been described, but the females of this study are similar to the description given for *A. tenuicollis orthocercus*. *Arrenurus tenuicollis* K. Viets, 1936 is a highly variable species, thus far with six subspecies described. Whether these subspecies all belong to the nominate taxon should be examined by molecular studies.

Distribution — Previously known from Chile only (K.O. Viets 1968).

***Arrenurus tenuicollis lacustris* n. subsp.**

Zoobank: [A4AF299B-4D24-47FD-BA00-03E5EA8137CD](https://zoobank.org/A4AF299B-4D24-47FD-BA00-03E5EA8137CD)

(Figure 11)

Material examined — Holotype male, Lago Hess, Nahuel Huapi NP, Río Negro Province, Argentina, 41°22'1,16" S, 71°44'12,35" W, 17-xi-1999 (MBR). Paratypes: three females (MBR), 2 females (RMNH), same data as holotype; six males, 41 females, Small lake about 15 km N of Villa La Angostura, along Ruta 234, Lanín NP, Neuquén Province, Argentina, 15-xi-1999 (RMNH).

Diagnosis — Dgl-1 not visible in dorsal view.

Description — Male: Idiosoma yellowish, dorsally 988 (911-1045) long and 494 (462-478) wide, ventrally 974 (919-956) long. Dorsal shield incomplete, 332 (308-336) wide; distance dorsal shield – anterior idiosoma margin 186 (170-203). Idiosoma without humps, Dgl-1 not visible in dorsal view. Gnathosomal bay narrow V-shaped. Cauda relatively long with straight lateral margins. Posterior margin with a shallow indentation, in posterior part of cauda no glandularia visible in dorsal view. Posterior margin lateral of the posterior shallow indentation with very fine setae. Gonopore 44 long, genital field rather broad, 283 wide, swollen and therefore visible in dorsal view. Length of P1-5: 28, 62, 42, 68, 41. P2 with a small patch of setae, anterior setae relatively long; near dorsal margin three long setae. Length of I-leg-4-6: 122, 130, 138. Length of IV-leg-4-6 144, 142, 140; IV-leg-4 without a spur. Legs with numerous swimming setae.

Female: Idiosoma 802 (745-899) long and 644 (608-680) wide, ventrally 826 (729-879) long. Idiosoma slightly truncated posteriorly. Dorsal shield complete, 599 (551-672) long and 502 (502-547) wide. Gnathosomal bay narrow V-shaped. Medial margin of fourth coxae

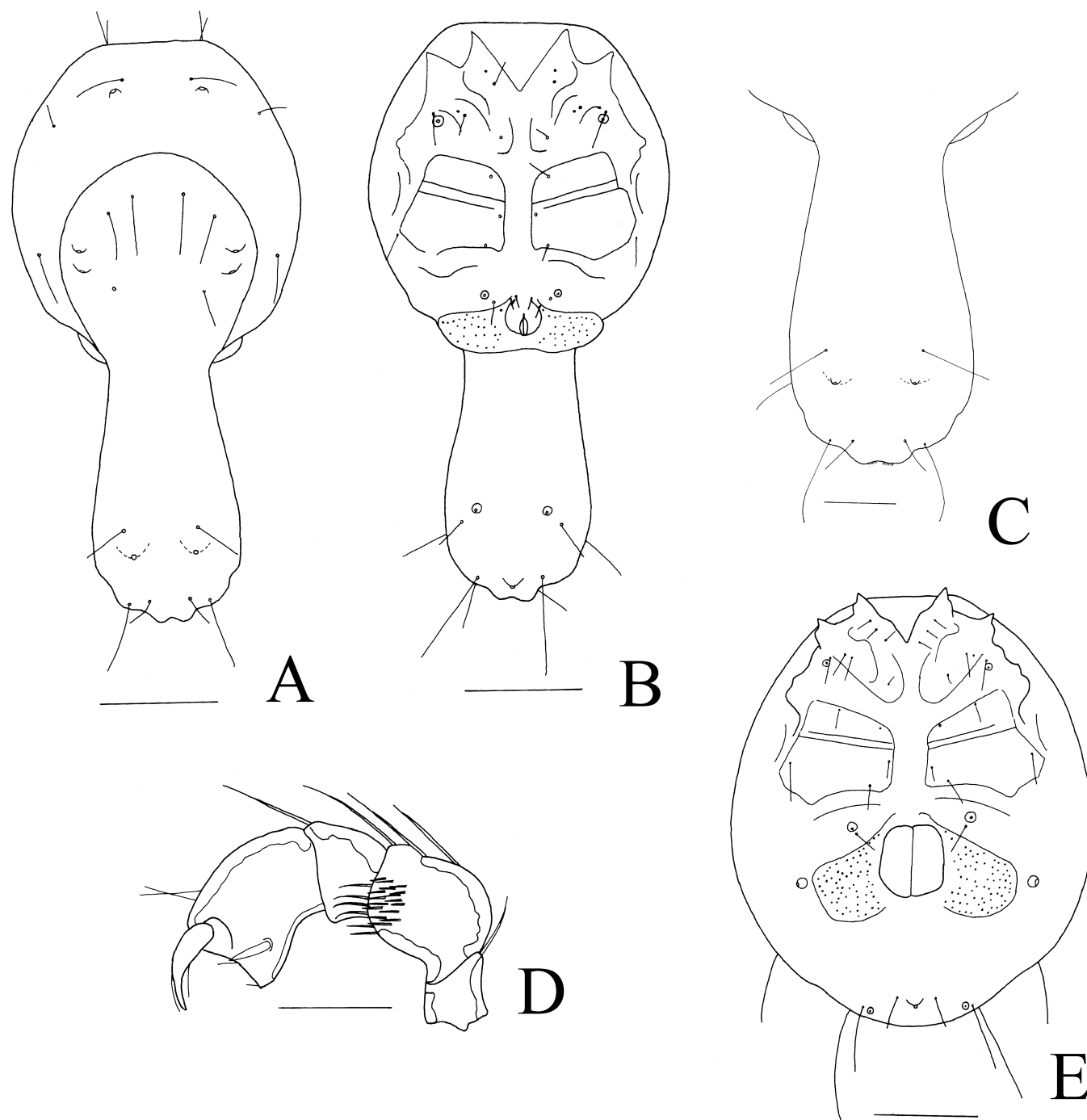


Figure 11 *Arrenurus tenuicollis lacustris* n. subsp. A-D holotype male, E paratype female. A – dorsum; B – venter; C – detail of cauda; D – palp; E – venter. Scale bars: A-B, E = 200 µm, C = 100 µm; D = 50 µm.

longer than medial margin of third coxae. Medial distance of fourth coxae about the same size of width of one gonopore valve. Length of P1-5: 28, 66, 50, 72, 44; palp as in male. Length of I-leg-4-6: 120, 120, 150. Length of IV-leg-4-6: 144, 142, 140.

Etymology — Named for its occurrence in lakes.

Remarks — A difference with all known subspecies of *Arrenurus tenuicollis* is that Dgl-1 are not visible in dorsal view in the new subspecies. The male of *A. tenuicollis tenuicollis* K. Viets, 1936 has a small hump near the anterior idiosoma margin, a narrower, posteriorly more

widened cauda compared to the new subspecies, *A. tenuicollis megacercus* K. Viets, 1954 and *A. tenuicollis orthocercus* both have the cauda with a posterolateral extension (absent in the new subspecies), additionally *A. tenuicollis orthocercus* has IV-leg-4 with a spur, *A. tenuicollis megaluroides* Lundblad, 1944 has the idiosoma with lateral extensions (absent in the new subspecies) and near the anterior idiosoma margin there is a small to large, rounded to pointed hump (no hump in the new subspecies), *A. tenuicollis gibberipalpis* Lundblad, 1944 has a pointed hump near the anterior idiosoma margin (absent in the new subspecies), P2 with a large patch of setae (smaller in the new subspecies) and the accompanying setae of Dgl-3 are distanced from the glandularia (much closer to the glandularia in the new subspecies), *A. tenuicollis acornutus* has the anterior part of the idiosoma distinctly set off from the idiosoma (not set off in the new subspecies) and smaller genital plates, *A. tenuicollis haitiensis* Lundblad, 1944 has the idiosoma with small anterior humps, a more pointed dorsal shield, the postocularia are more distanced from Dgl-2 and P2 has a larger patch of setae. The female has been described for a number of subspecies, the known females have larger genital plates compared to the new subspecies. Only the *A. tenuicollis gibberipalpis* female has similar genital plates, but in this subspecies P2 has a much larger patch of setae.

***Arrenurus triconicus* Marshall, 1919**

Material examined — **Argentina.** Entre Ríos Province: 1/1/0, ditch at Brazo Largo, N of Zarate, 33°54'37,21" S, 58°51'9,24" W, 6-xi-1999.

Distribution — Previously known from Brazil (Marshall 1919, K. Viets 1936, 1954b, Lundblad 1944), Guyana (Marshall 1919) and Argentina (Rosso de Ferradas 1973).

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