

Water mites from French Guiana, with the description of 14 new species (Acari: Hydrachnidia)

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Original research

ABSTRACT

This paper is the second paper dealing with water mites from French Guiana. The following new species are described: *Rhynchohydracarus mirabilis* Smit & Pešić, **sp. nov.** (Rhynchohydracaridae), *Limnesia guianaensis* Smit & Pešić, **sp. nov.**, *Limnesides crassipes* Smit & Pešić, **sp. nov.** (Limnesiidae), *Omartacarus (Omartacarus) sautensis* Smit & Pešić, **sp. nov.** (Omartacaridae), *Atractides courciboensis* Smit & Pešić, **sp. nov.**, *Hygrobates (Hygrobates) curtipes* Smit & Pešić, **sp. nov.**, *Hygrobates (Hygrobates) dilatatus* Smit & Pešić, **sp. nov.**, *Hygrobates (Hygrobates) guianaensis* Smit & Pešić, **sp. nov.**, *Mixobates projectus* Smit & Pešić, **sp. nov.**, *Paraschizobates (Paraschizobates) gracilipalpis* Smit & Pešić, **sp. nov.** (Hygrobatidae), *Geayia tanaru* Smit & Pešić, **sp. nov.**, *Geayia major* Smit & Pešić, **sp. nov.**, *Geayia purpureomaculata* Smit & Pešić, **sp. nov.** and *Geayia guianaensis* Smit & Pešić, **sp. nov.** (Krendowskiidae). *Limnesia magnipora* Besch is synonymized with *L. surinamensis* Besseling. The first descriptions are given for the female of *Limnesia surinamensis* Besseling and the male of *Geayia latirostris* K. Viets.

Keywords barcoding; Guianas; new species; systematics

Zoobank <http://zoobank.org/4AF3ACDE-ODAO-45B9-B05F-F056DF2DC30A>

Introduction

French Guiana is a part of the Guiana shield, a 1.7-billion-year-old Precambrian geological formation more than 1600 km long. Located in the north-eastern part of South America, it includes the “three Guianas» French Guiana, Surinam, Guyana and parts of Venezuela and Colombia. Bordered by Brazil in the east and south and by Suriname in the west, French Guiana is a French overseas territory of 84,000 km² and for 90% covered by tropical rainforest. In this biodiverse and under-surveyed area, aquatic inventories remain particularly incomplete. Improved taxonomic and ecological knowledge of benthic macroinvertebrates is a top priority to develop efficient bioassessment tools and to guide water management decisions regarding preservation and restoration of water quality (Clavier 2017).

Thus far, few water mites have been reported from the Guianas. All but one paper deals with the water mites of Surinam, with eight publications known, i.e. Walter (1919a), K. Viets (1939, 1940a, b, 1954a), Besseling (1949), Makhan (2005) and Smit (2020a). The number of water mites known from Surinam tallies 57 (Table 1). From French Guiana only one species has been reported, i.e. *Scutobates guianaensis* Smit & Clavier, 2019, while from Guyana no water mites are known.

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Table 1 Known water mite species from Surinam.

Species	Reference	Species	Reference
1 <i>Amazonella ribagai</i> Lundblad, 1930	Besseling 1949	30 <i>Koenikea aschnae</i> Makhan, 2005	Makhan 2005
2 <i>Arrenurus adulterinus</i> Viets, 1954	Viets 1954a	31 <i>Koenikea excavata</i> Lundblad, 1936	Besseling 1949
3 <i>Arrenurus bisinuosus</i> Viets, 1954	Viets 1954a	32 <i>Koenikea pallida</i> Lundblad, 1937	Besseling 1949
4 <i>Arrenurus cultriger</i> Viets, 1938	Viets 1954a	33 <i>Koenikea truncata</i> Besseling, 1949	Besseling 1949
5 <i>Arrenurus epimerosus</i> Marshall, 1919	Smit 2020a	34 <i>Limnesia amplipora</i> Viets, 1954	Viets 1954a
6 <i>Arrenurus hirtipalpis</i> (Besseling, 1949)	Besseling 1949	35 <i>Limnesia dorsalis</i> Lundblad, 1936	Besseling 1949
7 <i>Arrenurus illudens</i> Lundblad, 1937	Viets 1954a	36 <i>Limnesia geijskesi</i> Viets, 1940	Viets, 1940a
8 <i>Arrenurus infractus</i> Viets, 1937	Viets 1954a	37 <i>Limnesia hesperia</i> Lundblad, 1930	Besseling 1949
9 <i>Arrenurus lateriangulatus</i> Lundblad, 1944	Viets 1954a	38 <i>Limnesia pusilla</i> (Daday, 1905)	Viets 1954a
10 <i>Arrenurus nanus</i> Viets, 1954	Viets 1954a	39 <i>Limnesia surinamensis</i> Besseling, 1949	Besseling 1949
11 <i>Arrenurus productus</i> Viets, 1936	Viets 1954a	40 <i>Micruracaropsis phytotelmaticola</i> (Viets, 1939)	Viets 1939
12 <i>Arrenurus quadrisetosus</i> Viets, 1954	Viets 1954a	41 <i>Mideopsis gibberipalpis</i> Lundblad, 1943	Besseling 1949
13 <i>Arrenurus quadrituberculatus</i> Viets, 1937	Viets 1954a, Smit 2020a	42 <i>Mideopsis plaumanni</i> Lundblad, 1937	Besseling 1949
14 <i>Arrenurus stagnalis</i> Smit, 2020	Smit 2020a	43 <i>Neoaturus multiporus</i> (Walter, 1919)	Walter 1919
15 <i>Arrenurus surinamensis</i> Smit, 2020	Smit 2020a	44 <i>Neoaxona aculeata</i> Besseling, 1949	Besseling 1949
16 <i>Arrenurus tenuicollis</i> Viets, 1936	Viets 1954a	45 <i>Paraschizobates megapoides</i> Lundblad, 1937	Besseling 1949
17 <i>Arrenurus tenuicollis gibberipalpis</i> Lundblad, 1944	Viets 1954a	46 <i>Piona atrorubra</i> Lundblad, 1937	Viets 1954a
18 <i>Arrenurus tenuicollis megacercus</i> Viets, 1954	Viets 1954a	47 <i>Piona dejecta</i> Viets, 1937	Viets 1954a
19 <i>Arrenurus tumulosus</i> Viets, 1954	Viets 1954a	48 <i>Piona oxyura</i> Viets, 1954	Viets 1954a
20 <i>Centrolimnesia bondi</i> Lundblad, 1935	Viets 1954a	49 <i>Piona panniculata</i> Viets, 1940	Viets 1940b
21 <i>Centrolimnesia geijskesi</i> Besseling, 1949	Besseling 1949	50 <i>Piona praejuncta</i> Viets, 1940	Viets 1940b
22 <i>Arrenurus rotundus subrotundatus</i> (Viets, 1954)	Viets 1954a	51 <i>Piona robustipalpis</i> Viets, 1954	Viets 1954a
23 <i>Frontipodopsis staheli</i> Walter, 1919	Walter 1919	52 <i>Piona rotunda</i> (Kramer, 1879)	Viets 1940b
24 <i>Hydrachna miliaria</i> Berlese, 1888	Viets 1954a	53 <i>Piona sudamericana</i> Viets, 1910	Viets 1954a
25 <i>Hydrodroma longiseta</i> Viets, 1954	Viets 1954a	54 <i>Recifella lundbladi</i> (Besseling, 1949)	(Besseling 1949)
26 <i>Hydryphantes papillosus</i> Lundblad, 1936	Viets 1954a	55 <i>Unionicola levipalpis</i> Besseling, 1949	Besseling 1949
27 <i>Hydryphantes ramosus pumilus</i> Viets, 1954	Viets 1954a	56 <i>Unionicola pusuligera</i> Viets, 1954	Viets 1954a
28 <i>Hygrobatas curvipalpis</i> Besseling, 1949	Besseling 1949	57 <i>Unionicola tumidipalpis</i> (Lundblad, 1936)	Viets 1954a
29 <i>Hygrobatas pachydermis</i> (Lundblad, 1936)	Besseling 1949		

Since almost 15 years water mites are punctually collected by the junior author in French Guiana. Recent surveys conducted in preserved protected areas of National Reserves and National Park led to an interesting set of new specimens.

Material and methods

The water mites were sorted in the field and fixed in Koenike-fluid or ethanol 96%. The type material and all non-type material is lodged in Naturalis Biodiversity Center, Leiden. The following abbreviations have been used: Ac – acetabula; Cx-III – third coxae; Cxgl-2 – coxoglandularia 2; dc-1 – dorsocentralia 1; Dgl-1 – dorsoglandularia-1; IV-leg-5-6 – segments 5-6 of first to fourth leg; L – length; MNHN – Muséum national d’Histoire naturelle, Paris; P1-5 – palp segments 1-5; RMNH – Naturalis Biodiversity Center, Leiden; Vgl-3 – ventroglandularia 3; W – width. For the description of the new *Rhynchohydracarus* species the terminology of De Castro *et al.* (2022) is followed. All measurements are in μm , measurements of palp and leg segments are of the dorsal margins, measurements of paratypes are given in parentheses. Ventral length is measured from the tip of Cx-I till posterior idiosoma margin. Numbers of specimens are given as male/female/deutonymph. All material is collected by Simon Clavier. A few specimens were successfully barcoded at the Canadian Centre for DNA Barcoding (Guelph, Ontario, Canada). However, given the limited number of barcoded specimens, we only listed the BOLD access numbers.

Taxonomy

Family Rhynchohydracaridae Lundblad

Genus *Rhynchohydracarus* Lundblad, 1936

A small genus with three species known from South America (Brazil, Paraguay, Lundblad 1941, De Castro *et al.* 2022) and one from Panama (Valdecasas 2001). The genus is apparently rare, with thus far only four specimens described. Undescribed species have been reported from Costa Rica, Panama and Ecuador (see De Castro *et al.* 2022).

Rhynchohydracarus (Rhynchohydracarus) mirabilis Smit & Pešić sp. nov.

Zoobank: 81103BE2-D51B-45B5-B4FB-9A49DB847012

(Figures 1A-C)

Material examined — Holotype male, Petit-Saut Lake near dam, French Guiana, 5.058891°N, 53.050829°W, 12 Mar. 2018, leg. S. Clavier (RMNH).

Diagnosis (Female unknown) — Posterior to the large postocularia plate two pairs of smaller plates present.

Description — Male – Idiosoma dorsally 616 long and 494 wide, ventrally 680 long. Dorsal shield 567 long and 437 wide, with tightly fitting plates and platelets, consisting of a relatively small, anteriorly pointed plate with one pair of glandularia (dc-1), a large central plate (dc-2+3), 288 long and 275 wide, with the anteriorly located postocularia. These two unpaired plates surrounded by six platelets without glandularia and three pairs of small platelets, each with a glandularium (Figure 1A). Venter with five pairs of tightly fitting plates as well as two pairs of platelets. Genital field on an unpaired, anteriorly pointed plate with one pair of glandularia (pregen). Posterior to the latter plate a pair of small elongated plates without glandularia or setae, an unpaired elongated platelet with the excretory pore (postgen) and more posterior a small unpaired platelet (Figure 1B) and Vgl-3. Genital field 98 long and 129 wide, with numerous small acetabula. Near posterior margin of venter two pairs of bar-shaped sclerites, each with a glandularium. Length of P1-5: -, -, 50, 34, 18. P4 stocky (Figure 1C). Length of I-leg-4-6: 80, 90, 77. Length of IV-leg-4-6: 150, 102, 82. Legs without swimming setae.

Female – Unknown.

Etymology — Named for its wonderful appearance.

Discussion — In males of this genus the genital field is lying on a plate with one pair of glandularia (Cxgl-2), in females Cxgl-2 are lying each on a small platelet. The new species is most close to *R. testudo* Lundblad, 1936, *R. dividiuus* Lundblad, 1941 and *R. armiger* De Castro, Proctor & Lofego, 2022. From these species the new species differs in the presence of two pairs of dorsal plates posterior to the large postocularia plate. *Rhynchohydracarus testudo* has only one pair of plates, *R. dividiuus* and *R. armiger* have one pair of plates and an unpaired plate posteriorly to the postocularia plate. Moreover, the pair of small platelets without glandularia or setae posterior to the genital plate is absent in the forementioned species.

Family Limnesiidae Thor

Genus *Limnesia* Koch, 1836

Subgenus *Limnesia* s.s

Limnesia guianaensis Smit & Pešić sp. nov.

Zoobank: 5F31FFDF-7DCA-457B-9F70-63D862939FE8

(Figures 2A-D)

Material examined — Holotype male, National Reserve La Trinité / Parc Amazonien de Guyane, Courcibo River, French Guinea, 4.475657°N, 53.219474°W, 14 Nov. 2019, leg. S. Clavier, dissected and slide mounted (MNHN).

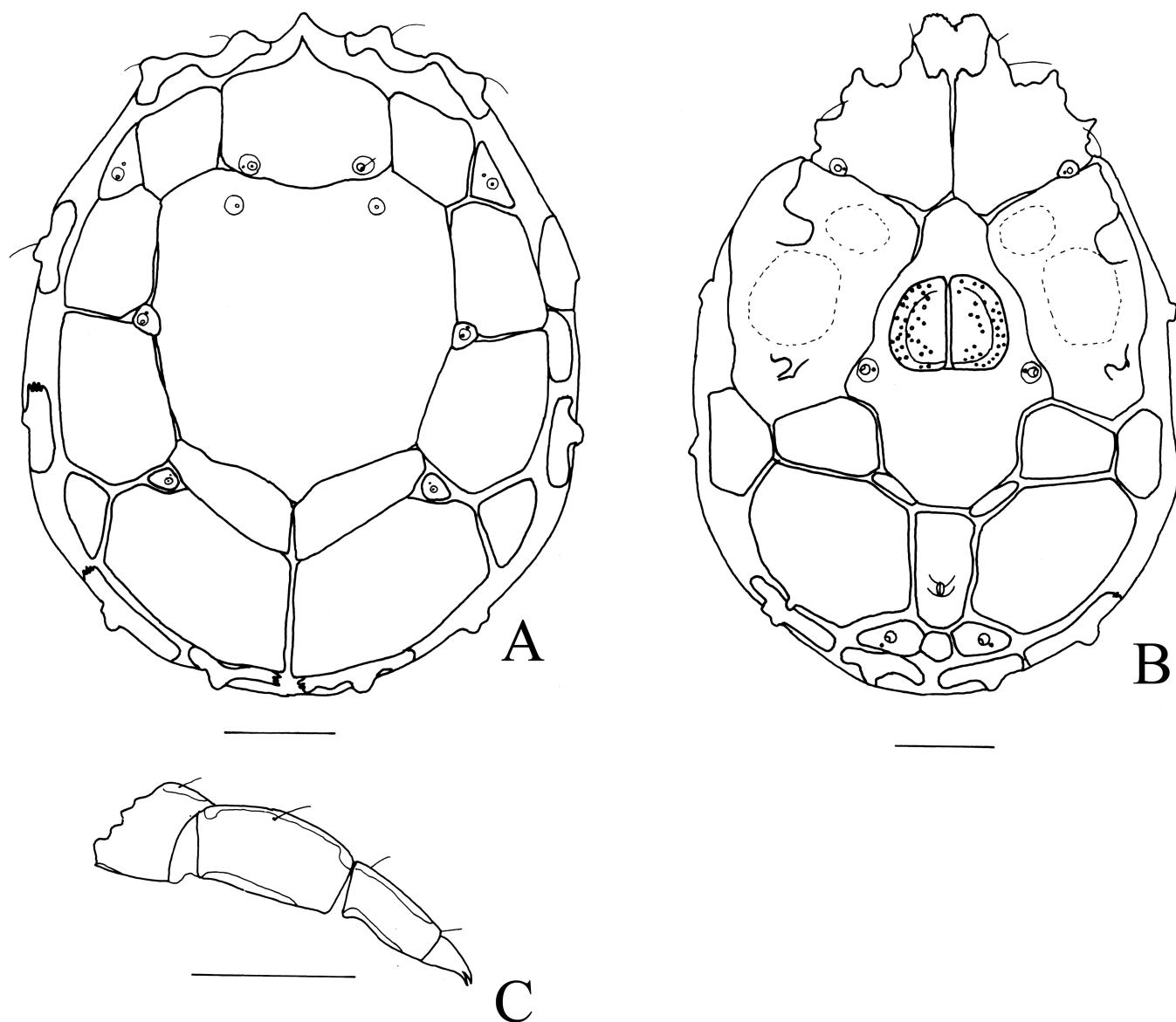


Figure 1 *Rhynchohydracarus mirabilis* Smit & Pešić **sp. nov.**, holotype male. A — dorsum; B — venter C — palp (part.). Scale bars: A-B = 100 μ m, C = 50 μ m.

Diagnosis (Female unknown) — Suture lines between Cx-III and Cx-IV complete, separating Cxgl-4 and setae of Cx-III; ventral margin of P2 convex, bearing a spine-like seta, located on a very slightly developed tubercle; P4 without ventral tubercles, ventral setae approached to distal margin of the segment, distal end of P4 and proximal end of P5 relatively high.

Description — Male — Idiosoma 1300 long; colour yellow brownish; integument finely striated. Dorsum posteriorly with a small, roundish platelet, 75 long and 84 wide. Coxal field 697 long and 1175 wide, Cx-III 659 wide; posterior and lateral margins of coxae with extended secondary sclerotization, Cx-I medially separated, medial margins well developed, apodemes short and incorporated into secondary sclerotization; Cxgl-4 located posterior to the medial setae of Cx-III, suture lines between Cx-III and Cx-IV complete, separating Cxgl-4 and setae

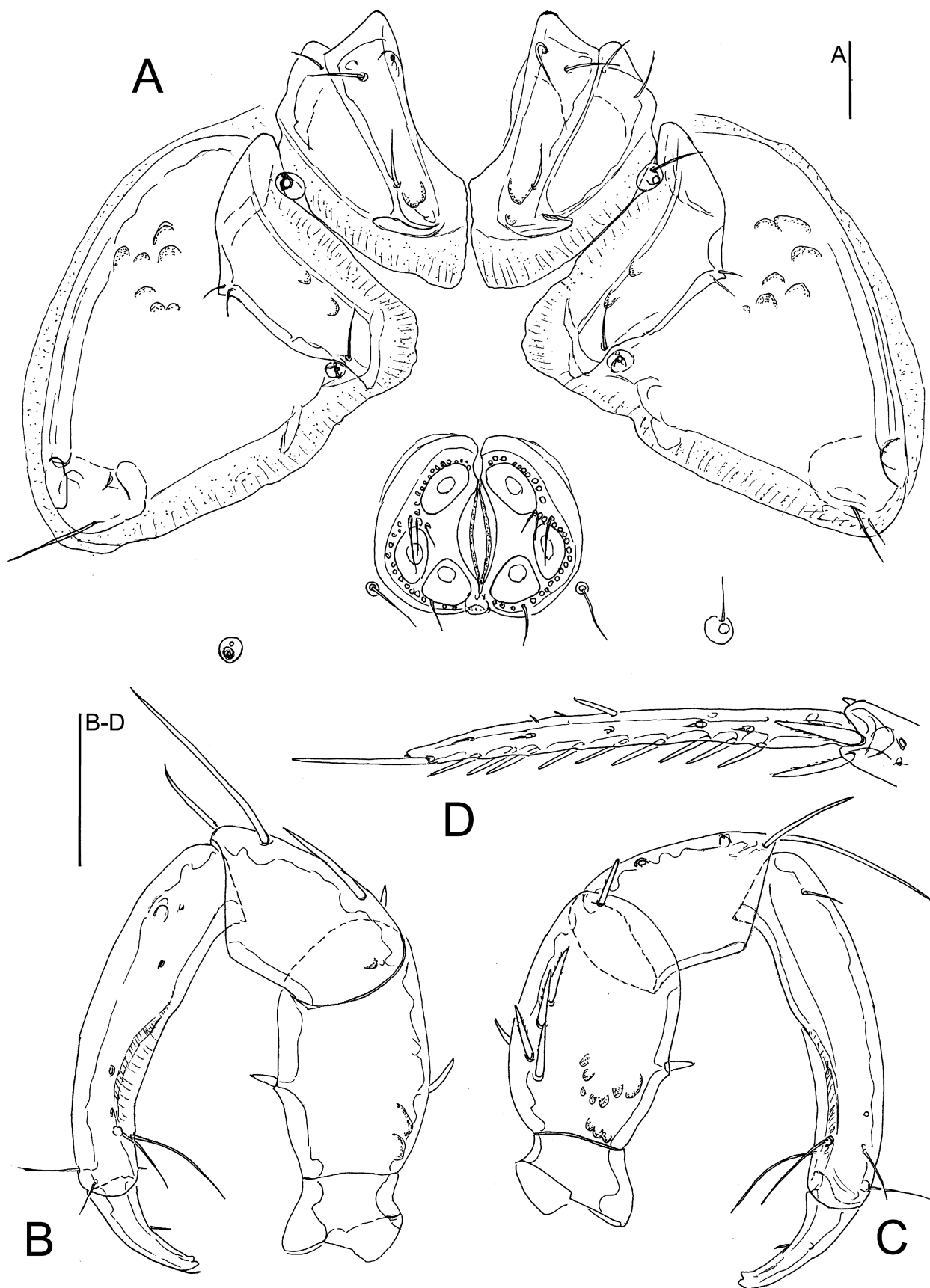


Figure 2 *Limnesia guianaensis* Smit & Pešić **sp. nov.**, holotype male. A — coxal and genital field; B-C — palp; D — IV-leg-6. Scale bars = 100 μ m.

of Cx-III. Genital field 238 long and 269 wide, within a border of secondary sclerotization, consisting of two flaps not fused at anterior end, genital plates with 33-34 small setae on each side, four of these located between Ac-1 and Ac-2 (Figure 2A); length of Ac-1-3: 75-78, 81-84, 69. Ejaculatory complex 203 long.

Gnathosoma with long dorsodistal projections, 247 long. Chelicera 453 long. Palp: dorsal length/height, dorsal length/height ratio: P1, 28/72, 0.39; P2, 161/103, 1.56; P3, 147/84, 1.74; P4, 238/59, 4.0; P5, 87/31, 2.8; length ratio P2/P4 0.68; P2 ventral margin convex, bearing a spine-like seta, located on a very slightly developed tubercle, just posterior to the center of the segment; P4 slender, without ventral tubercles, ventral setae approached to distal margin of the segment, and more distally one small seta, distal end of P4 and proximal end of P5 relatively high (Figures 2B-C).

Legs – Dorsal length of I-leg: 80, 134, 147, 183, 214, 228; dorsal length of IV-leg: 244, 197, 222, 311, 313, 297; IV-leg-6 with a row stout ventral setae, and a subterminal seta (Figure 2D), subterminal seta 94 long, L ratio seta/IV-leg-6 0.32; claws of I-III-leg with dorsal and ventral clawlets. Numbers of swimming setae: III-leg-5, 20; IV-leg-4, 13; IV-leg-5, 16.

Female – Unknown.

Etymology — Named for its occurrence in the Guianas.

Discussion — The new species belongs to the *fuhrmanni-onophora* species group (see Cook 1980). With regard to shape of genital field (wider than long with numerous genital setae) the new species resembles more to *Limnesia incognita* Lundblad, 1936 a species described from lower elevations in Paraguay and Southern Brazil (Lundblad 1936, 1941). Later on, Lundblad (1954) synonymized the latter species with *L. fuhrmanni* Walter, 1912, a species originally described from the Andes chain in Colombia at an altitude of 2000-2066 meters (Walter 1912). The new species from French Guiana can be separated by the shape of P4 (without ventral tubercles, ventral setae close to distal margin of segment, more distally P4 with one small seta, distal end of P4 and proximal end of P5 relatively high), suture lines between Cx-III and Cx-IV complete, separating Cxgl-4 and setae of Cx-III (in both *L. fuhrmanni* and *L. onophora* Cxgl-4 located on Cx-III, see Lundblad 1941 and Lundblad 1944, respectively).

In regard to the characteristic position of Cxgl-4, the structure of P4 and numerous swimming setae on the fourth leg, the new species from Guiana resembles *Limnesia bruscoma* Cook, 1980, a species known only from a single female collected in a small stream in Costa Rica (Cook 1980). The latter species can easily be separated by the shape P2 (see Cook 1980, fig. 565), which differs from the palp in the *fuhrmanni-onophora* species group (P2 ventral margin convex, bearing a spine-like seta, located on a very slightly developed tubercle).

Distribution — French Guiana; known only from the type locality.

***Limnesia hesperia* Lundblad, 1930**

New record — 1/0/0, Saut Sonnelle, Inini River, 3.668227°N, 53.960857°W, 28 Sept. 2017.

Distribution — Peru (Lundblad 1930), Paraguay (Lundblad 1941), Surinam (Besseling 1949), French Guiana (this study).

Remarks. According to Viets (1954b) Besseling's material from Surinam does not belong to this species. When compared with the description in Lundblad (1941) there are indeed differences in the setation of P4. However, Besseling's material and illustrations (Besseling 1949) matches the original description of Lundblad (1930), and, therefore, we disagree with Viets (1954b).

Subgenus *Allolimnesia* K. Viets, 1936

A subgenus with four species known from South America.

***Limnesia (Allolimnesia) polypora* (K. Viets, 1936)**

New records — 2/0/0, Petit-Saut Lake, 2/0/0, 4.939997°N, 53.044167°W, date unknown, between 2007 and 2017; Petit-Saut Lake near dam, 5.058891°N, 53.050829°W, 12 Mar. 2018.

Distribution — Brazil (K. Viets 1936, 1954a; Besch 1969), Venezuela (K. Viets 1956), French Guiana (this study).

Subgenus *Limnesiellula* K. Viets, 1935

Limnesia brasiliana (K. Viets, 1935)

New record — 1/5/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W.

Distribution — Brazil (K. Viets 1935, 1954a, b), French Guiana (this study).

Subgenus *Seppiella* Besch, 1969

A subgenus with two species known from South America (but see below).

Limnesia surinamensis Besseling, 1949

(Figures 3A-D)

Limnesia magnipora Besch, 1969 – **syn. nov.**

Type material — Syntype male, Boschbeek, Toemoek-Hoemak geb. [= mountain], Temomaiem, Surinam [idiosoma damaged, palp separated but not mounted, P5 missing, most legs missing], 28 Jul. 1939, leg. D.C. Geijskes (RMNH.ACA.5585).

New record — 0/1/0, Crique Aya, National Reserve La Trinité, 4.603164°N, 53.414064°W, 4 Nov. 2018, leg. S. Clavier.

Distribution — Surinam (Besseling 1949); French Guiana (this study).

Remarks — Thus far only the male was known, and therefore a description is given below of the female.

Description — Female – Idiosoma dorsally 551 long and 501 wide, ventrally 575 long. Dorsal and ventral shield present, both shields punctated. Dorsal shield with three pairs of glandularia, near Dgl-1 a short ridge (Figure 3A). An indistinct lineation visible on the dorsal shield. Coxae fused with ventral shield, suture lines of coxae incomplete; anterior coxae with short apodemes. Vgl-4 located medially of suture line Cx-III/IV (Figure 3B). Genital field 120 long, not incorporated in the ventral shield, with three pairs of acetabula. Length of P1-5: -, 80, 51, 104, 28. P2 ventrally with a stout seta on a short tubercle (Figure 3C). Length of I-leg-4-6: 76, 84, 92 (till tip of segment). Length of IV-leg-4-6: 106, 108, 101. Terminal seta of IV-leg-6 76 long (Figure 3D). III-leg-5 and IV-leg-4 with four swimming setae, III-leg-4 and IV-leg-5 with two swimming setae. I-III-leg claws with ventral clawlet.

Remarks — Besseling (1949) stated that the ventral seta of P2 is inserted directly on the segment, without a setal tubercle. Examination of the holotype shows that this is not correct. The seta of P2 is inserted on a distinct setal tubercle. Besch (1969) described a second species of this subgenus, i.e. *Limnesia magnipora* Besch, 1969. The only difference we see with *L. surinamensis* is the ridge near Dgl-1, which is more near the anterolateral margin of the dorsal shield. However, we think this is due to the way Besch illustrated the species. As *L. magnipora* is in all other characters similar to *L. surinamensis*, we propose to synonymize the two species.

Genus *Limnesides* Lundblad, 1936

A genus with thus far one species known from Brazil.

Limnesides crassipes Smit & Pešić sp. nov.

Zoobank: EB03A1B7-F619-46E5-8E2B-305522648F9D

(Figures 4A-D)

Material examined — Holotype female, Régina, Crique Kapiri, 4.10382°N, 52.086531°W, 28 m a.s.l., 24 Oct. 2017, leg. S. Clavier (RMNH).

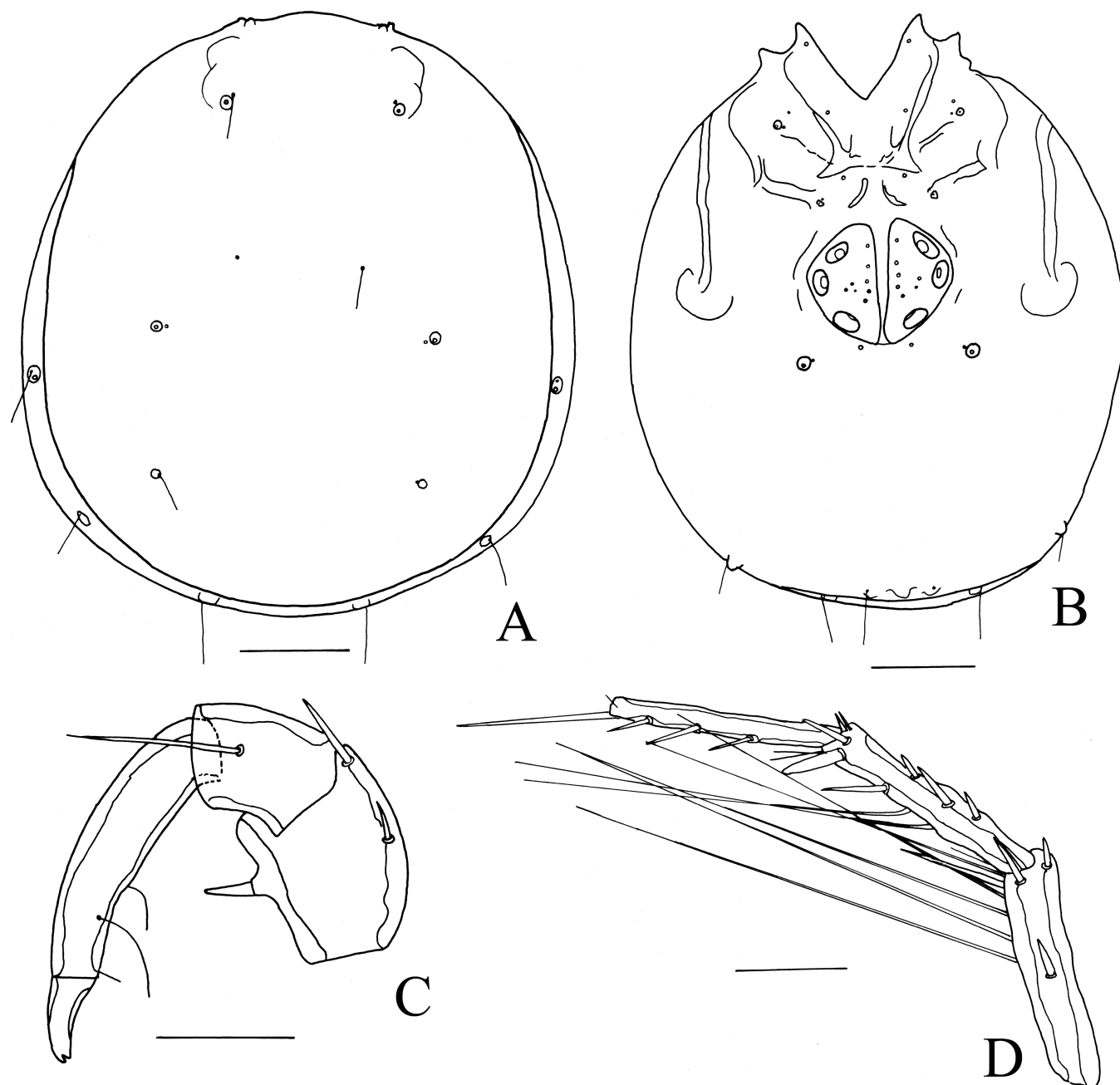


Figure 3 *Limnesia surinamensis* Besseling, female. A — dorsum; B — venter; C — palp (P1 missing); D — IV-leg-4-6. Scale bars: A-B = 100 μm, C-D = 50 μm.

Diagnosis (Male unknown) — Dorsum with a relatively small platelet (L 105), Cx-IV relatively short, not extending beyond posterior margin of genital field, the latter tapering anteriorly.

Description — Female — Idiosoma dorsally 632 long and 429 wide, ventrally 680 long. However, integument very soft and measurements, therefore, give only an indication. Dorsum posteriorly with a small platelet, 105 long. Gnathosoma elongated, 200 long, but unfortunately not in a good position in the slide for illustrating it. Cx-I fused medially, suture line Cx-I/II incomplete, anterior coxae with short apodemes. Cxgl-4 between Cx-II and Cx-III. Cx-IV not

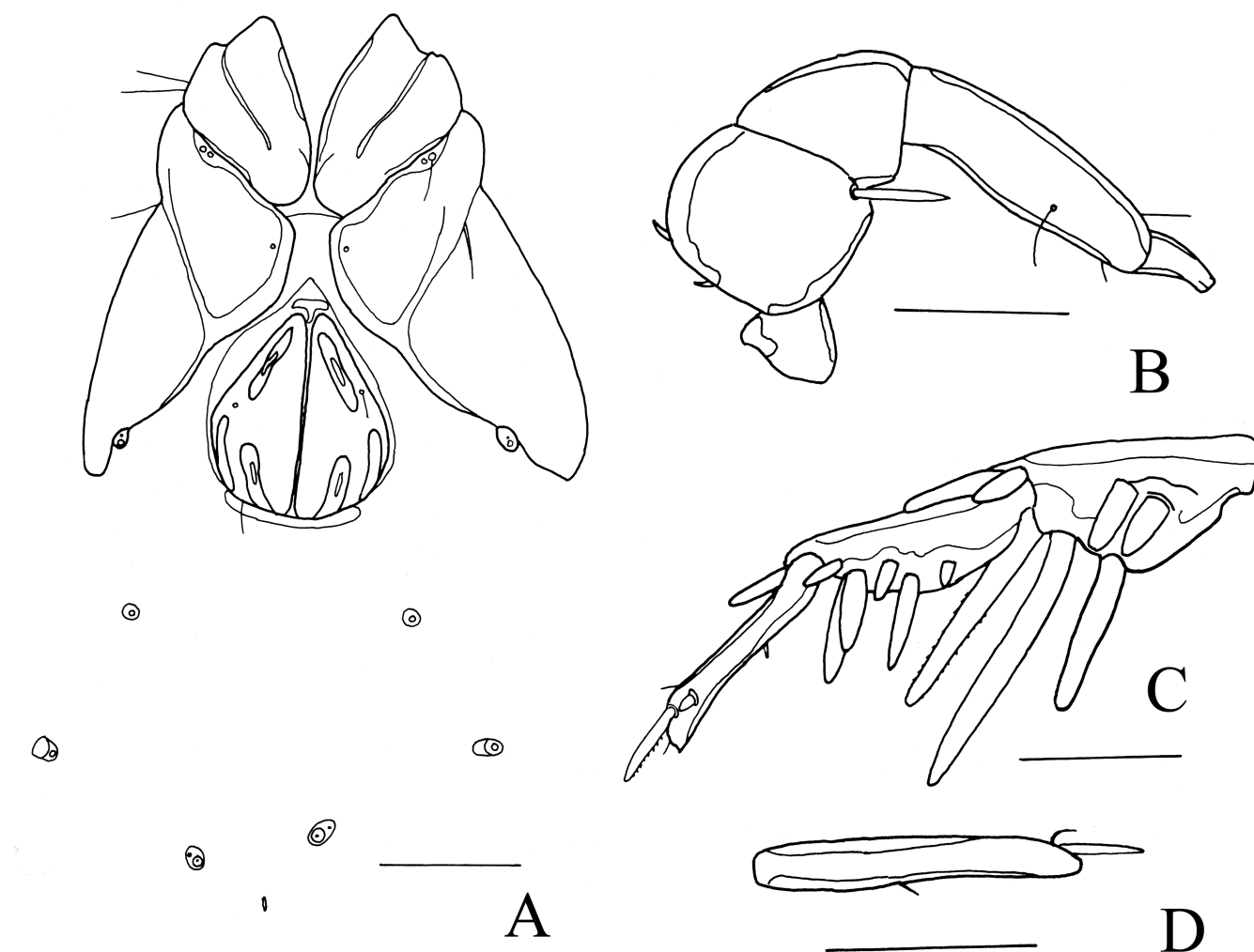


Figure 4 *Limnesides crassipes* Smit & Pešić **sp. nov.**, holotype female. A – venter; B – palp; C – IV-leg-4-6; D – IV-leg-6. Scale bars: A = 100 μ m, B-D = 50 μ m.

extending posteriorly beyond posterior margin of genital field. Genital field tapering anteriorly, 154 long, acetabula elongated and slightly contracted in the middle (Figure 4A). Pregenital sclerite 26 wide. Some secondary sclerotization present anterior to genital field, pointed anteriorly. Length of P1-5: 26, 44, 48, 84, 26. P2 with an anteroventral seta, inserted directly on the segment (Figure 4B). I-leg-4-6: 80, 76, 66. Length of IV-leg-4-6: 84, 82, 68. Fourth leg with thick, enlarged segments with many stout setae (Figure 4C), IV-leg-1 elongated, IV-leg-6 with a minute claw and a stout pinnate seta (Figure 4D), 32 long. Swimming setae absent.

Male – Unknown.

Etymology — Named for the thick fourth leg.

Remarks — The new species differs from *L. epimerosus* Lundblad, 1936 in the tapering genital field (not tapering in *epimerosus*), the small dorsal platelet (large in *epimerosus*, covering $\frac{3}{4}$ of dorsum) and the smaller Cx-IV not extending to posterior margin of genital field (Cx-IV large, extending far extending to posterior margin of genital field in *epimerosus*).

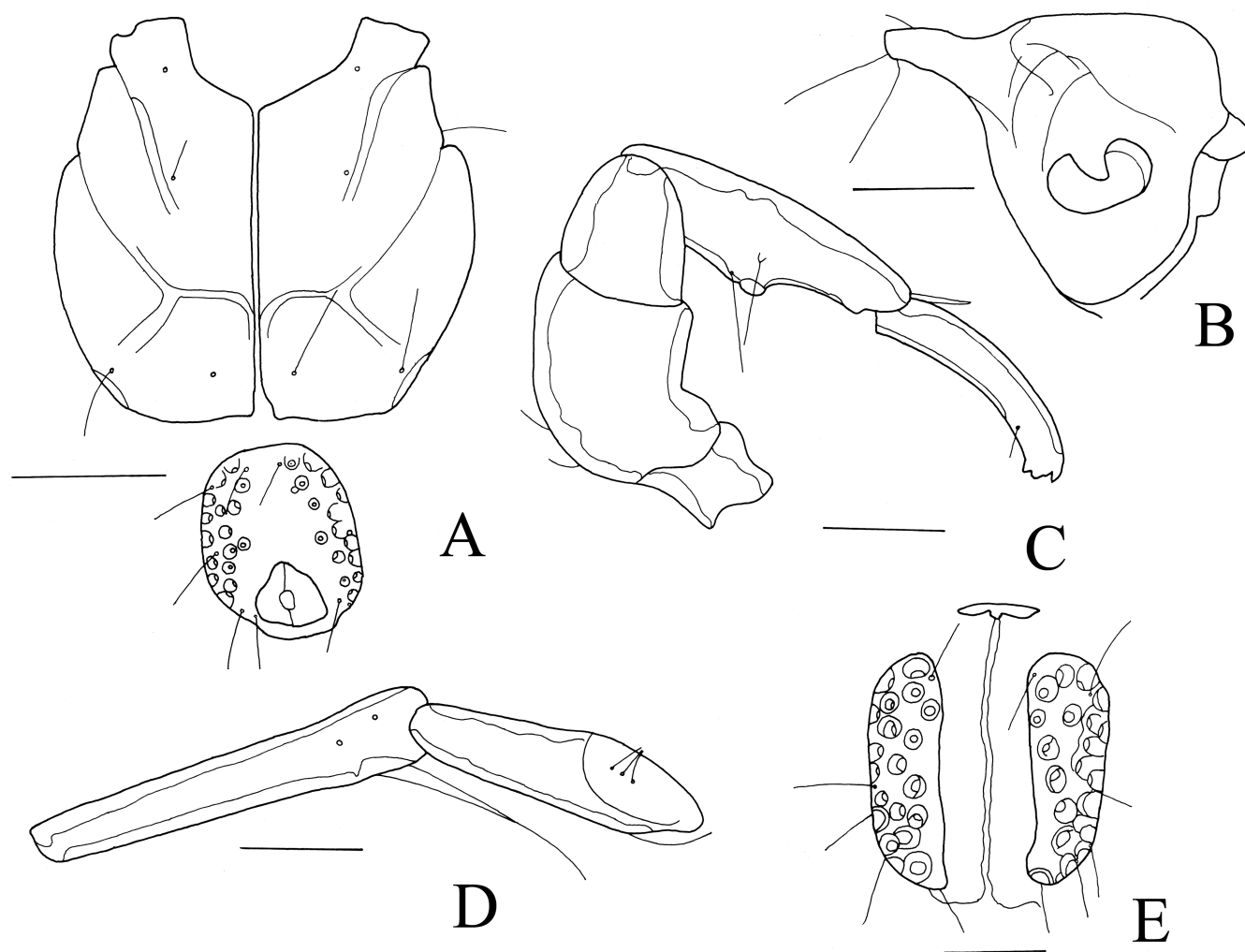


Figure 5 *Omartacarus sautensis* Smit & Pešić **sp. nov.**, A–D holotype male, E paratype female. A – venter; B – gnathosoma; C – palp; D – 1-leg-5 and -6; E – genital field. Scale bars: A= 100 µm, B- E = 50 µm.

Family Omartacaridae Cook

Genus *Omartacarus* Cook, 1963

A genus with a disjunct distribution, known from the Nearctic, Neotropical and Australasian regions.

Subgenus *Omartacarus* Cook, 1963

The subgenus has a similar distribution as the nominate taxon, with six species known from the Nearctic and Neotropical regions and five species from Australia.

Omartacarus (Omartacarus) sautensis Smit & Pešić **sp. nov.**

Zoobank: [B8CB7AFF-BE25-41C2-9844-5ABD4C6A4350](https://doi.org/10.24349/6f99-aqit)

(Figures 5A–E)

Material examined — Holotype male, Petit-Saut Lake, French Guiana, date unknown,

between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier (RMNH). Paratype: Same data as holotype (RMNH).

Diagnosis — Suture line between Cx-III and Cx-IV very characteristic, with Cx-III not reaching midline of venter.

Description — Male — Idiosoma dorsally 648 long and 535 wide, ventrally 689 long (but these measurements are an indication only as the integument is very soft). Dorsum without plates or platelets. Gnathosoma compact, 154 long and 127 high, rostrum relatively short with indistinct annulations, at least in lateral view (Figure 5B). Suture line between Cx-I and Cx-II incomplete. Suture line between Cx-III and Cx-IV very characteristic, with Cx-III medially not reaching midline of venter (Figure 5A). Genital field 120 long and 101 wide, with 15-16 pairs of acetabula; gonopore 42 long, narrowed anteriorly. Length of P1-5: 42, 122, 86, 130, 91 (P2 and P3 measured from the other palp). P4 ventrally with a tooth-like seta in the middle of segment (Figure 5C). Length of I-leg-4-6: 150, 176, 128 (till tip of segment). I-leg-5 anteroventrally with two long thin setae (but these are not swimming setae, figure 5D). Length of IV-leg-4-6: 219, 251, 184. Legs without swimming setae.

Female: Idiosoma dorsally 810 long and 753 wide, ventrally 859 long (but these measurements are an indication only as the integument is very soft). Dorsum without plates or platelets. Gnathosoma compact, 196 long and 120 high, rostrum relatively short with annulations. Coxae as in male, coxal field 259 long and 275 wide. Genital field 156 long, genital plates 116 long, the latter nearly as long as gonopore, with approximately 21 pairs of acetabula (Figure 5E). Length of P1-5: 34, 130, 64, 153, 96 (P4 measured from the other palp). Palp as in male. Length of I-leg-4-6: 156, 178, 136. Length of IV-leg-4-6: 210, 251, 200.

Etymology — Named after the type locality.

Discussion — The shape of the suture line between Cx-III and Cx-IV is not found in any other *Omartacarus* species. Moreover, a tooth-like seta in the middle of P4 is not found in other *Omartacarus* species. The genus *Omartacarus* is typically an interstitial species. Although the type locality is a lake, the collection has probably been made in an area near the dam with some subterranean influence.

Family Hygrobatidae Koch

Genus *Atractides* Koch, 1837

Atractides courciboensis Smit & Pešić sp. nov.

Zoobank: [ACDFED70-BA76-4434-BCE2-C0BB0058A361](https://zoobank.org/ACDFED70-BA76-4434-BCE2-C0BB0058A361)

(Figures 6A-D)

Material examined — Holotype female, National Reserve La Trinité / Parc Amazonien de Guyane, Courcibo River, French Guiana, 4.475657°N, 53.219474°W, 14 Nov. 2020, leg. S. Clavier, dissected and slide mounted (MNHN).

Diagnosis (Male unknown) — Gonopore long; I-leg-5 setae S-1 and S-2 close to each other, S-1 slender with truncate tip, S-2 pointed, basally enlarged, I-leg-6 curved, dorsal length/central height ratio 5.4.

Description — Female — Integument striated, muscle insertions unsclerotized. Mediocaudal margin Cx-I convex, apodemes of Cx-II in an obtuse angle (Figure 6A). Acetabula in a weakly curved line, gonopore long, pregen large (Figure 6B). Excretory pore smooth; Vgl-1 not fused to Vgl-2. Palps: ventral margin P2 straight, with slightly curved distal margin, ventral margin P3 slightly concave, P4 sword seta between ventral setae, nearer to distoventral hair (Figure 6C). Legs: I-leg-5 thickened with setae S-1 and S-2 close to each other, S-1 slender, with obtuse tip, S-2 pointed, proximally enlarged; I-leg-6 stout, curved, proximally slightly thickened, with parallel dorsal and ventral margins from the centre to the claw pit (Figure 6D).

Measurements. Idiosoma 525 long and 409 wide. Coxal shield 209 long; Cx-III 302 wide, medial length of Cx-I+II 83, lateral length of Cx-I+II 145. Genital field 125 long and 125 wide,

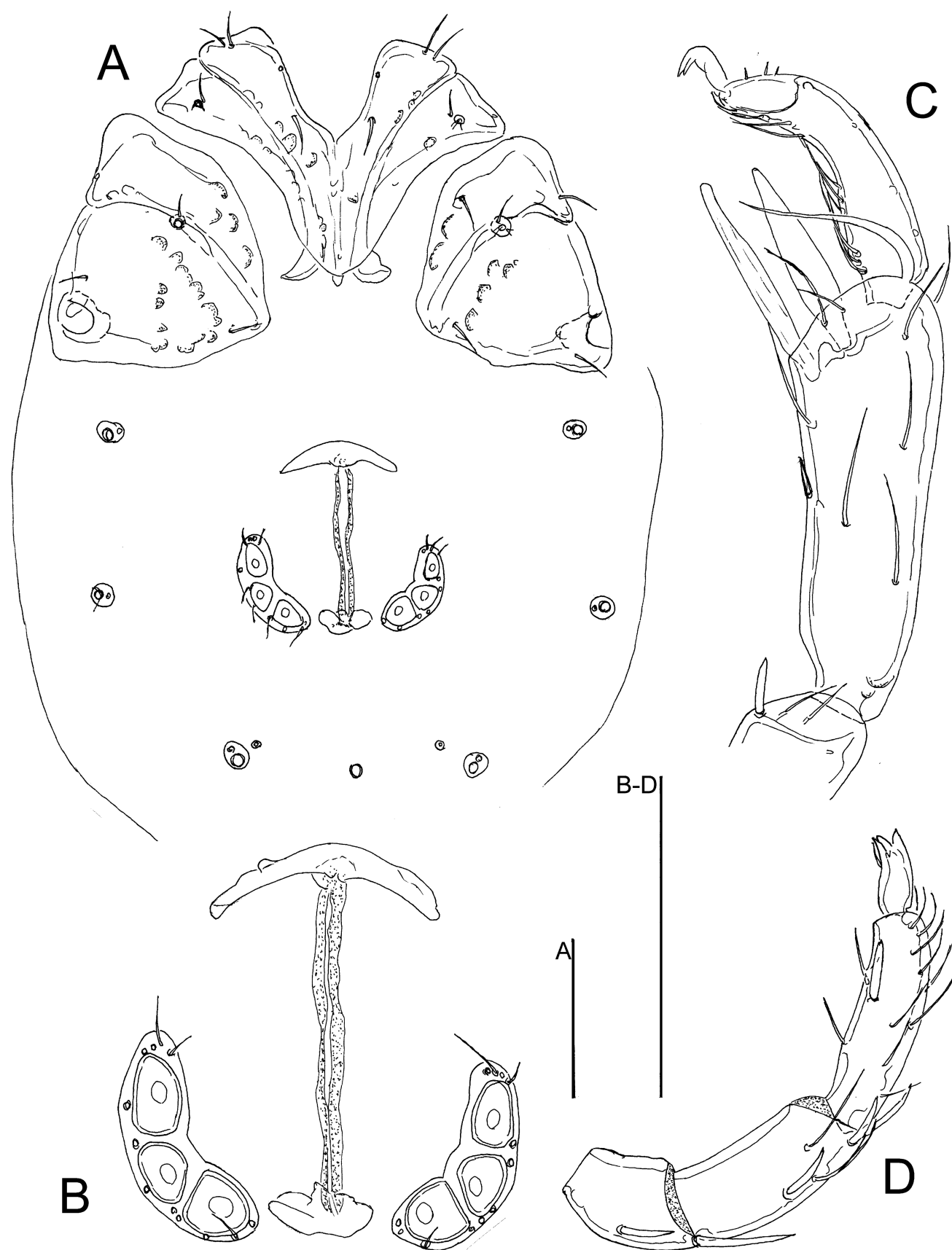


Figure 6 *Atractides courciboensis* sp. nov., holotype female. A — idiosoma, ventral view; B — genital field; C — palp, medial view (P1 lacking); D — I-leg-5 and -6. Scale bars = 100 µm.

genital plates 63–70 long, pregenital sclerite 70 wide, gonopore 108 long, length of Ac-1-3: 20–26, 20, 20–21. Eggs (n = 2) maximum diameter 119–128.

Palp: dorsal length/height, dorsal length/height ratio: P1, 22/23, 0.97; P2, 45/28, 1.6; P3, 61/27, 2.3; P4, 70/20, 3.5; P5, 26/11, 2.4; length ratio P2/P4, 0.64. Gnathosoma ventrally 70 long; chelicera 144 long.

Legs – I-leg-5 dorsal length 138, ventral length 102, dorsal length/ventral length ratio 1.35, maximum height 48, dorsal length/maximum H 2.9, S-1 long 67, length/width ratio 8.3, S-2 long 63, length/width ratio 5.0, distance S-1-2, 8, dorsal length S-1/2 ratio 1.08; I-leg-6 dorsal length 84, central height 16, dorsal length/central height ratio 5.4; dorsal length I-leg-5/6 ratio 1.6.

Male – Unknown.

Etymology — Named after the Courcibo River.

Discussion — The new species from French Guiana most resembles *A. crassitarsis* (Lundblad, 1942), a species originally described from southern Brazil (Lundblad 1942) on the basis of a female, and later on reported by Cook (1980) with a question mark from a small stream in Mexico. From the new species, *A. crassitarsis* can be separated by the comparatively shorter gonopore and stouter I-leg-6 (see Figures 45 A and –C in Lundblad 1942).

Genus *Hygrobates* Koch, 1837

Subgenus *Hygrobatides* Lundblad, 1936

Currently eight species are known of this subgenus, all from Central and South America (Smit 2020b).

Hygrobates (Hygrobatides) curtipes Smit & Pešić sp. nov.

Zoobank: 455FC874-BFA2-4FFF-B578-51A015006D57

(Figures 7A–C)

Material examined — Holotype female, Crique Baboune, National Reserve La Trinité, French Guiana, 4.590557°N, 53.413572°W, 3 Nov. 2018, leg. S. Clavier (MNHN).

Diagnosis (Male unknown) — Leg segments of first and second leg very short; P2 with finger-like ventral extensions.

Description — Female – Idiosoma dorsally 672 long and 616 wide, ventrally 494 wide. Dorsum without platelets. Coxae in three groups, fused first coxae tapering posteriorly. Cxgl-4 lying in a bowing of the incomplete suture line of Cx-III/IV. Genital field with three widely separated acetabula (Figure 7A). Pre-genital sclerite bowed, 126 wide; genital field 176 long. Length of P1-5: 30, 112, 70, 112, 38. P2 with denticles and finger-like ventral extensions, P3 with only denticles (Figure 7B). Length of I-leg-4-6: 92, 80, 88 (till tip of segment). Leg segments of first (Figure 7C) and second leg very stocky. I-leg-4 with three long setae (one seta separated but present in slide), I-leg-5 with three long setae, 3–4 fine setae and near anterior margin one bowed fine seta. Length of IV-leg-4-6: 144, 150, 114. Claws of legs with small clawlet, claw blade small. Legs without swimming setae.

Male – Unknown.

Etymology — Named for the short segments of first and second legs.

Remarks — The odd finger-like ventral extensions of P2 are unique and not found in any *Hygrobates* species. Moreover, the very stocky first and second legs are not found in other *Hygrobatides* species.

Hygrobates (Hygrobatides) dilatatus Smit & Pešić sp. nov.

Zoobank: F8C2A2BE-90AE-4B30-98DD-73331F232C0B

(Figures 8A–D)

Material examined — Holotype female, Crique Aya, National Reserve La Trinité, French Guiana, 4.590557°N, 53.413572°W, 4 Nov. 2018, leg. S. Clavier (MNHN).

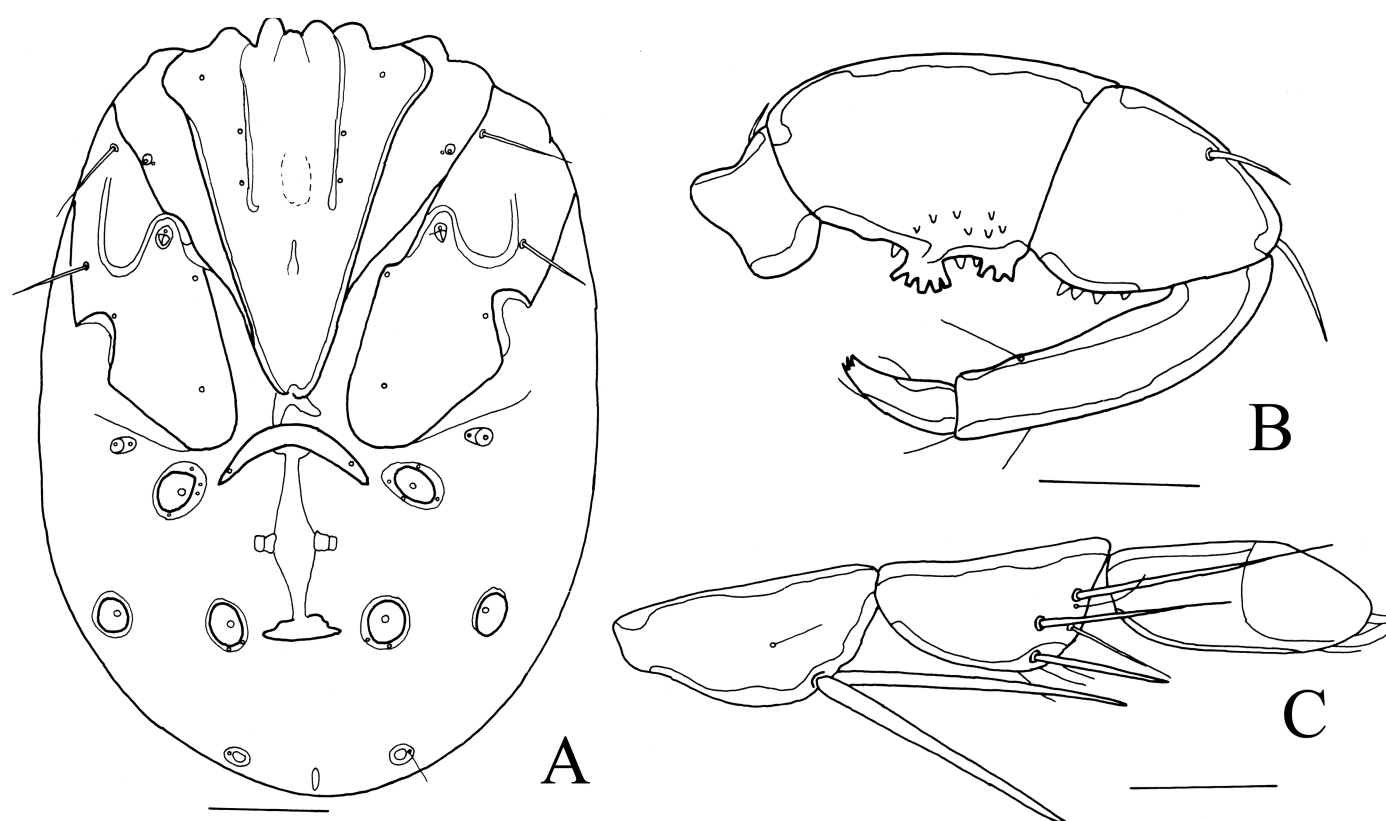


Figure 7 *Hygrobatoides curtipes* Smit & Pešić sp. nov., holotype female. A — venter; B — palp; C — I-leg-4-6. Scale bars: A = 100 μ m, B-C = 50 μ m.

Diagnosis (Male unknown) — The three pairs of acetabula widely separated from each other, first pair at level of postgenital sclerite, posterior two pairs lying far posteriorly; Cxgl-4 not extending far anteriorly; P2 with a blunt anteroventral projection covered by minute denticles.

Description — Female — Idiosoma without plates or platelets, dorsally 810 long and 786 wide, ventrally 846 long. Coxae in three groups, anterior coxae posteriorly pointed. Cxgl-4 near incomplete suture line of Cx-III/IV, posterior to Cx-IV an area of secondary sclerotization (Figure 8A). Genital field 198 long with three pairs of widely separated acetabula, first pair of acetabula at level of postgenital sclerite; pregenital sclerite 146 wide. Acetabula (partly) surrounded by a small fringe of secondary sclerotization (Figure 8B). Length of P1-5: 31, 136, 100, 198, 42. P2 anteroventrally with a blunt projected, its tip covered by minute denticles; P3 ventrally and medially with denticles; P4 slender, ventrally with two widely separated setae (Figure 8C). Length of I-leg-4-6: 182, 178, 116. I-leg-5 anteroventrally with two pointed setae, unequal in size (Figure 8D). Length of IV-leg-4-6: 243, 251, 210. Swimming setae absent. Excretory pore surrounded by a small fringe of secondary sclerotization.

Male — Unknown.

Etymology — Named after the widely separated acetabula.

Discussion — Unlike all other *Hygrobatoides* species, Cxgl-4 are not extending far anteriorly. Moreover, none of the known species have the acetabula so widely separated as in the new species and P2 with a blunt anteroventral projection.

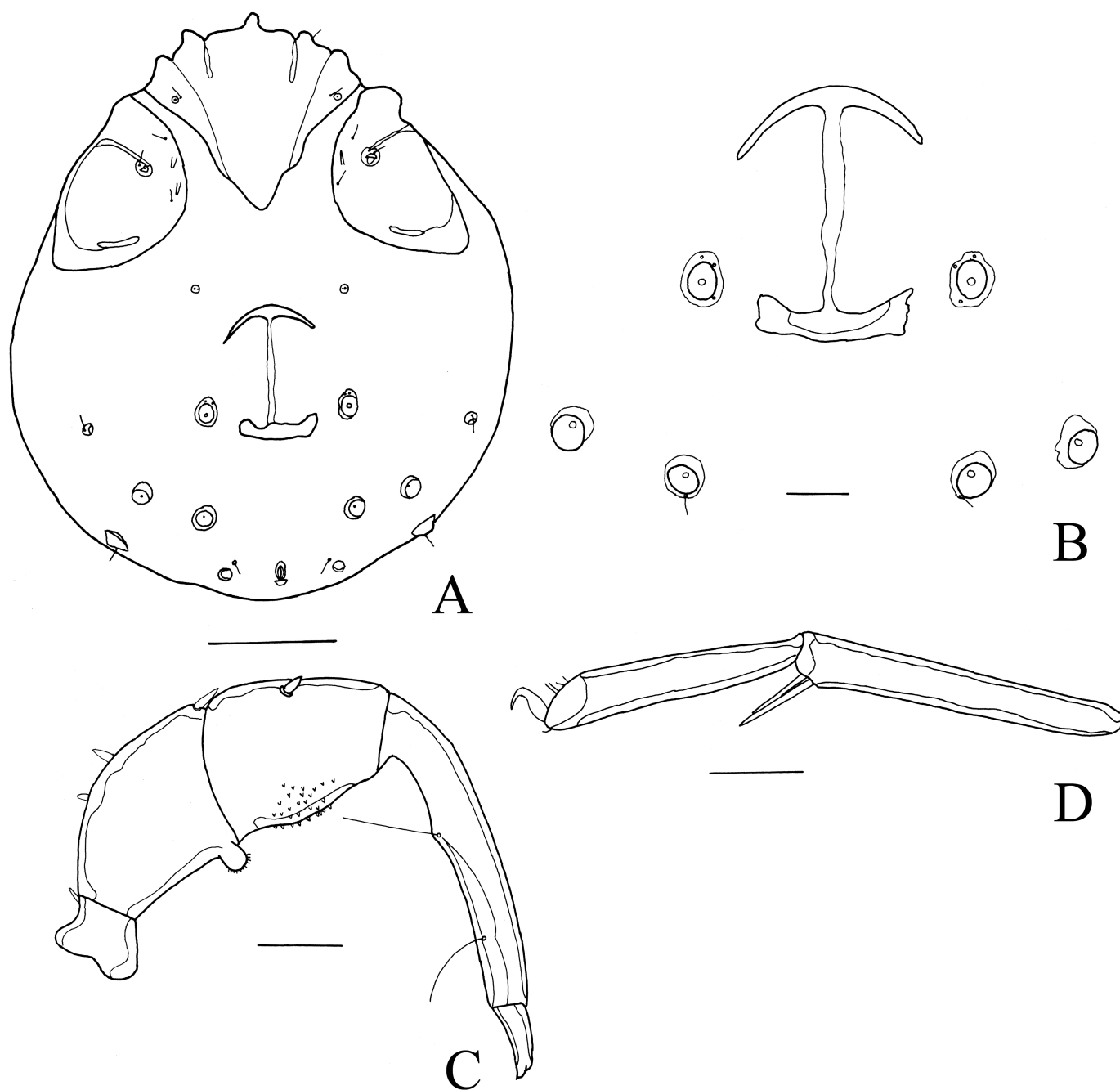


Figure 8 *Hygrobatites dilatatus* Smit & Pešić **sp. nov.**, holotype female. A — venter; B — genital field; C — palp; D — I-leg-5 and -6. Scale bars: A = 200 μm , B-D = 50 μm .

Hygrobatites (Hygrobatides) guianaensis* Smit & Pešić **sp. nov.*

Zoobank: [5B1BD8F6-2405-4291-B9F9-B7D14142504E](https://zoobank.org/5B1BD8F6-2405-4291-B9F9-B7D14142504E)

(Figures 9A-C)

Material examined — Holotype female, Crique des Pères, 5.047681°N, 52.600785°W, 26 Jun. 2019, leg. S. Clavier (RMNH). Paratype: one female, Marais de Kaw-Roura National Reserve, French Guiana, 4.645064°N, 52.160725°W, 23 Jun. 2020, leg. S. Clavier, sequenced

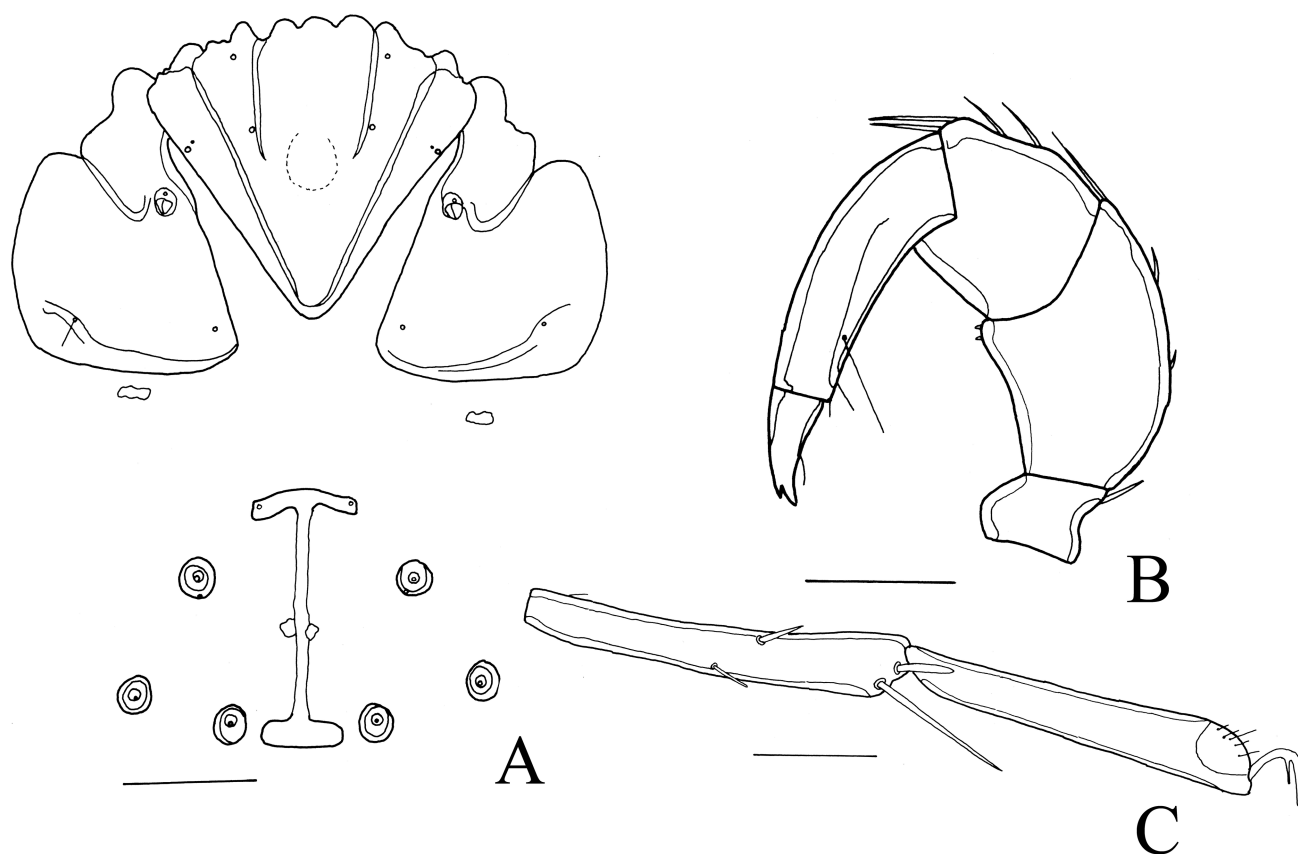


Figure 9 *Hygrobat es guianaensis* Smit & Pešić **sp. nov.**, holotype female. A — venter; B — palp; C — I-leg-5 and -6. Scale bars: A = 100 µm, B–C = 50 µm.

(BOLD: HYDME039-22).

Diagnosis (Male unknown) — Cxgl-4 extending slightly anteriorly, acetabula well separated, pregenital sclerite slightly bowed and relatively short.

Description — Female — Idiosoma without plates or platelets, dorsally 851 long and 761 wide, ventrally 692 long. Coxae in three groups, anterior coxae posteriorly bluntly pointed. Cxgl-4 extending slightly anteriorly (Figure 9A). Genital field 188 long, with three pairs of well-separated acetabula; pregenital sclerite slightly bowed, 82 wide. Acetabula surrounded by a small fringe of secondary sclerotization. Length of P1-5: 28, 94, 56, 98, 38. P2 anteroventrally with two denticles; P3 without denticles; P4 ventrally with two fine setae, unequal in size (Figure 9B). Length of I-leg-4-6: 138, 152, 124. I-leg-5 anteroventrally with two pointed setae, unequal in size (Figure 9C). Length of IV-leg-4-6: 184, 192, 156. Swimming setae absent.

Etymology — Named for its occurrence in the Guianas.

Discussion — Most similar in the shape of the genital field and palp is *H. pachydermis* Lundblad, 1936 from Brazil. The latter species has Cxgl-4 shifted much more anteriorly, the pregenital sclerite is larger and strongly bowed and the anterior coxae are less broad. The female of *H. rufus* Lundblad, 1937 from Brazil is unknown, but P4 of this species is stockier compared to the new species.

Genus *Mixobates* Thor, 1905

A genus with seven species known from the Palearctic, five from North America and one from Central America (Tuzovskij & Gerecke 2003). The first description of a new species from

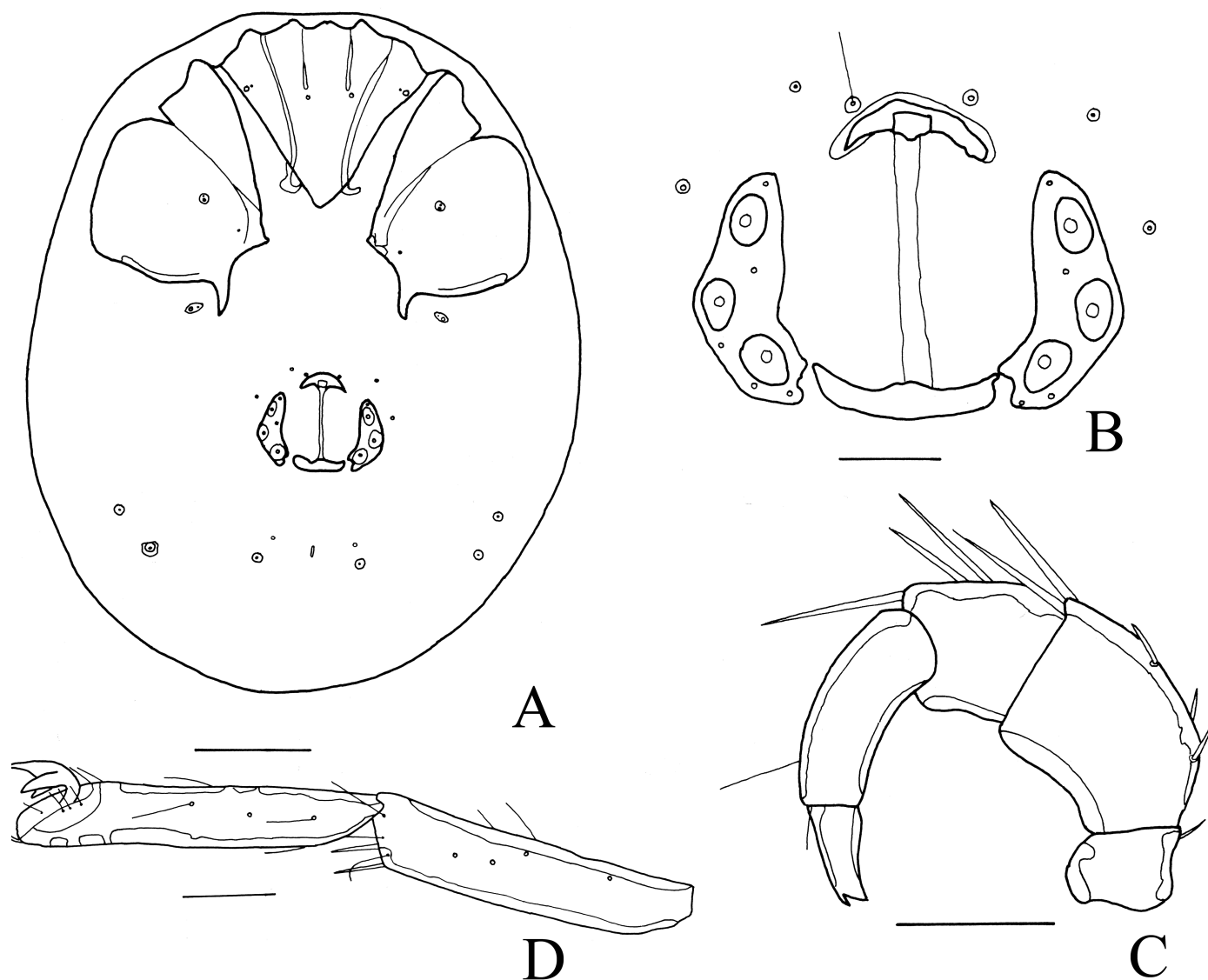


Figure 10 *Mixobates projectus* Smit & Pešić sp. nov., holotype female. A – venter; B – genital field; C – palp; D – I-leg-5 and -6. Scale bars: A = 200 μ m, B–D = 50 μ m.

South America is given below.

***Mixobates projectus* Smit & Pešić sp. nov.**

Zoobank: [OBC3FE43-8866-4D2F-BA95-9B5885140A22](https://zoobank.org/OBC3FE43-8866-4D2F-BA95-9B5885140A22)

(Figures 10A–D)

Material examined — Holotype female, Petit-Saut Lake, French Guiana, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier (RMNH). Paratypes: Three females, same data as holotype (RMNH).

Diagnosis (Male unknown) — Cx-IV posteromedially with large projection, P4 stocky and curved.

Description — Female – Idiosoma soft, without plates or platelets, dorsally 1126 long and 925 wide, ventrally 1102 long. Coxae in three groups, Cx-I fused medially, apodemes of

anterior coxae short. Cxgl-4 well distance from suture line of Cx-III and Cx-IV. Cx-IV with a large posteromedial projection (Figure 10A). Genital field 164 long and 210 wide, with three pairs of acetabula; pregenital sclerite 78 wide. Genital plates 108 long, slightly curved (Figure 10B). Length of P1-5: 22, 82, 54, 68, 34. P4 stocky and slightly curved (Figure 10C). Length of I-leg-4-6: 168, 172, 144. I-leg-5 distally with two pointed setae and three fine setae, one of these bowed (Figure 10D). Length of IV-leg-4-6: 212, 208, 190. Legs without swimming setae.

Male – Unknown.

Etymology — Named for the relatively large projections of Cx-IV.

Discussion — All but one Nearctic and Neotropical species has the palp with denticles. Only *M. inermis* (Cook, 1974) has the palp without denticles, but P4 of this species is more slender and the coxae form one group.

Genus *Paraschizobates* Lundblad, 1937

A genus with three species known from Central and South America (Smit 2020b).

Subgenus *Paraschizobates* Lundblad, 1937

Paraschizobates (*Paraschizobates*) *gracilipalpis* Smit & Pešić sp. nov.

Zoobank: 97838BE8-0C9B-4713-BCA0-FA3B260679FD

(Figures 11A-C)

Material examined — Holotype female, Petit-Saut Lake, French Guiana, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier (RMNH). Paratypes: Two females, same data as holotype (RMNH).

Diagnosis (Male unknown) — Genital plates slender; heavy medial seta of P4 not larger than ventral setae of P4.

Description — Female – Idiosoma dorsally 786 (794-875) long and 664 (591-737) wide, ventrally 818 (810-859) long. Idiosoma without plates or platelets. Gnathosoma with a long narrow projection. Cx-I separated medially. Cxgl-4 lying in a bowing of suture line Cx-III/IV (Figure 11A). Genital field 150 long, slender and only slightly bowed, shorter than gonopore, with three pairs of acetabula; pregenital sclerite 58 wide. Length of P1-5: 30, 82, 90, 120, 38. P4 slender, ventrally with two setae and one medial seta, all more or less of similar size, claw of P5 downturned (Figure 11B). Length of I-leg-4-6: 184, 190, 132. I-leg-5 with an arrow-like anteroventral seta (Figure 11C); downturned distal seta of I-leg-5 probably present, but not in a good position in the slide. Length of IV-leg-4-6: 219, 288, 332. Legs without swimming setae.

Male – Unknown.

Etymology — Named for the slender palp.

Discussion — The two known species of the nominate subspecies have more bowed genital plates and the acetabula are less slender compared to the new species. Moreover, both these species have P4 medially (or ventrally) with a stout, blunt seta, which is larger than the two ventral setae.

Family Unionicolidae Oudemans

Genus *Koenikea* Wolcott, 1900

A genus with numerous species known worldwide.

Subgenus *Koenikea* s.s

Koenikea (*Koenikea*) *angustipalpis* K.O. Viets, 1975

New record — 0/1/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier.

Distribution — Brazil (K.O. Viets 1975), French Guiana (this study).

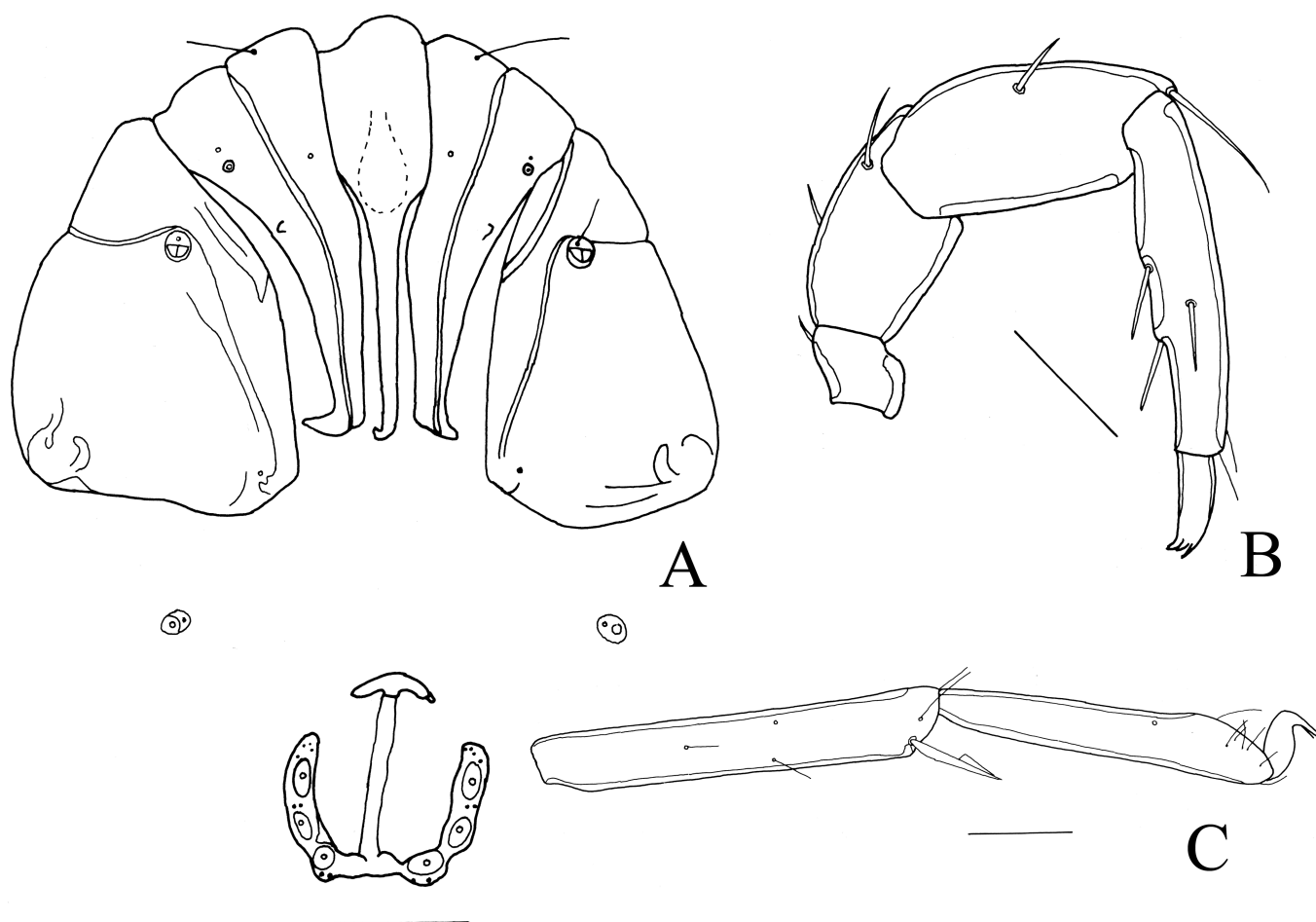


Figure 11 *Paraschizobates gracilipalpis* Smit & Pešić **sp. nov.**, holotype female. A – venter; B – palp; C – I-leg-5 and -6. Scale bars: A = 100 μ m, B-C = 50 μ m.

Subgenus *Notomideopsis* Wolcott, 1905

A widespread subgenus, known from Central and South America, Australia, New Guinea, New Caledonia and Fiji (Smit 2020).

Koenikea (*Notomideopsis*) *brasiliensis* Lundblad, 1930

(Figure 12A-B)

New record — 1/2/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier.

Description — Male – Idiosoma dorsally 721 long and 705 wide, ventrally 737 long. Dorsal shield complete, 664 long and 632 wide, configuration of glandularia as described for female. Apodemes of anterior coxae reaching almost till middle of Cx-IV. Genital field indistinct with approximately 25 pairs of acetabula, surrounding a pair of glandularia (Figure 12A). Gonopore 108 long. Length of P1-5: -, -, 60, 96, 40. P4 anterodorsally with a relatively long seta (Figure 12B). Length of I-leg-4-6: 170, 211, 259. Legs-I and II with long fluted of grooved setae. Length of IV-leg-4-6: 239, 316, 211; IV-leg-5 with a row of 13 pectinate setae and a large terminal pectinate seta. Swimming setae: III-leg-4 one, III-leg-5 two, IV-leg-4

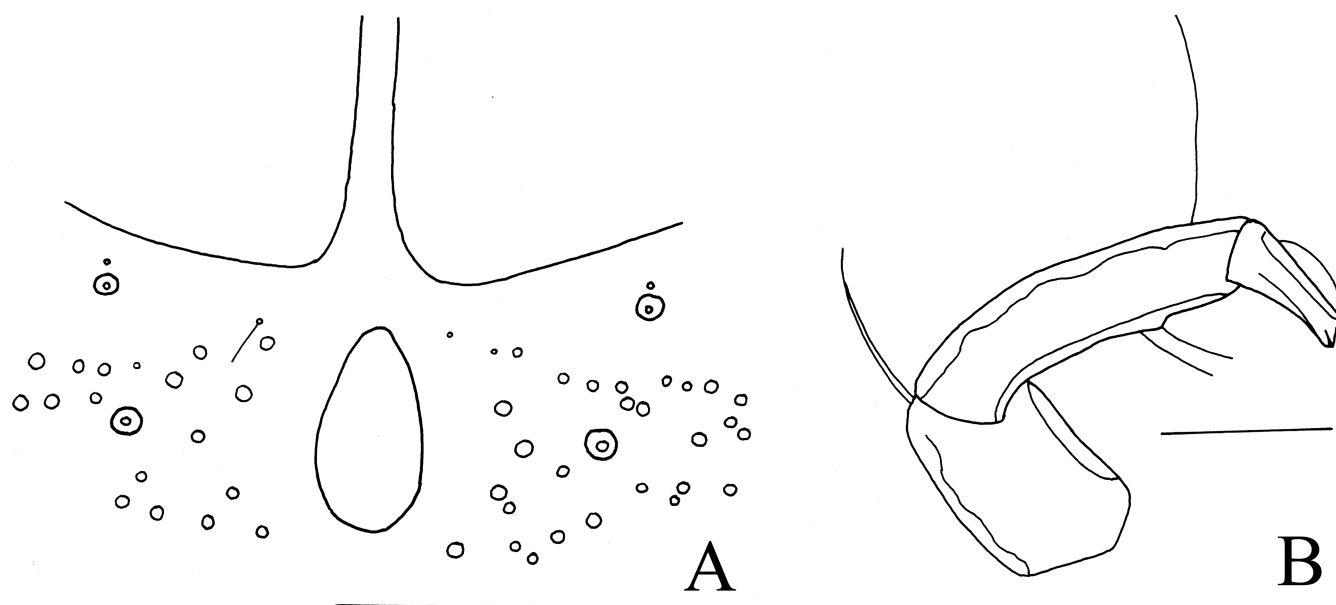


Figure 12 *Koenikea brasiliensis* Viets, male. A — genital field; B — palp (P1 missing). Scale bars: A = 100 μ m, B = 50 μ m.

three, IV-leg-5 two.

Remarks — The male was thus far unknown, and therefore a descriptions is given above. The anterodorsal long seta of P4 is present in the females of this study too, but was not illustrated by Lundblad (1943). Possibly this seta was broken off in Lundblad's specimen.

Distribution — Brazil (Lundblad 1930), Paraguay (Lundblad 1943), French Guiana (this study).

Subgenus *Pseudokoenikea* Lundblad, 1941

A subgenus with two species and one subspecies known from South America.

***Koenikea (Pseudokoenikea) horrida* Lundblad, 1930**

New record — 0/2/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier; 0/2/0, KAW20, Marais de Kaw-Roura National Reserve, French Guiana, 4.645064°N, 52.160725°W, 23 Jun. 2020, leg. S. Clavier.

Remarks — The apodemes of the anterior coxae of this species are very short, just reaching the anterior margin of Cx-III.

Distribution — Brazil (Lundblad 1930; K.O. Viets 1975), French Guiana (this study).

Genus *Neumania* Lebert, 1879

Subgenus *Tetraneumania* Lundblad, 1930

A subgenus known from North, Central and South America with more than a dozen species known.

***Neumania (Tetraneumania) breviseta* K. Viets, 1959**

New record — 0/2/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier.

Discussion — The female described by K. Viets (1959) has the anterior genital plates with three pairs of acetabula and the posterior genital plates with four pairs of acetabula. The specimens from French Guiana have both anterior and posterior genital plates with three pairs of acetabula.

Distribution — Brazil (K. Viets 1959), French Guiana (this study).

Genus *Recifella* K. Viets, 1935

Subgenus *Eorecifella* Cook, 1980

***Recifella elliptica* (Walter, 1919)**

New record — 1/0/0, Crique Aya, National Reserve La Trinité, 4.590557°N, 53.413572°W, 4 Nov. 2018.

Distribution — Brazil (Walter 1919b; Lundblad 1943), Paraguay (Lundblad 1943), French Guiana (This study).

Genus *Schadeella* Lundblad, 1938

A genus with one species known from South America.

***Schadeella crassipalpis* Lundblad, 1938**

New record — 0/1/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier.

Remarks — The specimen from French Guiana has less acetabula than the illustrated specimen of Lundblad (1943). Lundblad (1943) didn't give the number of acetabula, but based on his illustration the specimen from Paraguay has the anterior genital plate with 4-6 acetabula and the posterior genital plate with 11-12 acetabula. The female from French Guiana has the anterior genital plate with two acetabula, and the posterior plate with eight acetabula. However, nothing is known about the variation in the number of acetabula. Therefore, we have assigned our specimen to Lundblad's species.

Distribution — Paraguay (Lundblad 1938, 1943), Brazil (Besch 1969), French Guiana (this study).

Family Arrenuridae Thor

Genus *Arrenurus* Dugès, 1834

***Arrenurus (Megaluracarus) pugiunculatus* K. Viets, 1954**

New record — 2/2/0, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier.

Distribution — Brazil (K. Viets 1954b), French Guiana (this study).

Family Krendowskiidae K. Viets

Genus *Geayia* Thor, 1897

A genus with 21 species known of which 12 species occur in South America. Most South American species belonging to the subgenera *Geayella* Lundblad, 1936 and *Geayidia* Lundblad, 1941, both with the genital field having three pairs of acetabula. Species of these two subgenera can be separated only in the male sex, with sexual dimorphism in the fourth legs (IV-leg-3 and -4 with a dorsal row of curved enlarged setae) in *Geayella* and without sexual dimorphism in *Geayidia*.

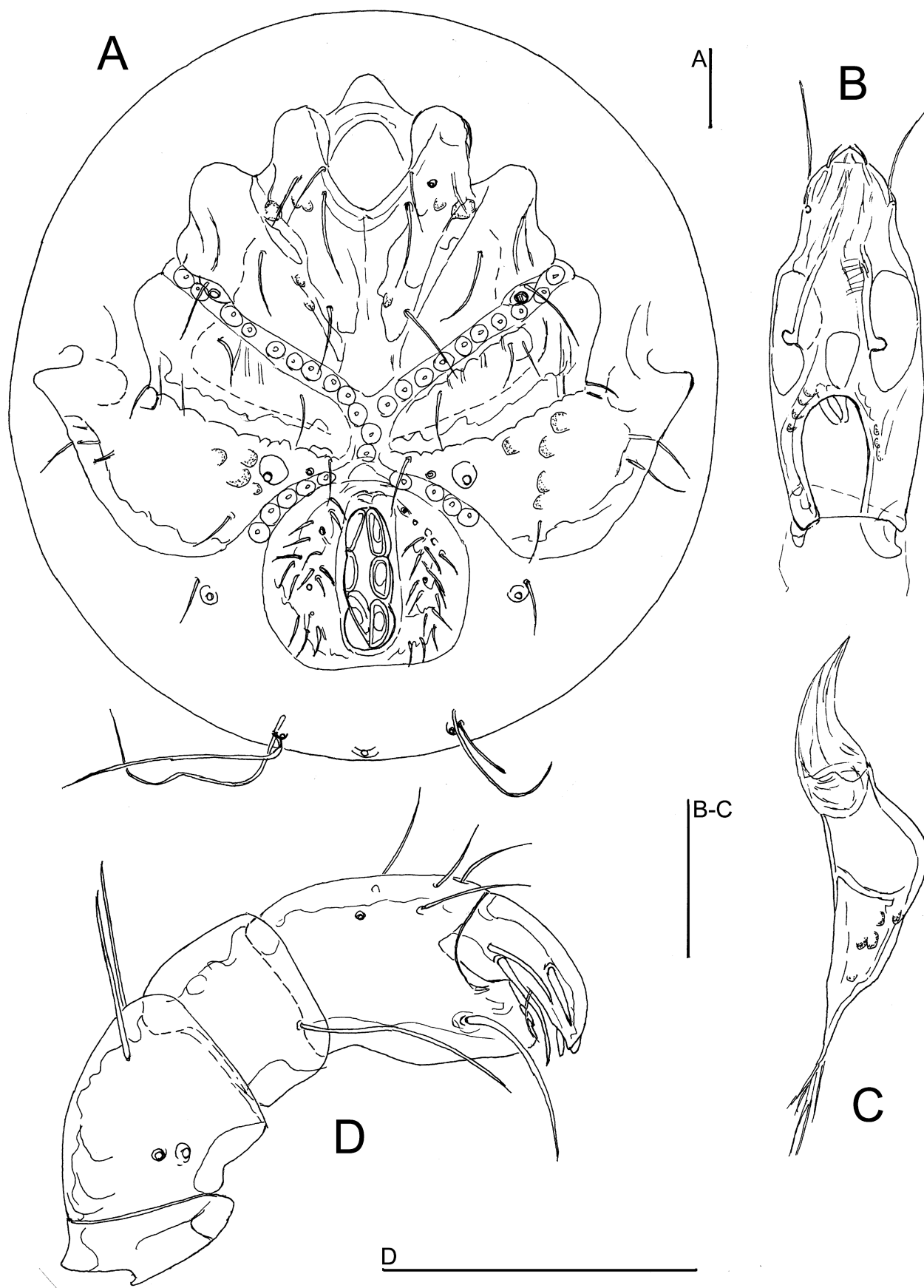


Figure 13 *Geayia latirostris* K. Viets, male. A — ventral shield; B — gnathosoma, ventral view; C — chelicera; D — palp, medial view. Scale bars = 100 μ m.

***Geayia (Geayidea) latirostris* K. Viets, 1954**

(Figures 13A-D, 20L, 21G-H)

New records — 0/5/0, Mana River, Saut Lézard, French Guiana, 4.971032°N, 53.784833°W, 25 Sep. 2017, leg. S. Clavier; 5/7/0, Maroni River, Langatabiki, French Guiana, 4.999439°N, 54.435816°W, 13 Sep. 2017, leg. S. Clavier; 1/0/0, Inini River, Saut Sonnelle, French Guiana, 3.668227°N, 53.960857°W, 28 Sep. 2017, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (all RMNH).

Morphology. General features — Dorsal and ventral shield present; dorsal shield complete, with colour pattern as photographed in Figure 20L. Dorsal portion of gnathosomal bay bluntly pointed and projecting well forward; one row of idiosoma pores on each side between Cx-II and Cx-III (Figure 13A). Genital field with three pairs of acetabula. Palp: two long setae on medial surface of P2 inserted near middle of segment, antagonistic bristle of P4 long and whip-like, P5 inserted dorsally at distal end of P4 (Figure 13D). Gnathosomal rostrum wide, distally truncated and ending in a wide, flat-arched, posteriorly slightly tapering gnathosoma (Figure 13B), its posterior margin without a central indentation (Figures 21G-H).

Male – Dorsal shield long 638 and 606 wide; ventral shield 950 long and 900 wide. Genital field 226 long and 244 wide, gonopore 209 long and 63 wide. Ejaculatory complex L 309. Palp: dorsal length/height, dorsal length/height ratio: P1, 16/53, 0.29; P2, 78/59, 1.32; P3, 49/56, 0.88; P4, 78/50(basal), 1.56; P5, 58/26, 2.2. Gnathosoma 228 long and 97 wide. Chelicera 275 long.

Dorsal length of I-leg: 69, 72, 113, 153, 153, 203; dorsal length of IV-leg: 131, 150, 150, 194, 209, 213; IV-leg-3 and -4 without a row of enlarged setae on dorsal surface characteristic for *Geayela*. Swimming setae: II-leg-4, 4; II-leg-5, 3-4; III-leg-3, 5; III-leg-4, 13-14; III-leg-5, 10-11; IV-leg-3, 9; IV-leg-4, 13; IV-leg-5, 11.

Remarks — *Geayia latirostris* was originally described based on a female from Igarapé São Benedito in the Amazon region of Brazil (Viets 1954b). Therefore, this is the first description of the male.

Distribution — Brazil, French Guiana (this study).

***Geayia (?) tanaru* Smit & Pešić sp. nov.**

Zoobank: 18B8DB84-962A-4517-AF46-F325A017355F

(Figures 14A-E, 20A-C, 21A-B)

Material examined — Holotype female, Crique Baboune, National Reserve La Trinité, French Guiana, 4.590557°N, 53.413572°W, 3 Nov. 2018, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (MNHN). Paratypes: one female, Crique Aya, National Reserve La Trinité, French Guiana, 4.590557°N, 53.413572°W, 11 Nov. 2018, leg. S. Clavier (RMNH).

Diagnosis (Male unknown) — Dorsum and venter with a colour pattern as given in Figure 20B-C; gnathosoma elongated, L/W ratio > 4.0, posterior margin with a V-shaped cleft flanked by a pair of angular flange-like extensions, rostrum triangular-conical, ending in a pointed tip in a lateral view.

Description — Female – Dorsal and ventral shield present; dorsal shield complete, 834 long and 781 wide, L/W ratio 1.07; dorsum and venter with a colour pattern as photographed in figures 20B-C, colour pattern of dorsal shield consisting of anteromedial and posteromedial patches and a pair of lateral patches, encompassing a central H-shaped yellow patch (Figure 20A). Ventral shield 1230 long and 1163 wide; dorsal portion of gnathosomal bay bluntly pointed and projecting well forward; one row of body pores on each side between Cx-II and Cx-III (Figure 14A). Genital field 388 long and 363 wide, with three pairs of acetabula, gonopore 288 long and 188 wide. Egg maximum diameter (n = 2) 153-159.

Palp: dL/H, dL/H ratio: P1, 23/56, 0.4; P2, 86/63, 1.37; P3, 44/61, 0.72; P4, 63/53, 1.19; P5, 44/22, 2.0; two long setae of medial surface of P2 inserted near middle of the segment, antagonistic bristle of P4 slender and relatively short; P5 inserted dorsally at distal end of P5

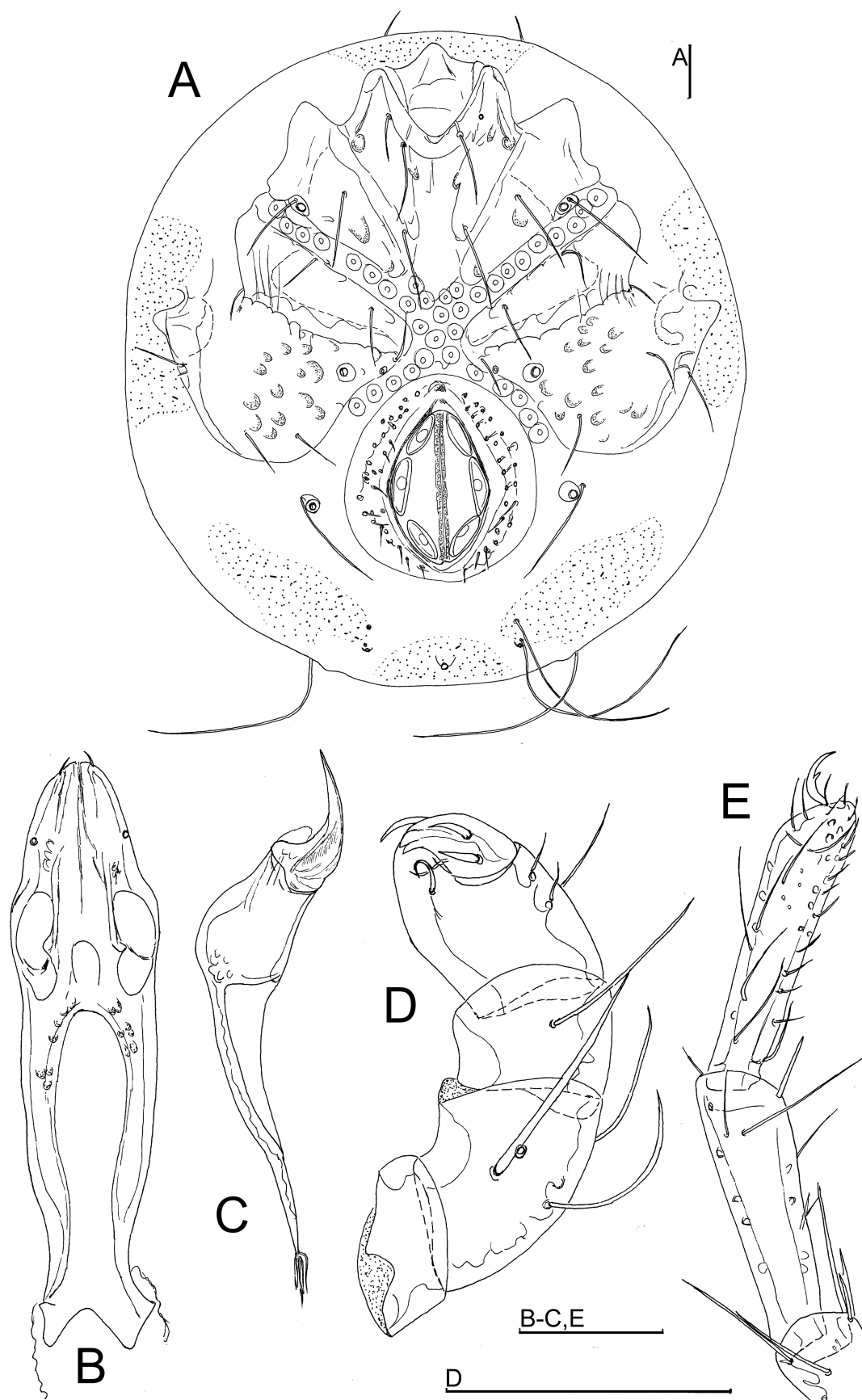


Figure 14 *Geayia tanaru* sp. nov., holotype female. A – ventral shield; B – gnathosoma, ventral view; C – chelicera; D – palp, medial view; E – I-leg-5 and -6. Scale bars = 100 μ m.

(Figure 14D). Gnathosoma attached to a protrusible tube of soft integument, relatively long, 414 long and 105 wide, L/W ratio 3.95, gnathosomal rostrum triangular-conical, ending in a pointed tip in a lateral view, posterior margin with a V-shaped cleft flanked by a pair of angular flange-like extensions (Figure 14B). Chelicera (14C) 281 long.

Dorsal length of I-leg (Figure 14E): 75, 97, 144, 194, 209, 228; dorsal length of IV-leg: 161, 180, 209, 259, 272, 259; swimming setae: II-leg-4, 5-6; II-leg-5, 4; III-leg-3, 6-7; III-leg-4, 13-14; III-leg-5, 9-10; IV-leg-3, 6; IV-leg-4, 13; IV-leg-5, 12.

Etymology — Named after the Tanaru Indian or the Man of the Hole, the last member of an uncontacted indigenous people of the Amazon rainforest. The name is a noun in apposition.

Discussion — With regard to shape of gnathosoma (relatively long, gnathosomal rostrum triangular-conical, posterior margin with a cleft) *Geayia tanaru* sp. nov. resembles *G. major* sp. nov. (see below). The latter species can be separated in a major dimensions, dorsum and venter without a distinctive colour pattern and posterior margin of gnathosoma with a U-shaped cleft, not flanked by a pair of lateral angular flange-like extensions as in *G. tanaru* sp. nov.

Distribution — French Guiana.

***Geayia* (?) *major* Smit & Pešić sp. nov.**

Zoobank: DE83D05E-5054-46D6-9CAB-4F7C58E498BE

(Figures 15A-F, 20D-E, 21C-D)

Material examined — Holotype female, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (RMNH). Paratype: one female, Crique Aya, National Reserve La Trinité, French Guiana, 4.590557°N, 53.413572°W, 4 Nov. 2018, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (MNHN).

Diagnosis (Male unknown) — Idiosoma and gnathosoma large in dimensions, ventral shield length > 1500, gnathosoma > 600 µm, dorsum and venter without a colour pattern; gnathosoma elongated, length/width ratio > 4.0, posterior margin with a U-shaped cleft, no flanked by a pair of lateral extensions, rostrum triangular-conical, ending in a pointed tip in a lateral view.

Description — Female (holotype, in parentheses some measurements of a paratype specimen from Crique Aya): Dorsal and ventral shield present; dorsal shield complete, 1075 (1094) long and 1030 (1080) wide, length/width ratio 1.04 (1.01); dorsum without a colour pattern (Figures 20D-E). Ventral shield (Figure 15A) 1506 (1500) long and 1413 (1463) wide; dorsal portion of gnathosomal body bluntly pointed and projecting well forward; on each side two rows of body pores between Cx-II and Cx-II. Genital field 369 (356) long and 356 (394) wide, with three pairs of acetabula, gonopore 278 (256) long and 200 (200) wide.

Palp: dorsal length/height, dorsal length/height ratio: P1, 22/94, 0.23; P2, 125/81, 1.54 (127/88, 1.45); P3, 72/78, 0.92 (72/86, 0.84); P4, 94/73(basal), 1.28 (94/81, 1.15); P5, 62/38, 1.6 (69/38, 1.8); two long, thickened setae of medial surface of P2 inserted near middle of the segment, antagonistic bristle of P4 moderately long and thick; P5 relatively long, inserted dorsally at distal end of P5. Gnathosoma elongated and slender, 719 (663) long and 156 (163) wide, length/width ratio 4.6 (4.1), gnathosomal rostrum triangular-conical, ending in a pointed tip in a lateral view, posterior margin with a U-shaped cleft, no flanked by a pair of lateral extensions (Figures 15B-C, 21C-D). Chelicera (Figure 15D) 688 long.

Dorsal length of I-leg-3-6 (Figure 15F): 147, 203, 211, 220; dorsal length of IV-leg-2-6: 209, 238, 306, 316, 275; swimming setae: II-leg-4, 9; II-leg-5, 7; III-leg-4, 16; III-leg-5, 14; IV-leg-3, 8; IV-leg-4, 13; IV-leg-5, 12.

Male – Unknown.

Etymology — Named for its major dimensions.

Discussion — See discussion under *Geayia tanaru* sp. nov.

Distribution — French Guiana.

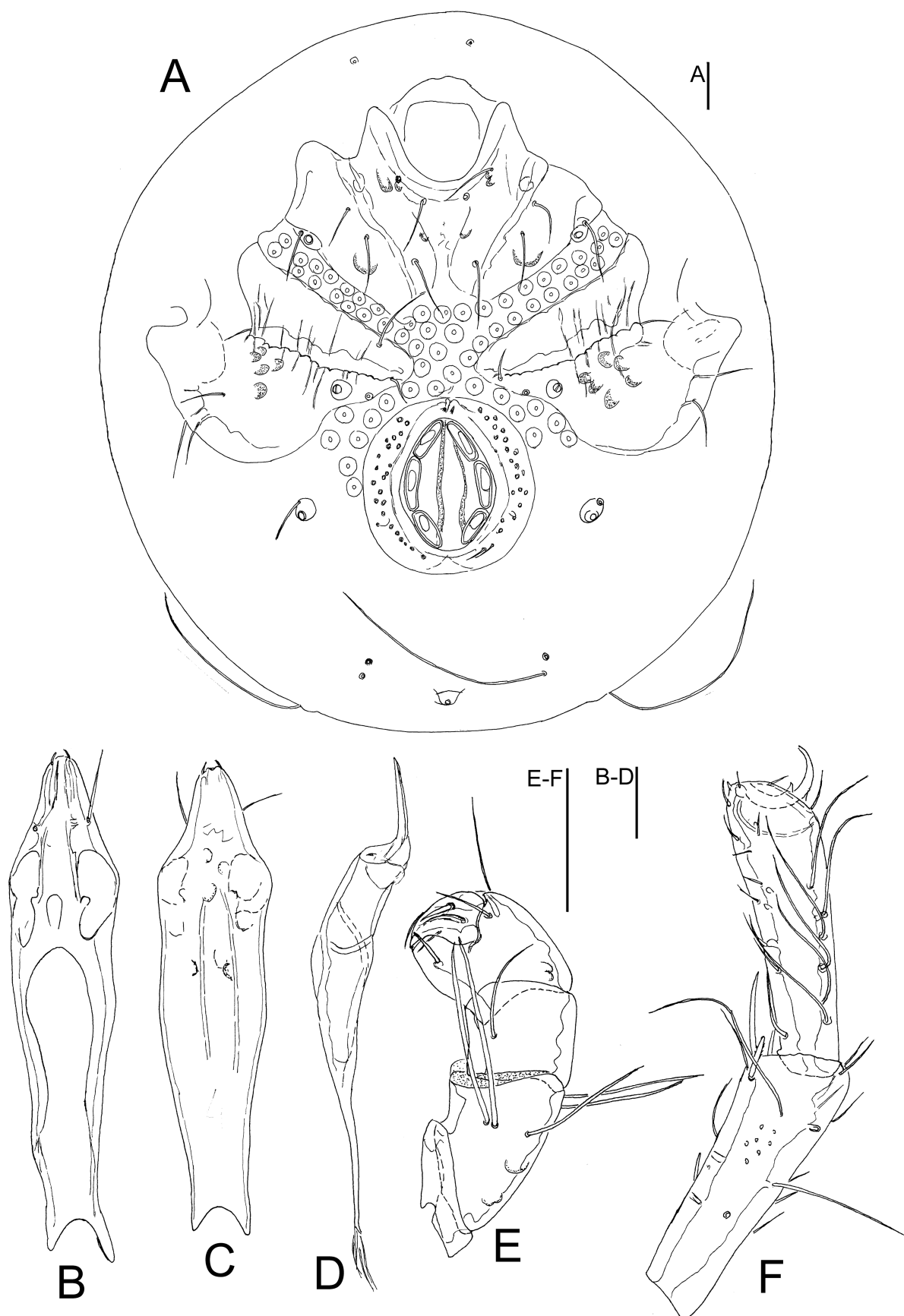


Figure 15 *Geayia major* sp. nov., A, C-F holotype female, B paratype female. A – ventral shield; B – gnathosoma, ventral view; C – gnathosoma, dorsal view; D – chelicera; E – palp, medial view; F – I-leg-5 and -6. Scale bars = 100 μ m.

***Geayia (Geayidea) purpureomaculata* Smit & Pešić sp. nov.**

Zoobank: 703AAEB9-08E4-4F6A-85D6-E00766892086

(Figures 16A-D, 17A-E, 20F-J)

Material examined — Holotype male, National Reserve La Trinité / Parc Amazonien de Guyane, Courcibo River, French Guiana, 4.475657°N, 53.219474°W, 14 Nov. 2019, leg. S. Clavier, sequenced (BOLD: HYDME044-22), dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shields in Koenike fluid) (MNHN), Paratype: one juvenile male, same data as the holotype (RMNH).

Other material — 1/0/0, Comte River, Roche Fende, French Guiana, 4.397775°N, 52.583060°W, 23 Oct. 2017, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shields in Koenike fluid).

Diagnosis (Female unknown) — Dorsal shield with a distinctive colour pattern consisting of a paired, roundish anteromedial, and a large, unpaired posteromedial patches, and a small pair of lateral patches.

Description — Male (holotype, in parentheses measurements of specimen from Comte river) – Dorsal and ventral shields present; dorsal shield (Figure 16B) complete, long 663 (563) and 675 (550) wide; dorsal and ventral shields with a distinctive colour pattern as photographed in figures 20F, H; colour pattern of dorsal shield of holotype consisting of a paired, roundish anteromedial, and a large, unpaired posteromedial patches, and a small pair of lateral patches, all patches intensive purple (Figure 20F). Ventral shield (Figure 16A, 17A) 928 (844) long and 897 wide; dorsal portion of gnathosomal bay bluntly pointed and projecting well forward; on each side one row of body pores between Cx-II and Cx-II. Genital field 219 (206) long and 250 (223) wide, with three pairs of acetabula (Figure 16D, 17B), gonopore 159 (159) long and 56 (59) wide.

Palp: dL/H, dL/H ratio: P1, 16/58, 0.28 (17/47, 0.37); P2, 79/59, 1.34 (77/55, 1.4); P3, 47/58, 0.81 (42/51, 0.82); P4, 69/53(basal), 1.3 (61/45, 1.34); P5, 45/21, 2.1 (39/20, 1.9); two long setae of medial surface of P2 inserted near middle of segment, antagonistic bristle of P4 long and whip-like, P5 inserted dorsally at distal end of P5 (Figure 16C, 17F). Gnathosoma 319 (289) long and 95 (88) wide, L/W ratio 3.4 (3.3), gnathosomal rostrum triangular-conical, ending in a pointed tip in a lateral view, posterior margin shallowly indented (Figures 16E-F, 17C). Chelicera (Figure 17D) 303 (284) long.

Dorsal length of I-leg (Figure 17E): 69 (62), 83 (66), 116 (100), 142 (131), 159 (147), 197 (172); dorsal length of IV-L: 163, 150, 166 (144), 206 (180), 209 (194), 211 (191); IV-leg-3 and -4 without a row of enlarged setae on dorsal surface characteristic for *Geayela*. Swimming setae: II-leg-4, 3 (3-4); II-leg-5, 5 (5); III-leg-3, 4 (3); III-leg-4, 10 (11); III-leg-5, 8 (9); IV-leg-3, 5 (4); IV-leg-4, 10 (11); IV-leg-5, 10 (9-10).

Female – Unknown.

Etymology — Named for the purple spots on the dorsal shield.

Discussion — With regard to the shape of gnathosoma, the new species from French Guinea most resembles *G. avinotata* K. Viets, 1959, a species originally described from Igarapé Curi of the Amazon region of Brazil (Viets 1959). The latter species can be separated by the characteristic colour pattern of the dorsal shield (colour dark violet with a light-yellow marking in the form of a bird in flight as illustrated in the original description, see Figure 17G).

The specimen from Comtu River differs from the type specimen in smaller dimensions, and a divided posteromedial patch on the dorsal shield (compare Figures 20G and 20J) and the basal sclerites of the acetabula are more sclerotized (compare Figures 16B and 17B). It is possible that these differences are age-related, but the taxonomic position of these populations should be also checked by the application of molecular techniques.

Distribution — French Guiana.

***Geayia (Geayidea) guianaensis* Smit & Pešić sp. nov.**

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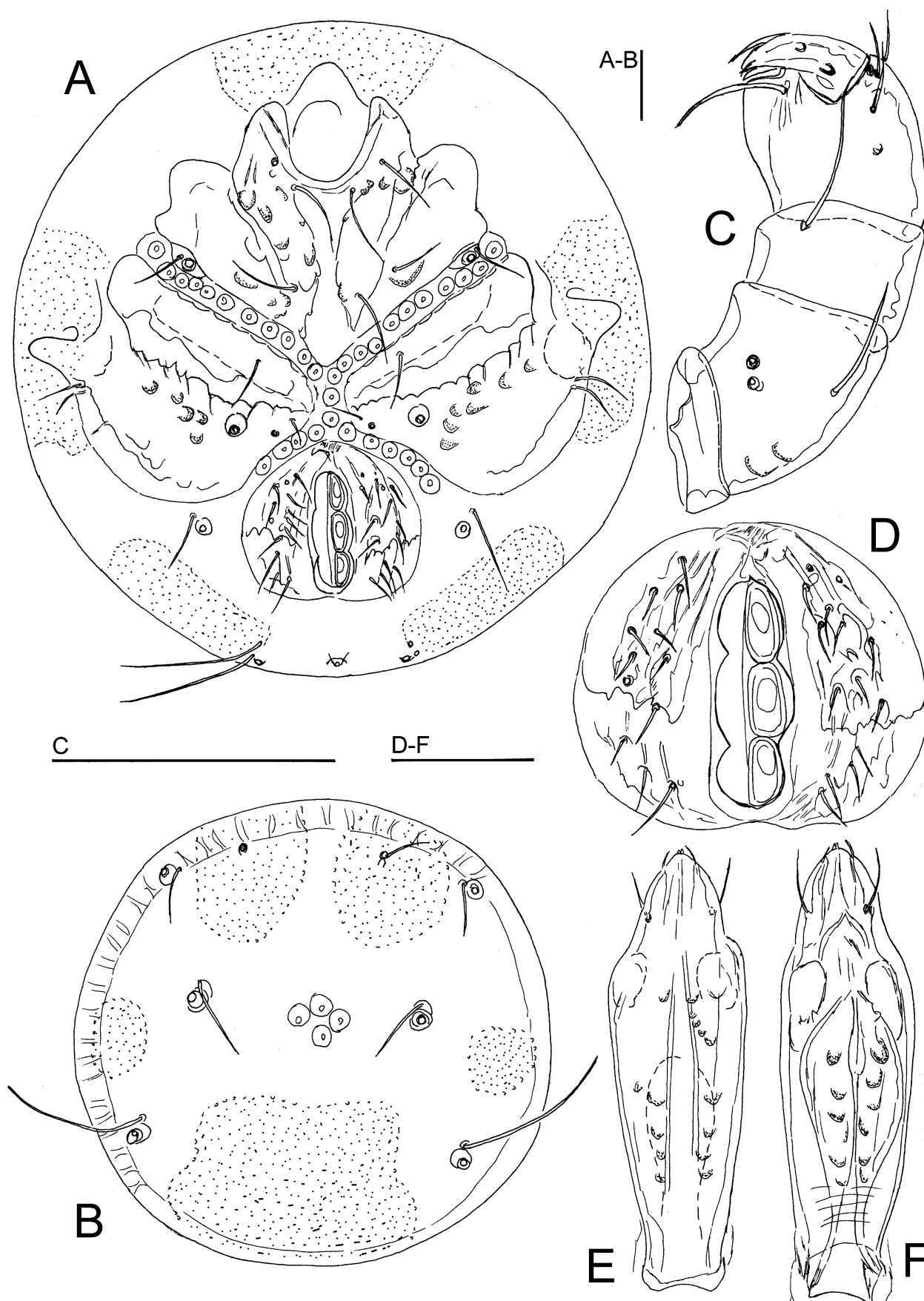


Figure 16 *Geayia purpureomaculata* sp. nov., holotype male. A — ventral shield; B — dorsal shield; C — palp, medial view; D — genital field; E — gnathosoma, dorsal view; F — gnathosoma, ventral view. Scale bars = 100 μm.

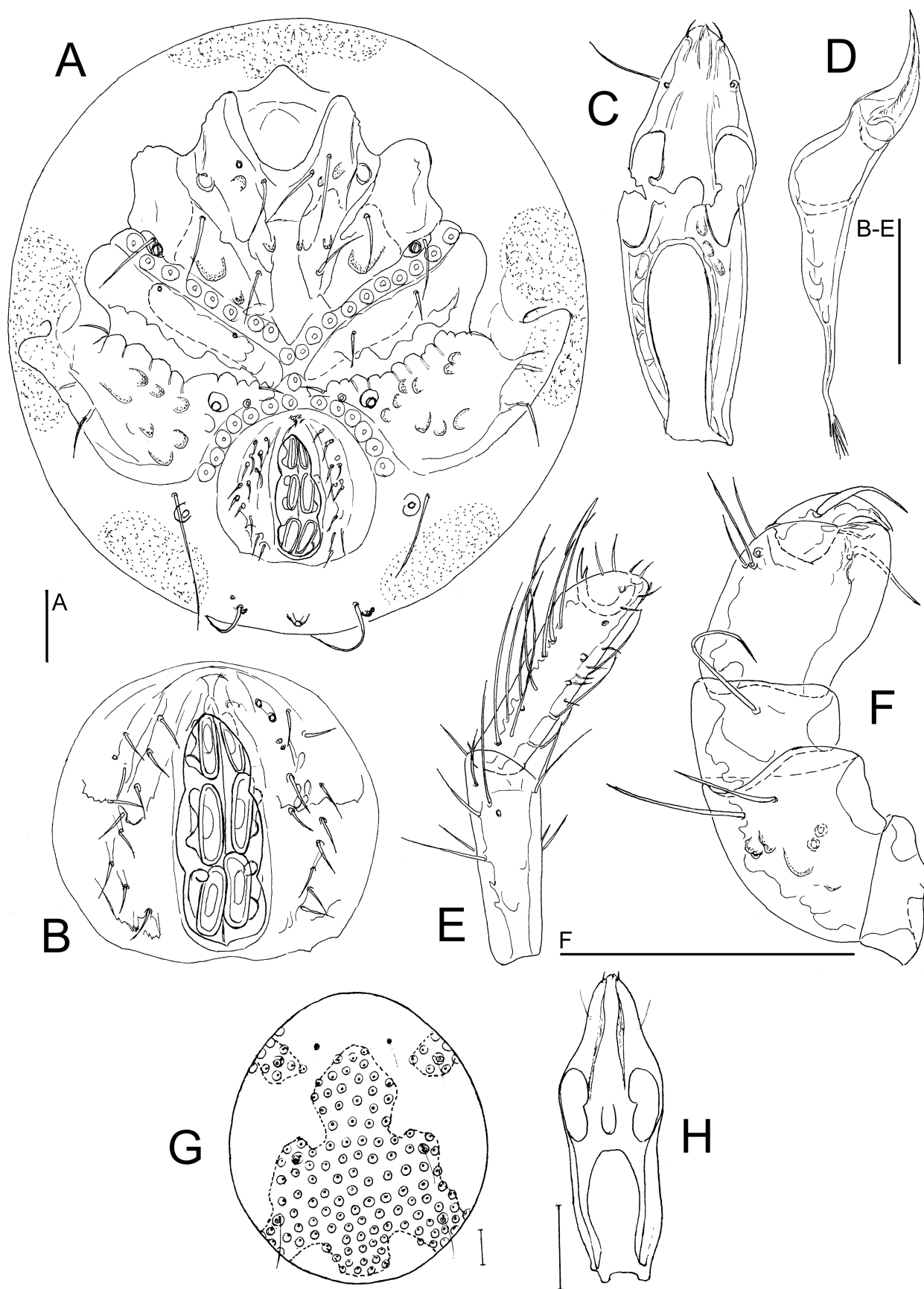


Figure 17 *Geayia purpureomaculata* sp. nov., male, Comte River, French Guiana. A — ventral shield; B — genital field; C — gnathosoma, ventral view; D — chelicera; E — I-leg-5 and -6; F — palp, lateral view. 17G-H *G. avinotata* K. Viets, 1959, female: G — dorsal shield; H — gnathosoma, ventral view (illustrations taken from K. Viets 1959). Scale bars = 100 μ m.

(Figures 18A-E, 19A-E, 20K, 21E-F)

Material examined — Holotype female, Petit-Saut Lake, date unknown, between 2007 and 2017, 4.939997°N, 53.044167°W, leg. S. Clavier, dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (RMNH). Paratypes: 2[one of them juvenile]/3/0, same data as the holotype, one male dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid) (RMNH).

Diagnosis — Dorsum and venter without a colour pattern; gnathosoma L/W ratio 3.3-3.5, gnathosomal rostrum subrectangular in shape, posterior margin with a U-shaped cleft, not flanked by a pair of lateral extensions; genital field as long as wide or slightly wider.

Description — General features – Dorsal and ventral shield present; dorsal shield complete; dorsal and ventral shields without a colour pattern (Figure 20K). Dorsal portion of gnathosomal bay rounded and projecting well forward; on each side one row of body pores between Cx-II and Cx-III (Figure 18A). Genital field with three pairs of acetabula. Palp: two long setae on medial surface of P2 inserted near middle of segment, antagonistic bristle of P4 long and whip-like; P5 inserted dorsally at distal end of P5 (Figure 18D-E). Gnathosomal rostrum subrectangular in shape, posterior margin with a U-shaped cleft, not flanked by a pair of lateral extensions (Figures 18B, 21E-F).

Female (holotype) – Dorsal shield long 756 and 731 wide; ventral shield 1050 long and 1013 wide. Genital field 273 long and 275 wide, gonopore 241 long and 166 wide. Palp: dorsal length/height, dorsal length/height ratio: P1, 19/48, 0.39; P2, 66/53, 1.24; P3, 48/48, 1.0; P4, 66/46(basal), 1.43; P5, 34/19, 1.8. Gnathosoma 294 long and 84 wide, length/width ratio 3.5.

Dorsal length of I-leg-2-5: 72, 103, 125, 131, 152; dorsal length of IV-leg: 138, 141, 159, 191, 200, 184. Swimming setae: II-leg-4, 5-6; II-leg-5, 5; III-leg-3, 3; III-leg-4, 13; III-leg-5, 10; IV-leg-3, 11; IV-leg-4, 14; IV-leg-5, 12.

Male (paratype, n=1) – Dorsal shield (Figure 19B) long 625 and 594 wide; ventral shield (Figure 19A) 888 long and 837 wide. Genital field (Figure 19D) 209 long and 214 wide, gonopore 152 long and 53 wide. Ejaculatory complex 313 long. Palp (Figure 19E): dorsal length L/height, dorsal length/height ratio: P1, -/-,-; P2, 61/55, 1.11; P3, 48/47, 1.03; P4, 58/42(basal), 1.37; P5, 31/14, 2.2; L ratio P2/P4 1.05. Gnathosoma (Figure 19C) 269 long and 81 wide, length/width ratio 3.3.

Dorsal length of I-leg-3-6: 142, 178, 197, 197; dorsal length of IV-leg-2-6: 78, 97, 120, 138, 169; IV-leg-3 and -4 without a row of enlarged setae on dorsal surface characteristic for *Geayella*. Swimming setae: II-leg-4, 4; II-leg-5, 4; III-leg-4, 9; III-leg-5, 13; IV-leg-4, 10; IV-leg-5, 10.

Etymology — Named for its occurrence in the Guianas.

Discussion — With regard to the shape of the gnathosoma (elongated with a subrectangular gnathosomal rostrum, posterior margin with a U-shaped cleft, not flanked by a pair of lateral extension), the new species from French Guinea most closely resembles *G. micronycha* K. Viets, 1954. The latter species was originally described based on two male specimens from Rio Ipojuca near Escada (Pernambuco State) in northeastern Brazil (K. Viets 1954a). Later on, K. Viets (1959) described the female of *G. micronycha* from Igarapé Caraná in the Amazon region. From the new species from French Guinea, *G. micronycha* (in parentheses measurements from K. Viets 1954b and K. Viets 1956) differs in the dorsal shield with a dark blue patch forming a cross-shaped pattern, and a yellow mushroom-like shaped patch with a central pair of glandularia in the middle of the cross-shaped figure, male genital field elongated, elliptic, distinctly longer than wide (L/W 228/157), and in both sexes the gnathosoma is more elongated (L/W 437/85 in ♂, 460/87 in ♀), posteriorly strongly tapering (see Figures 141 in K. Viets 1954a and Figure 41 in K. Viets 1959).

Distribution — French Guiana.

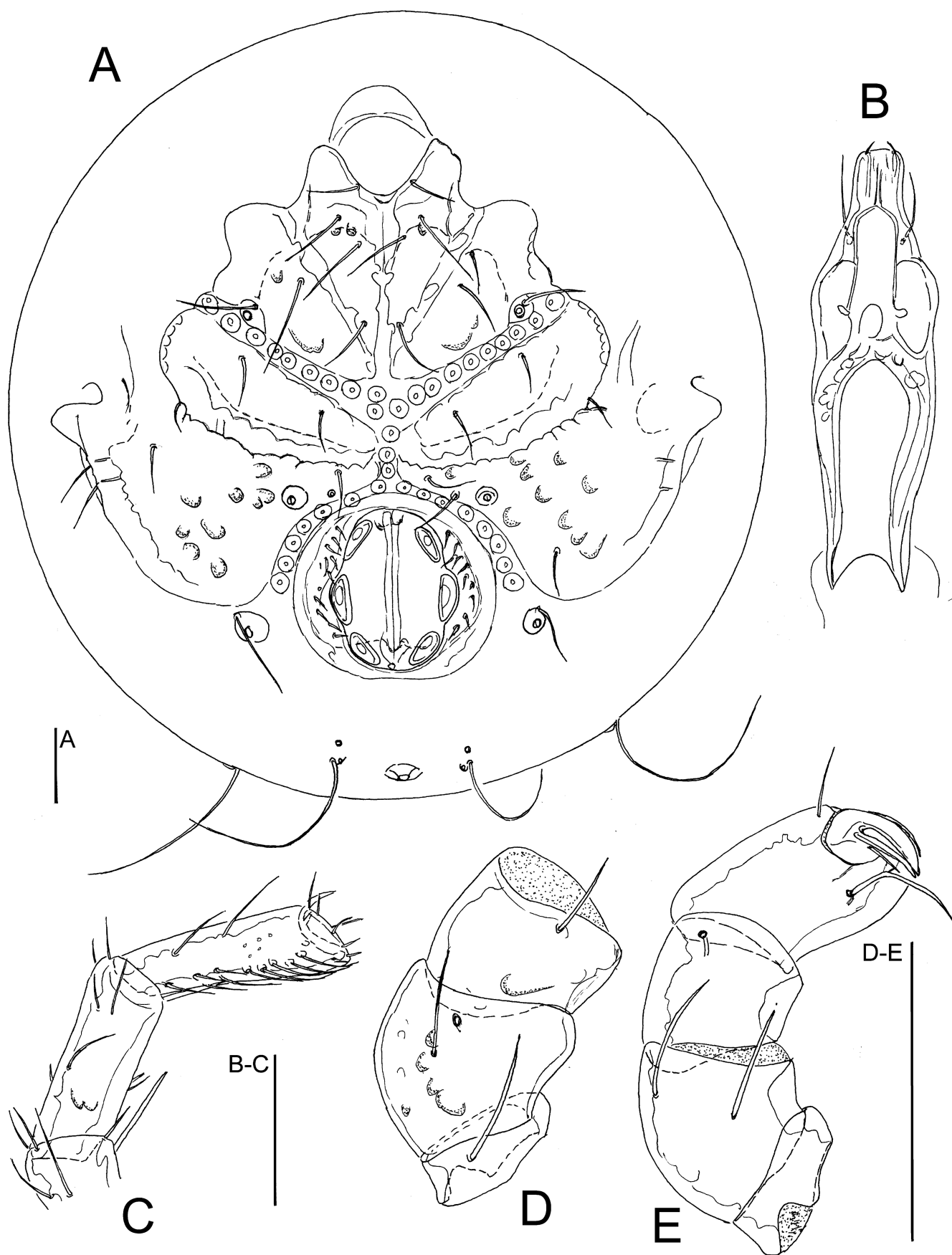


Figure 18 *Geayia guianaensis* sp. nov., holotype female. A – ventral shield; B – gnathosoma, ventral view; C – I-leg-5 and -6; D – P1-3; E – palp. Scale bars = 100 μ m.

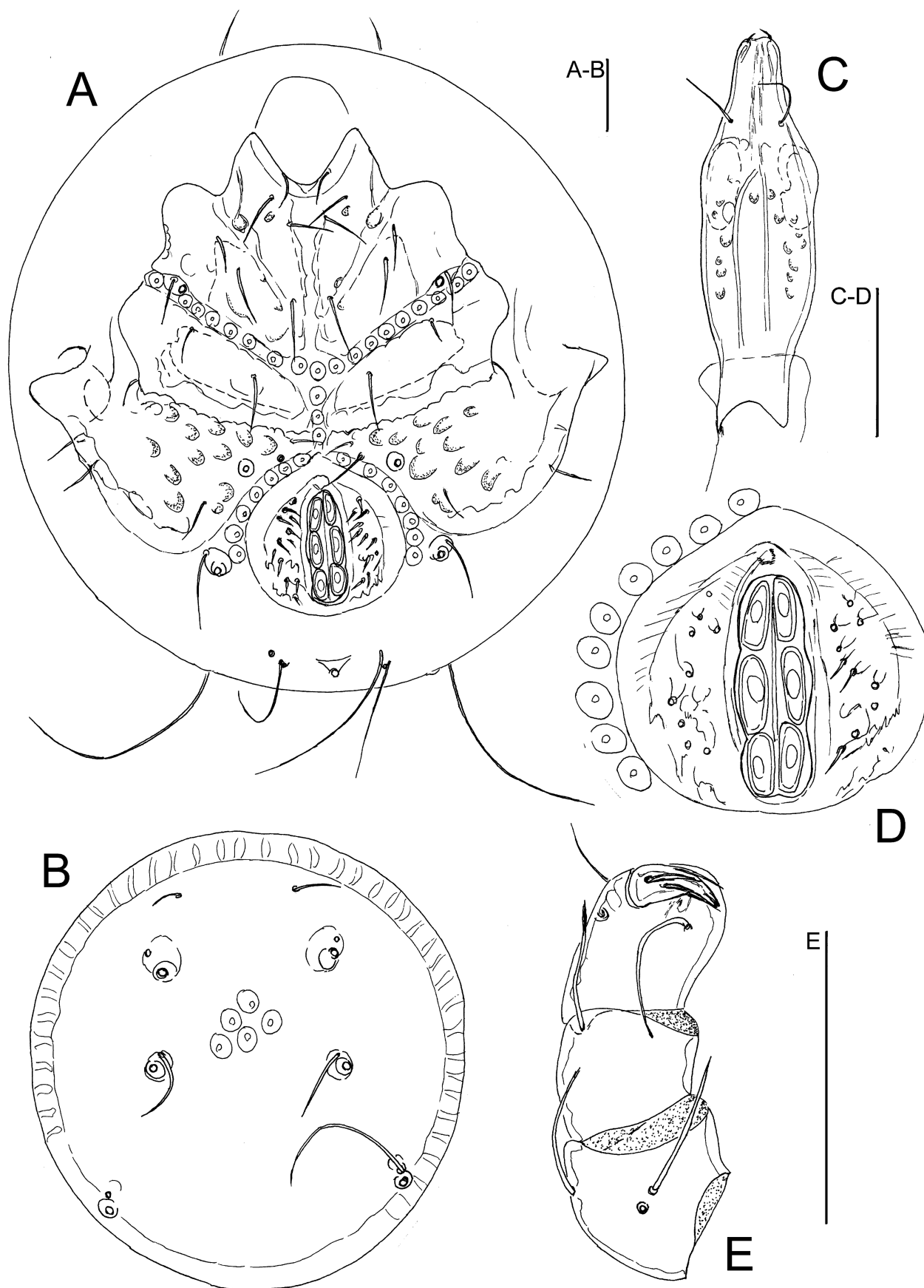


Figure 19 *Geayia guianaensis* sp. nov., paratype male. A – ventral shield; B – dorsal shield; C – gnathosoma, dorsal view; D – genital field; E – palp, medial view (P1 missing). Scale bars = 100 µm.

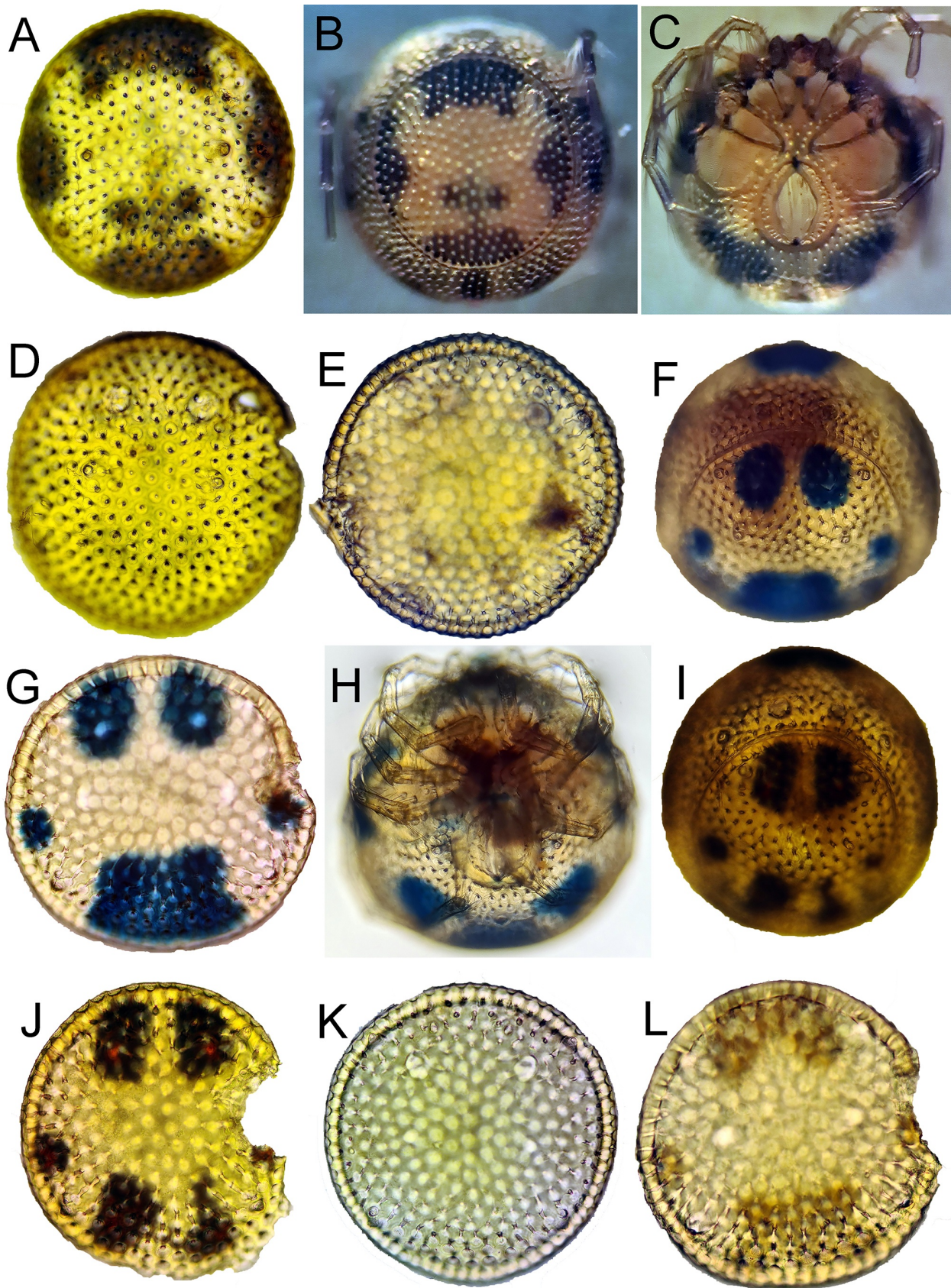


Figure 20 Photographs of selected structures (A, D-E, G, J-L – dorsal shields, B, F, I – idiosoma, dorsal view, C, H – idiosoma, ventral view). A-C – *Geayia tanaru* sp. nov.: A – holotype female, B-C – paratype female. D-E – *G. major* sp. nov. female: D – holotype; E – paratype. F-J – *Geayia purpureomaculata* sp. nov. male: F-H holotype; I-J – Comte River. K – *G. guianaensis* sp. nov., paratype male. L – *G. latirostris*, male, Inini river.

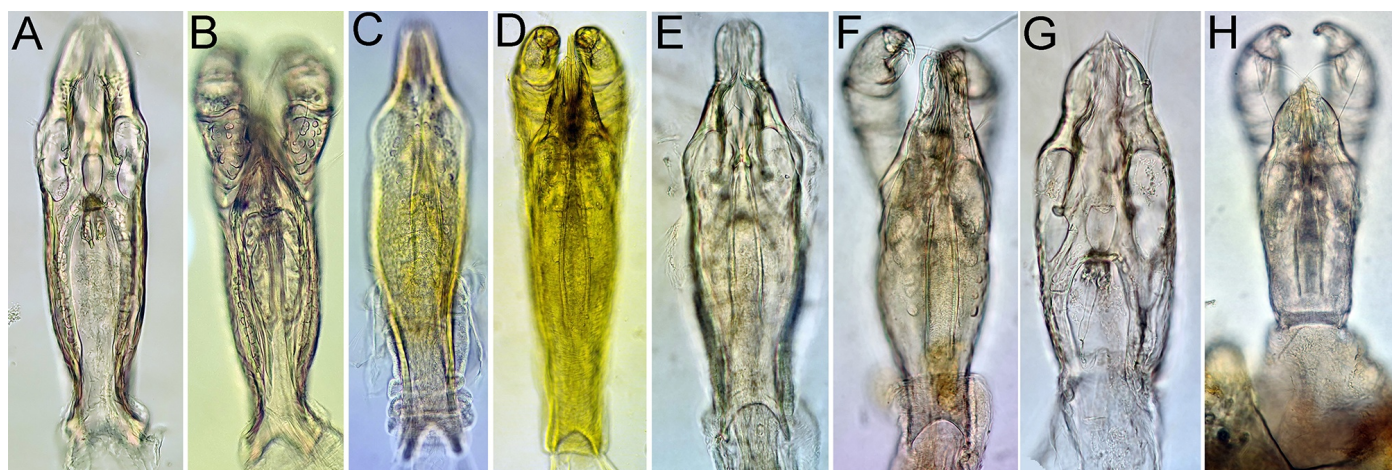


Figure 21 Photographs of gnathosoma. A-B — *Geayia tanaru* sp. nov. female holotype: A – ventral view; B – gnathosoma and palps, dorsal view. C-D — *G. major* sp. nov. female (C – holotype; D – paratype): C – dorsal view; D – gnathosoma and palps, dorsal view. E-F — *G. guianaensis* sp. nov., paratype male: E – ventral view; F – gnathosoma and palps, dorsal view. G-H — *G. latirostris*, male (G – Inini river; H – Maroni river): G – ventral view; H – gnathosoma and palps, dorsal view.

Genus *Roquella* Lundblad, 1930

Roquella (*Pararoquella*) *papillata* K. Viets, 1954

New record — 1/1/0, Mont Grand Matoury National Reserve, Crique La Fontaine, French Guiana, 4.859162°N, 52.369091°W, 1 Oct. 2020, leg. S. Clavier, both specimens sequenced (BOLD: HYDME042-22; BOLD: HYDME043-22), male dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid); 0/1/0, Crique Baboune tributary, National Reserve La Trinité, French Guiana, 4.602947°N, 53.395652°W, 9 Nov. 2018, leg. S. Clavier; 0/2/0, Crique Baboune, National Reserve La Trinité, French Guiana, 4.602947°N, 53.395652°W, 3 Nov. 2018, leg. S. Clavier, one female dissected (gnathosoma, palps and legs mounted on slide, dorsal and ventral shield in Koenike fluid).

Distribution — Brazil (K. Viets 1954b), French Guiana (this study).

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New species were discovered during surveys conducted under the Water Framework Directive and the Petit-Saut dam. Office de l'Eau de Guyane, Hydreco Guyane and EDF Guyane are thanked especially Mathieu Rhoné and Régis Vigouroux.

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References

- Besch W. 1969. Water mites from the Amazon Region - Wassermilben (Hydrachnellae, Acari) aus dem Amazonasgebiet II. Beitr. Neotrop. Fauna, 6: 80-89. <https://doi.org/10.1080/01650526909360417>
- Besseling A.J. 1949. Watermijten uit Suriname. Tijdschr. Entomol., 91: 159-179. (in Dutch with German summary)
- Clavier S., 2017. DIAG - Diversity of Aquatic Invertebrates of French Guiana. <https://www.researchgate.net/project/DIAG-Diversity-of-Aquatic-Invertebrates-of-French-Guianad-maps>.
- Cook D.R. 1980. Studies on neotropical water mites. Mem. Amer. Entom. Inst., 31: 1-645.
- De Castro L.S., Proctor H.C., Lofego A.C. 2022. A new species of *Rhynchohydracarus* Lundblad 1936 (Acariformes: Hydrachnidae: Hydryphantoidea: Rhynchohydracaridae) from central Brazil, with DNA barcodes, a key for known species and a proposal for the homologies of dorsalia, ventralia, lateral and glandularia for the family. Acarologia, 62: 161-173. <https://doi.org/10.24349/Olg5-xgOI>
- Lundblad O. 1930. Südamerikanische Hydracarin. Zugleich Revision von E. Daday aus Paraguay beschriebenen Arten. Zool. Bidr. Uppsala, 13: 1-86.
- Lundblad O. 1936. Weitere neue Wassermilben aus Santa-Catharina in Südbrasilien. Zool. Anz., 116: 14-24.
- Lundblad O. 1938. Neue Wassermilben aus Paraguay. Zool. Anz., 122: 7-19.
- Lundblad O. 1941. Die Hydracarinfauna Südbrasilien und Paraguays. Erster Teil. Kungl. Svensk. Vetenskapsakad. Handling., (s. 3), 19: 1-183.
- Lundblad O. 1942. Die Hydracarinfauna Südbrasilien und Paraguays. Zweiter Teil. Kungl. Svensk. Vetenskapsakad. Handling., (s. 3), 20: 1-175.
- Lundblad O. 1943. Die Hydracarinfauna Südbrasilien und Paraguays. Dritter Teil. Kungl. Svensk. Vetenskapsakad. Handling., (s. 3), 20: 1-148.
- Lundblad O. 1944. Einige neue und wenig bekannte Hydracarin aus Südamerika. Ent. Tidskr., 65: 135-162.
- Lundblad O. 1954. Die Hydracarinfauna von Colombia. Ark. Zool., (s. 2), 5: 435-585.
- Makhan D. 2005. Two new species of water mites (Acari: Hydrachnida) from Suriname. Rev. Biol. Neotrop., 2: 135-138.
- Smit H. 2020a. New records of the water mite genus *Arrenurus* Dugès, 1834 from South America (Acari: Hydrachnida: Arrenuridae), with the description of five new species and one new subspecies. Acarologia, 60: 371-3889. <https://doi.org/10.24349/acarologia/20204374>
- Smit H. 2020b. Water mites of the world, with keys to the families, subfamilies, genera and subgenera (Acari: Hydrachnida). Monogr. Ned. Ent. Ver., 12: 1-774.
- Smit H., Clavier S. 2019. A new taxonomic placement for *Scutobates* Cook, 1966, with the description of a new species from French Guiana (Acari: Hydrachnida: Hygrobatidae). Zootaxa, 4543: 587-589. <https://doi.org/10.11646/zootaxa.4543.4.7>
- Tuzovskij P.V., Gerecke R. 2003. A new diagnosis and status for *Mixobates* Thor, 1905 (Acari, Hydrachnida, Hygrobatidae), with a revision of the Palaearctic species. Ann. Limnol. - Int. J. Limn., 39: 151-174. <https://doi.org/10.1051/limn/2003013>
- Valdecasas A.G. 2001. A new subfamily of Rhynchodracaridae (Acari, Hydrachnellae) from the island of Coiba (Panama) with descriptions of new taxa. J. nat. Hist., 35: 1565-1574. <https://doi.org/10.1080/002229301317067674>
- Viets K. 1935. Neue brasilianische Wassermilben. Zool. Anz., 112: 273-283.
- Viets K. 1936. Weitere brasilianische Wassermilben aus dem Staate Pernambuco. Zool. Anz., 113: 209-218.
- Viets K. 1939. Eine neue, die erste Süßwassermilbe (Hydrachnellae, Acari) aus tropischen Pflanzengewässern. Zool. Anz., 128: 69-77.
- Viets K. 1940a. Über *Limnesiella* Daday, 1905 (Hydrachnellae, Acari). Zool. Anz., 130: 243-250.
- Viets K. 1940b. Über einige *Piona*- und *Arrenurus*-Arten (Hydrachnellae, Acari) aus Südamerika. Zool. Anz., 131: 105-112.
- Viets K. 1954a. Süßwassermilben (Hydrachnellae, Acari) aus Südamerika. Arch. Hydrobiol., 49: 1-224.
- Viets K. 1954b. Wassermilben aus dem Amazonasgebiet (Hydrachnellae, Acari). (Systematische und ökologische Untersuchungen). Bearbeitung der Sammlungen Dr. R. Braun, Arau, und Dr. H. Sioli, Belém. Schweiz. Zschr. Hydrol., 16: 78-247. <https://doi.org/10.1007/BF02483636>
- Viets K. 1956. Wassermilben (Hydrachnellae, Acari) aus Venezuela und Kolumbien. Ergebn. Deutsch. Limnol. Venezuela-Exp. 1952, 1: 315-327.
- Viets K. 1959. Nachtrag zu meiner Bearbeitung der "Wassermilben aus dem Amazonasgebiet (Hydrachnellae, Acari)". Arch. Hydrobiol., 56: 128-169.
- Viets K.O. 1975. *Koenikea*-Arten (Acari, Hydrachnellae) aus dem Amazonas-Gebiet. Amazonia, 3: 305-336.
- Walter C. 1912. Hydracarina de Colombie. In: Fuhrmann O. and Mayor E. (eds.), Voyage d'exploration scientifique en Colombie. Mém. Soc. neuchâteloise Sci. natur., 5 (2): 193-201.
- Walter C. 1919a. Neue Hydracarin aus Surinam. Zool. Anz., 50: 257-265.
- Walter C. 1919b. Hydracarin aus den peruanischen Anden und aus Brasilien. Rev. Suisse Zool., 27: 19-59. <https://doi.org/10.5962/bhl.part.36322>