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NEW SPECIES OF WATER MITES FROM OMAN, WITH SOME ZOOGEOGRAPHICAL NOTES (ACARI: HYDRACHNIDIA)

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ABSTRACT — The paper deals with a collection of epigeal water mites from Oman. One new genus, *Omanaxonopsis*, and 16 new species are described: *Bharatavolvzia arabica*, *Nilotonia bisetosa*, *N. longiseta*, *Torrenticola arabica*, *T. omanensis*, *Limnesia kochi*, *Protolimnesia inexpectata*, *Atractides arabicus*, *A. omanensis*, *Neumania indentata*, *Axonopsis arabica*, *A. balneatoris*, *A. omanensis*, *Omanaxonopsis arabica*, *Arrenurus dugesi* and *Arrenurus rectituberculatus*. The zoogeographical position of Oman is discussed briefly.

KEYWORDS — Acari; Hydrachnidia; Oman; new genus; new species; zoogeography

INTRODUCTION

Oman, lying in the northeastern part of the Arabian peninsula, occupies an interesting position between three faunal regions, i.e. the Ethiopian (or Afrotropical), Palearctic and Oriental realms. In the north of Oman the Al-Hajar mountains are rising to 3,000 m. In the south we find the Dhofar mountains, which continue into Yemen. In between these two mountain ranges there is a large stretch of barren desert, which acts as a zoogeographical barrier. Wallace (1876) included Oman in the Ethiopian faunal region. More recent studies show that the northern part has more affinities with the Oriental realm, and the south with the Ethiopian (or Afrotropical) realm. Brown and Gallagher (1985) studied freshwater snails of Oman, and divided these snails in three groups: Afro-Asian, African and Asian. Gerecke (2004) studied a

small collection of water mites collected in ground-water of Oman. He found two genera with an Oriental distribution. One species, *Tiramideopsis expansipes* Cook, 1967, was found in northern Oman. From the other genus, *Bharatohydracarus* Cook, one species was collected in northern Oman and one in southern Oman. Interestingly, Gerecke (2004) concluded that these two species represent two phylogenetic lines. Roselaar (2006), based on a study of passerine birds, concluded that the northern part of Oman is part of the Oriental region, while the southern part belongs to the Ethiopian region. However, in land snails no relations could be found with the Oriental realm (Mordan, 1980), and also Larsen (1984), based on a study of butterflies (Lepidoptera), came to the conclusion that the influence of the Oriental region in northern Oman is small.

Three papers have been published on the water mites of Oman. Smit (2003) and Gerecke (2004)

dealt with hyporheic fauna exclusively. The present study is the result of a collection trip in 2008 by the senior author. Only water mites from surface waters were collected. A first paper of the material collected during this trip has been published by Pešić *et al.* (2009).

MATERIALS AND METHODS

All material has been collected by the senior author and is lodged in the Zoological Museum of the University of Amsterdam (ZMAN). The following abbreviations are used: Ac-1 = first acetabulum, Cx-I = first coxae, Dc-1-4 = dorsocentralia 1-4, Cxgl-4 = coxoglandularium 4, Dgl-1-7 = dorsoglandularia 1-7, H = height, L = length, %L = relative length, I-Leg-6 = Leg 1, sixth segment (tarsus), P-1 = palp, first segment, Vgl-1-4 = ventroglandularia 1-4, W = width. Measurements are given as μm . Numbers are given as males/females/nymphs. Measurements of paratypes are given in parentheses. All measurements of palp and legs are of dorsal margin.

SYSTEMATICS

Family Acherontacaridae Cook, 1967

Genus *Bharatavolzia* Cook, 1967

Bharatavolzia (*Bharatavolziella*) *arabica* n. sp

(Figures 1A-E)

Type series — Holotype female, stream Wadi Bani Auf, Oman, 23°16.699 N 57°27.690 E, alt. 655 m, 13-xi-2008.

Diagnosis — Gnathosoma slender in ventral view; P-4, in addition to the medial seta, with a heavy anteroventral seta.

Description

Female — Idiosoma dorsally L 802, W 520, with a large anteromedial and a large posteromedial plate and five pairs of smaller lateral plates. Eyes absent. Anteromedial plate L 263, W 336, anteriorly with a rounded extension. Posteromedial plate

L 482, W 300. Large anterolateral plate L 243, W 102; large posterolateral plate L 251, W 70. All dorsal plates and platelets without glandularia, but the associated setae present. Idiosoma ventrally L 867, W 502. Suture lines of coxal plates indistinct. Genital field placed between first coxae, L 57, W 94. Gnathosoma slender in ventral view. Palp (Fig. 1C): total L 236; L: P-1, 8; P-2, 84; P-3, 52; P-4, 60; P-5, 32; P-4 anteroventrally with a heavy seta, medial side of P-4 also with a stout seta. L of I-Leg-4-6: 76, 96, 84 (120 to tip of segment). I-Leg-6 anterodorsally with a heavy seta, I-Leg-4 and I-Leg-5 anteroventrally with 1-3 setae. L of IV-Leg-4-6: 96, 106, 88 (140 to tip of segment). IV-Leg-6 anterodorsally with two heavy setae close to each other. IV-Leg-4 and -5 anteroventrally with a group of setae, one of these setae of IV-Leg-5 with large pectinations. All legs with large claws.

Male — Unknown.

Etymology — Named after the Arabian Peninsula.

Remarks — This is the fourth known species of the genus *Bharatavolzia*, two species are known from India (Cook, 1967), while one species is known from Iran (Schwoerbel and Sepasgosarian, 1980). Cook (1967) erected the subgenus *Bharatavolziella* for species without eye capsules. The new species differs from the two other known species of this subgenus in the slender gnathosoma and the presence of two heavy setae on P-4 instead of one or none. Moreover, compared to the Indian *B. pallida* Cook the new species has a larger anterior extension of the anteromedial dorsal plate, and compared to *B. cooki* Schwoerbel and Sepasgosarian from Iran the large anterolateral plate is less slender. The large posterolateral platelet of the new species is much longer than the smaller platelet posterior to it, but in *B. cooki* these platelets are much less different in size.

Family Hydrodromidae K. Viets, 1936

Genus *Hydrodroma* Koch, 1837

Hydrodroma rheophila Cook, 1967

Material examined — 1/2/0, Ayn Tabraq, captured spring, 17°06.034 N 54°19.599 E, 7-xi-2008;

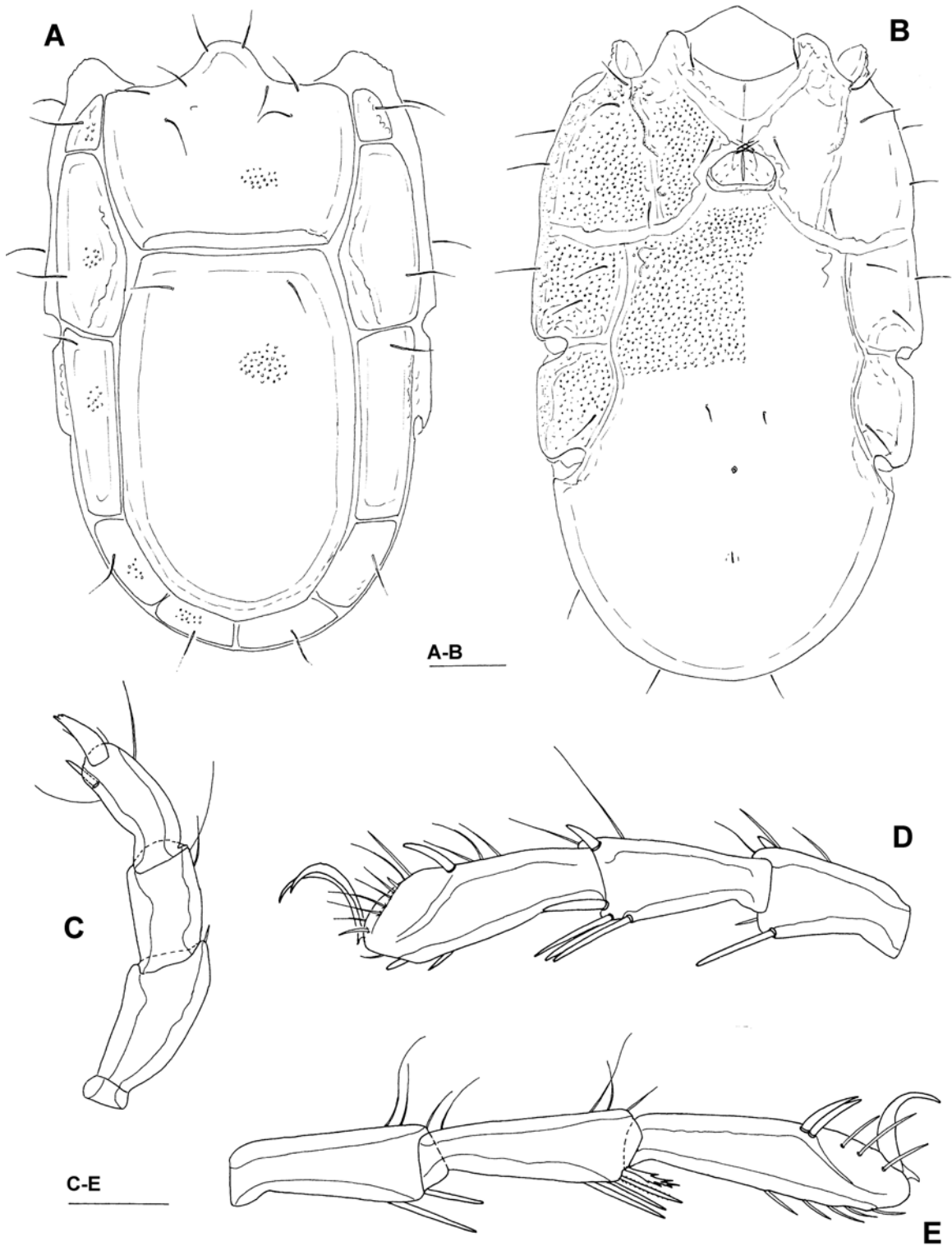


FIGURE 1: *Bharatavolzia arabica* n. sp., female: (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C) – palp; (D) – I-Leg-4-6; (E) – IV-Leg-4-6. Scale bars = 200 μ m (A-B), 50 μ m (C-E).

5/2/0, Ayn Tabraq, stream, 7-xi-2008, 17°06.034 N 54°19.599 E; 1/0/0, stream Wadi Ghul, 23°10.297 N 57°11.996 E, alt. 805 m, 12-xi-2008; 0/1/0, Ayn Razat, 17°07.807 N 54°14.231 E, 3-xi-2008.

Distribution — India, Indonesia, Iran. New for Oman.

Family Anisitsiellidae Koenike, 1910

Genus *Nilotonia* Thor, 1905

Nilotonia (Dartiella) robusta (Walter, 1931)

Material examined — 0/1/0, Ayn Razat, 17°07.807 N 54°14.231 E, 3-xi-2008; 11/33/0, Wadi upstream of Al Mughsayl, 16°54.810 N 53°44.860 E, 5-xi-2008.

Remarks — Previously reported from Saudi Arabia (sub nomen *N. buettikeri* Bader, 1980), Sahara and Israel.

Nilotonia (Dartiella) bisetosa n. sp.

(Figures 2A-F)

Type series — Holotype female, spring Al Khremh, crossing road to United Arab Emirates border, Oman, 24°47.421 N 55°56.503 E, 15-xi-2008. Paratypes: 0/1/0, same data as holotype. Other material. 0/0/4, same data as holotype.

Diagnosis — IV-Leg-6 with two long, distal setae.

Description

Female — Idiosoma soft, lineated, dorsally L 786 (1142), W 608 (891), ventrally L 842 (1102). Dorsum with one large, posterior plate, L 138 (113), W 94 (81). Setae associated with pre-antennal glandularia large. Cx-I separated medially, with triangular apodemes. Cx-III with a blunt corner medially, anteriorly of genital field. Genital field (Fig. 2C) with three pairs of elongated acetabula, L 208, W 154. Pre-genital sclerite of moderate size, bowed, post-genital sclerite straight and narrow. Chelicera L 413, cheliceral claw L 100. Palp (Fig. 2D): total L 527; L: P-1, 32; P-2, 170, P-3, 94, P-4, 180, P-5, 51; P-2 ventrally with a long seta, ventral margin with numerous small denticles; P-4 with two setal

tubercles, each with a seta, one of which is much longer than the other; ventral margin of P-4 with three more distal setae; P-5 with three heavy, distal setae. L of I-Leg-4-6 (Fig. 2E): 176, 190, 140. I-Leg-5 anteroventrally with three setae, I-Leg-4 anteroventrally with three heavy, serrated setae, more medially two more serrated setae. L of IV-Leg-4-6: 259, 284, 243. IV-Leg-6 (Fig. 2F) with two distal setae, the distal one 132 long, the proximal 123 long. Ventral margin of IV-Leg-5 with six setae, ventral margin of IV-Leg-4 with eight setae. IV-Leg-5 distally with five heavy setae of various lengths, IV-Leg-4 distally with seven heavy setae of various lengths, three of these long and serrate. Claws of legs I-III with comb. Excretory pore slit-like, with an indistinct ring.

Male — Unknown.

Deutonymph — The nymphs collected together with the adults are provisionally assigned to the new species, IV-Leg-6 of the nymph has only one long seta. P-2 is ventrally without a seta, but the many denticles are present.

Etymology — Named for the two long setae of IV-Leg-6.

Remarks — The subgenus *Dartonia* has IV-Leg-6 with more than one heavy distal setae, but is also characterized by P-2 with more than eight setae and the claw of III-Leg has heavy clawlets, leading to a bidentate or tridentate appearance (Panesar, 2004). The latter two characters are absent in the new species, and therefore it is placed in the subgenus *Dartiella*. No other species of this subgenus has a IV-Leg-6 with two distal long setae.

Nilotonia (Dartiella) longiseta n. sp.

(Figures 3A-G)

Type series — Holotype male (idiosoma in fluid, palp, first and fourth leg mounted), stream Hatta pools, Oman, 24°41.165 N 56°09.556 E, 15-xi-2008, alt. 421 m (ZMAN). Paratypes: 0/5/0, same data as holotype; 0/1/0, stream Wadi Ghul, Oman, 23°10.297 N 57°11.996 E, 12-xi-2008, alt. 805 m; 0/1/0, unnamed stream crossing road to Al Fay, near Ray, Oman, 24°38.709 N 56°06.760 E, 15-xi-2008, alt. 562 m; 2/0/0, Pools Wadi Bani Auf,

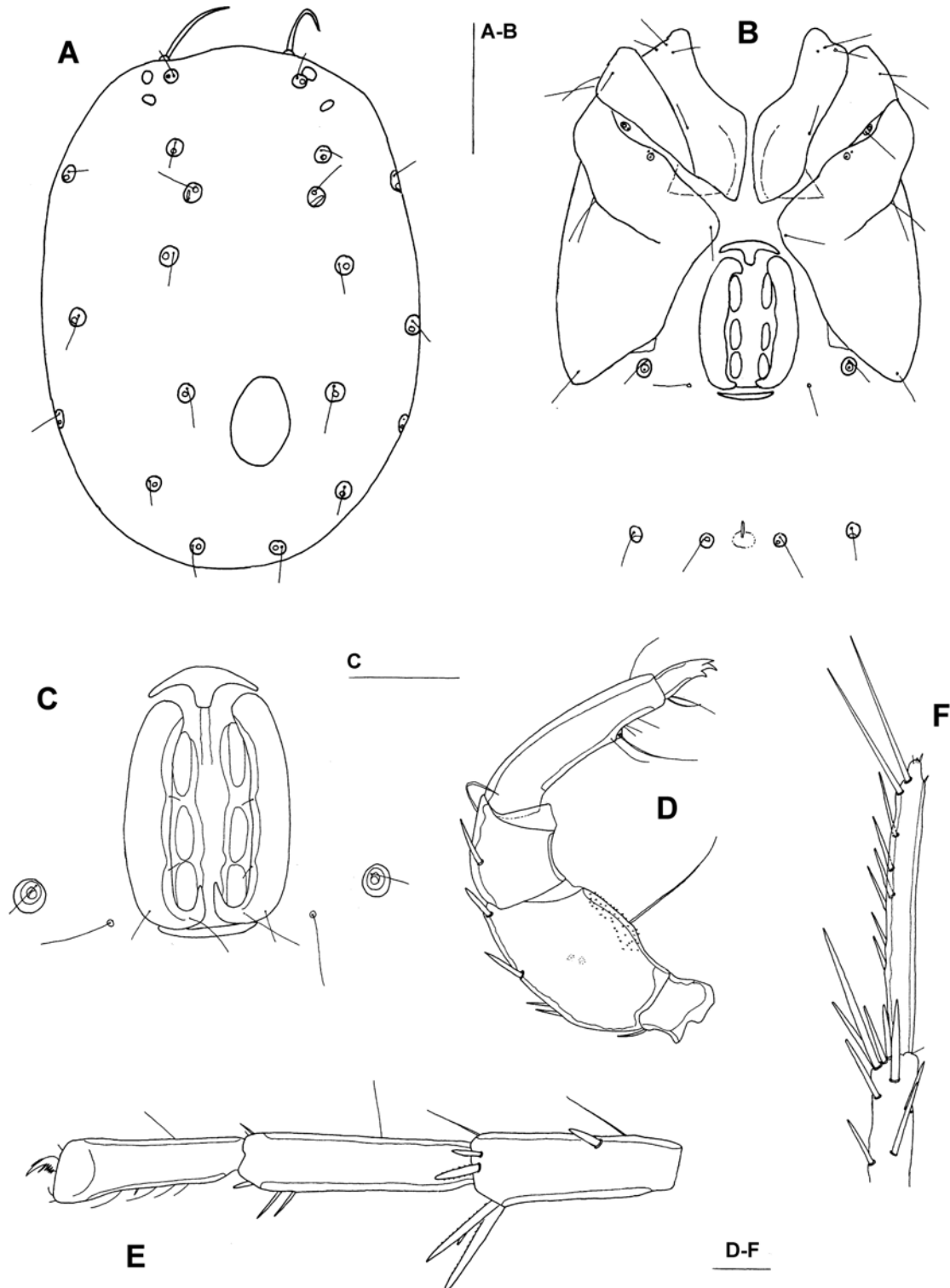


FIGURE 2: *Nilotonia bisetosa* n. sp., female: (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C) – genital field; (D) – palp; (E) – I-Leg-4-6; (F) – IV-Leg-6. Scale bars = 200 μ m (A-B), 50 μ m (C-F).

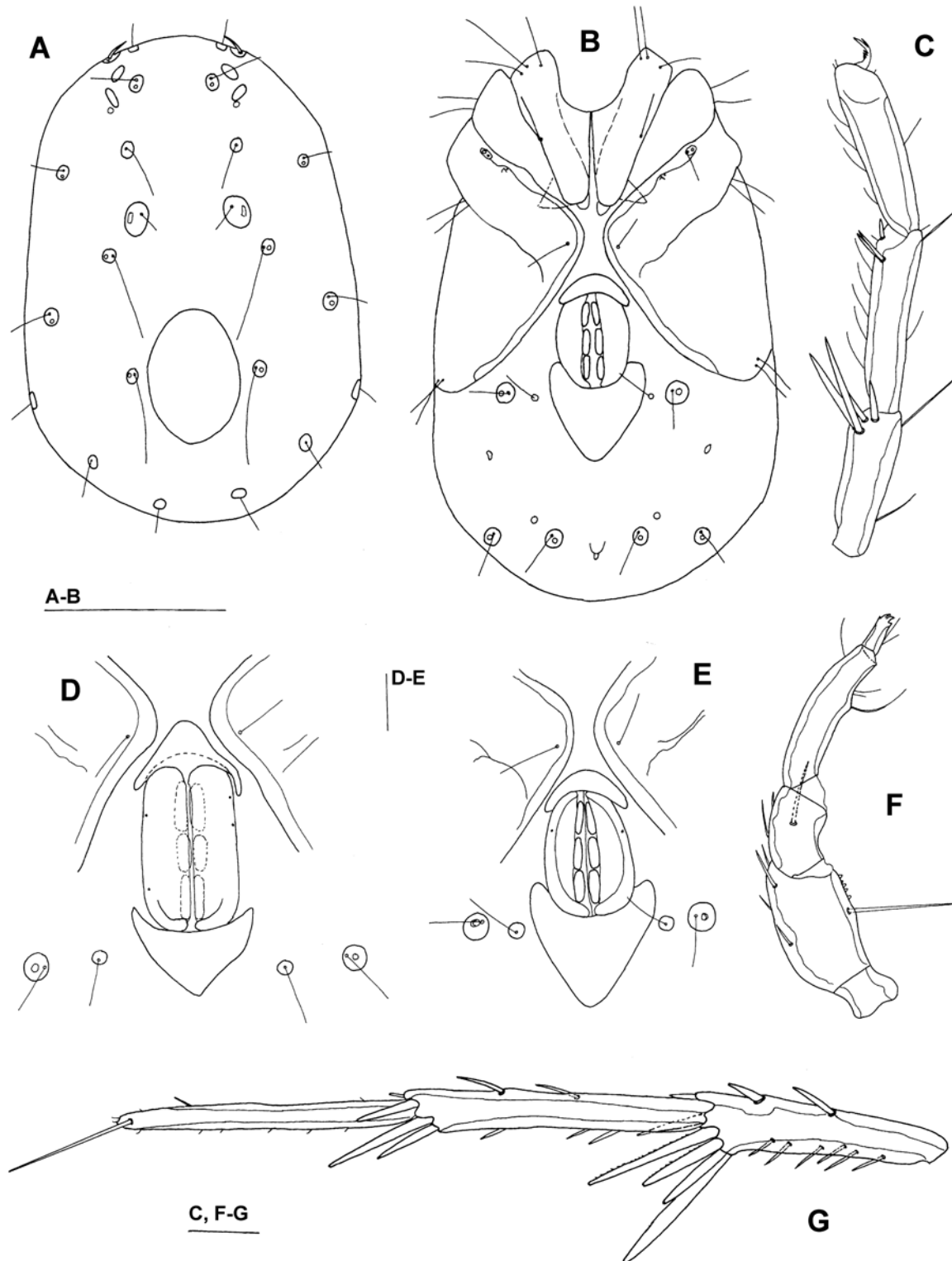


FIGURE 3: *Nilotonia longiseta* n. sp. (A-C, E-G: male, D: female): (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C) – I-Leg-4-6; (D-E) – genital field; (F) – palp; (G) – IV-Leg-4-6. Scale bars = 200 μm (A-B), 50 μm (C-G).

Oman, 23°13.464 N 57°25.083 E, 13-xi-2008, alt. 655 m.

Diagnosis — Male with a large area (L 106, W 104) of secondary sclerotization posterior to genital field; secondary sclerotization in female posterior to genital field smaller; pregenital sclerite of female extended anteriorly; setae of D2 and D3 long, posterior dorsal plate large.

Description

Male — Idiosoma soft, dorsally L 551 (530-591), W 389 (421-429), ventrally L 608 (559-664). Dorsum with one large, posterior plate, L 160 (180-218), W 112 (130-148). Setae of glandularia D2 and D3 (sensu Wiles, 1997a) long. Cx-I separated medially, with triangular apodemes; Cx-I posteriorly with narrow secondary sclerotization. Cx-III with a blunt corner medially, anteriorly of genital field. Genital field (Fig. 3E) with three pairs of elongated acetabula, L 106, W 76. Pregenital sclerite large, bowed, posteriorly of genital field a somewhat triangular secondary sclerotization. Chelicere L 247, cheliceral claw L 74. Palp (Fig. 3F): total L 316; L: P-1, 22; P-2, 96; P-3, 62; P-4, 108; P-5, 28; P-2 with a 72 long ventral seta, which is inserted somewhat medially; ventral margin of P-2 distally with 5-6 denticles of variable size; P-3 with a long medial seta which extends beyond posterior margin of P-4; P-4 with a short setal tubercle, ventral margin with three setae various in length, of which the seta on the setal tubercle is the longest. L of I-Leg-4-6: 101, 126, 96. I-Leg-4 with four heavy distal setae, two longer, two shorter (Fig. 3C). L of IV-Leg-4-6: 178, 202, 182. IV-Leg-6 with a 90 long distal seta. IV-Leg-5 with three heavy distal setae, at least the longest of these serrated. IV-Leg-4 with five heavy distal setae, some of these (or all?) serrated. Claws of legs I-III with a comb and a clawlet. Excretory pore smooth.

Female — Idiosoma soft, dorsally L 656 (559-802), W 502 (421-591), ventrally L 713 (616-850). Dorsum with one large, posterior plate, L 194 (150-196), W 124 (106-128), and a pair of smaller more anteriorly located plates. Setae of glandularia D2 and D3 (sensu Wiles, 1997a) long. Cx-I separated medially, with triangular apodemes; Cx-I posteriorly with narrow secondary sclerotization. Cx-III with a blunt corner medially, anteriorly of genital

field. Chelicerae of mounted female not measurable. Genital field with three pairs of elongated acetabula, L 146, W 82. Pregenital sclerite larger and more extended anteriorly compared to male (Fig. 3D). Secondary sclerotization posterior to genital field as in male, but shorter. Palp: total L 420; L: P-1, 32; P-2, 136; P-3, 78; P-4, 140; P-5, 34; palp as in male, but ventral margin of P-2 with numerous (15-20) denticles. L of I-Leg-4-6: 120, 140, 104. L of IV-Leg-4-6: 206, 244, 236. Distal seta of IV-Leg-6 100 long. Legs as in male. Excretory pore smooth.

Etymology — Named after the long setae on the dorsum.

Remarks — The combination of long setae of D2 and D3, the typical shape of the female pregenital sclerite and a large dorsal plate separates this species from other *Nilotonia* species.

Family Torrenticolidae Piersig, 1902

Genus *Torrenticola* Piersig, 1896

Torrenticola (Torrenticola) arabica n. sp.

(Figures 4A-G, 5A-B)

Type series — Holotype: male, stream Wadi Ghul, Oman, 23°10.297 N 57°11.996 E, alt. 805 m, 12-xi-2008. Paratypes: 20/26/0 (0/1/0 mounted), same data as holotype.

Further records — 9/12/0 (2/1/0 mounted), stream Wadi Ban Auf, Oman, 23°16.699 N 57°27.690 E, alt. 655 m, 13-ix-2008.

Diagnosis — Median suture line of Cx-II+III short; Cx-IV extended posterior to genital field in both sexes; genital field L/W ratio 1.05-1.13 in male; P-2 ventral projection curved distally; capitulum with a long rostrum; postgenital area in the male well developed, ratio postgenital L/idiosoma L 28.8-29.0.

Description

Male — (holotype, in parentheses measurements of specimens from Wadi Ban Auf, n=2). Idiosoma (ventral view: Fig. 4B) L 759 (694-747), W 588 (556-637); dorsal shield (Fig. 4A) L 634 (606-675), W 456 (425-475), L/W ratio 1.39 (1.42-1.43); dorsal plate 606 (581-644); shoulder plate L 194 (184-201), W 63

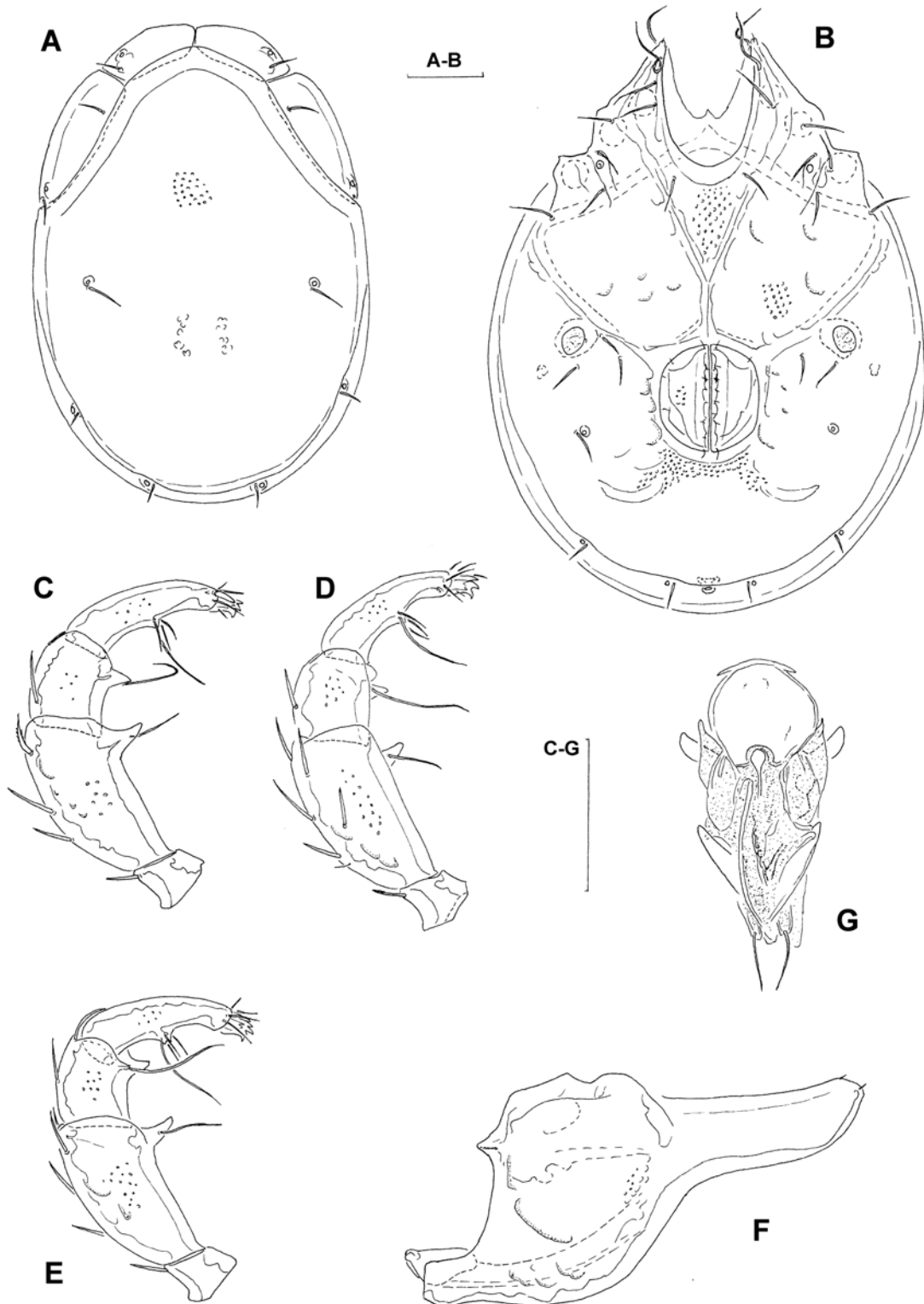


FIGURE 4: *Torrenticola arabica* n. sp., male (A-D, F holotype; E, G specimen from Wadi Ban Auy): (A) – dorsal shield; (B) – idiosoma, ventral view; (C) – palp, medial view; (D-E) – palp, lateral view; (F) – capitulum; (G) – ejaculatory complex. Scale bars = 100 μ m.

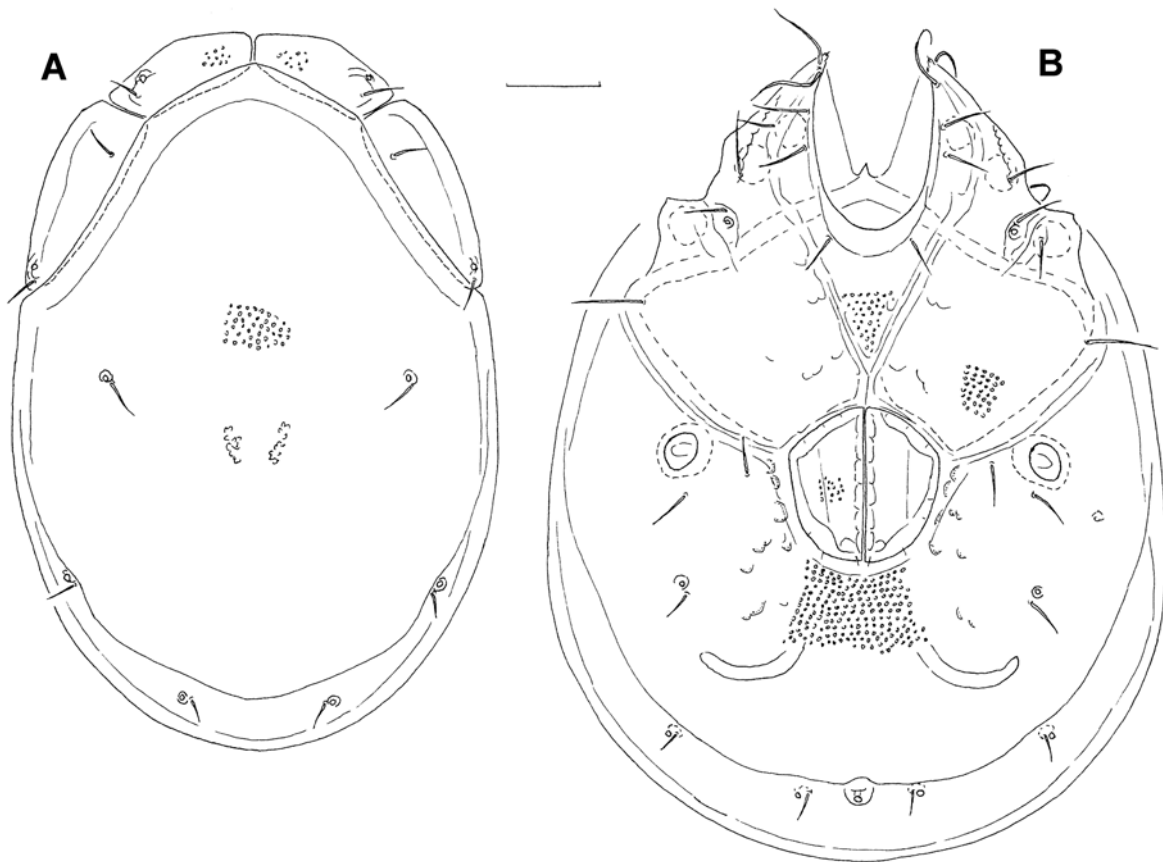


FIGURE 5: *Torrenticola arabica* n. sp., female: (A) – dorsal shield; (B) – idiosoma, ventral view. Scale bars = 100 μ m.

(59-66), L/W ratio 3.1 (3.1); frontal plate L 133 (131-136), W 53 (44-50), L/W ratio 2.5 (2.7-3.0); shoulder/frontal plate L ratio 1.46 (1.4-1.5); gnathosomal bay L 167 (135-159), Cx-I total L 314 (256-291), Cx-I medial L 147 (119-128), Cx-II+III medial 86 (86-92); ratio Cx-I L/Cx-II+III medial L 3.65 (2.8-3.4); Cx-I medial L/Cx-II+III medial L 1.7 (1.3-1.5); genital field L/W 141 (139-144)/133 (127-128), L/W ratio 1.05 (1.1-1.13), ejaculatory complex (Fig. 4G) L 197 (184-197); distance genital field-excretory pore 186 (153-166), genital field-caudal idiosoma margin 219 (200-216); capitulum (Fig. 4F) ventral L 325 (306-317); palp (Figs. 4C-E) total L 346 (332-343), L: P-1, 32 (31-32); P-2, 123 (112-122); P-3, 63 (62-63); P-4, 108 (105-106); P-5, 20 (20-22); %L: P-1, 9.2 (9.3); P-2, 35.6 (33.8-35.6); P-3, 18.2 (18.4-18.7); P-4, 31.2 (30.9-31.6); P-5, 5.8 (5.8-6.6); L P-2/P-4 ratio 1.14 (1.07-1.15); P-2 ventral projection curved distally.

Female — (paratype, in parentheses measurements of specimen from Wadi Ban Auf) similar to the male. Ventral shield (Fig. 5B) L 856 (813), W 669 (675); dorsal shield (Fig. 5A) L 772 (719), W 525 (522), L/W ratio 1.47 (1.38); dorsal plate 734 (688); shoulder plate L 216 (222), W 75 (73), L/W ratio 2.9 (3.0); frontal plate L 166 (153), W 63 (56), L/W ratio 2.6 (2.7); shoulder/frontal plate L ratio 1.3 (1.45); gnathosomal bay L 184 (169), Cx-I total L 328 (293), Cx-I medial L 142 (125), Cx-II+III medial L 44 (56); ratio Cx-I L/Cx-II+III medial L 7.5 (5.2); Cx-I medial L/Cx-II+III medial L 3.2 (2.2); genital field L/W 164 (159)/159 (163), L/W ratio 1.03 (0.98); distance genital field-excretory pore 247 (230), genital field-caudal idiosoma margin 316 (292); capitulum ventral L 363 (364); palp total L 384 (391), L: P-1, 35 (34); P-2, 132 (139); P-3, 71 (71); P-4, 123 (122); P-5, 23 (25); %L: P-1, 9.1 (8.7); P-2, 34.4 (35.6); P-3 18.5,

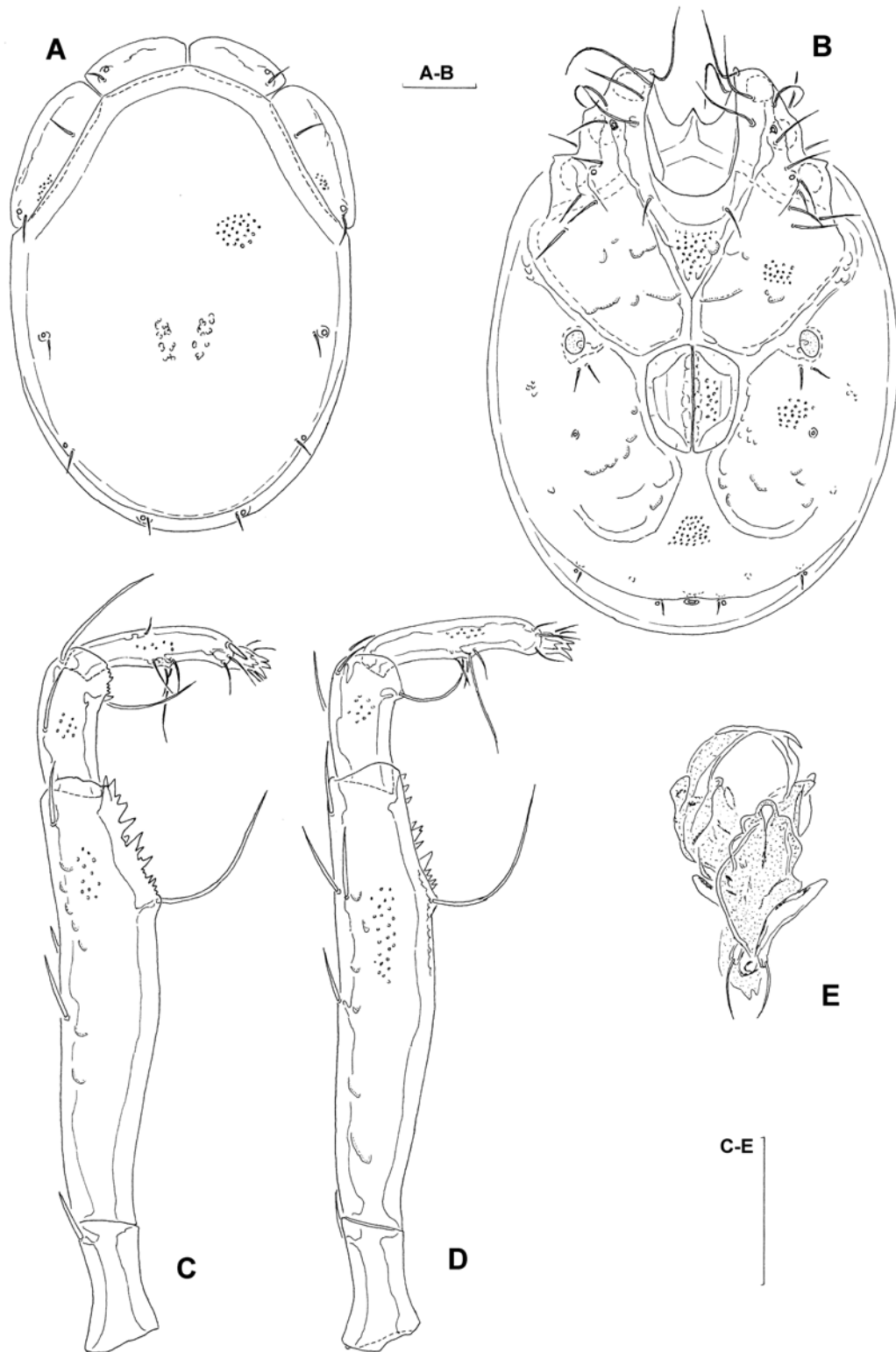


FIGURE 6: *Torrenticola omanensis* n. sp., male: (A) – dorsal shield; (B) – idiosoma, ventral view; (C) – palp, medial view; (D) – palp, lateral view; (E) – ejaculatory complex. Scale bars = 100 μ m.

(18.2); P-4, 32.0 (31.2); P-5, 6.0 (6.4); L P-2/P-4 ratio 1.07 (1.14); shape and setation as in male.

Remarks — Due to a ventral projection on P-2 which curves distally, one (of 4) P-4 ventral setae long, capitulum with a long rostrum, similarly shaped ejaculatory complex and Cx-IV posteriorly extended well beyond genital field in both sexes, *Torrenticola arabica* n. sp., closely resembles *T. semisuta* (Halík, 1930), a species widespread from the Indian Himalayas to Malaysia (Wiles, 1997b; Pešić *et al.*, 2007; Pešić and Smit, 2009). *Torrenticola semisuta* (for an analysis of diagnostic characters of this species see Pešić and Smit, 2009) can be distinguished from *T. arabica* n. sp., in the following features: Cxgl-4 located sub-apically (apically in *T. arabica* n. sp.), male genital field more elongated (L/W 1.23-1.25; 1.05-1.13 in *T. arabica* n. sp.), the excretory pore and Vgl-2 slightly shifted from the line of primary sclerotization in both sexes, and the shortened male postgenital area (18.8-22% of the total idiosoma L; in *T. arabica* n. sp. 28-29%).

Etymology — The species is named for its occurrence in Arabian Peninsula.

Distribution — Oman.

***Torrenticola (Megapalpis) omanensis* n. sp.**

(Figures 6A-E, 7A-B)

Type series — Holotype: male, stream Hatta Pools, Oman, 24°41.165 N 56°09.556 E, alt. 421 m, 15-xi-2008. Paratype: (1/0/0), same data as holotype.

Diagnosis — Males (female unknown). Cx-IV extended strongly posterior to genital field; P-2 long (L ratio P-2/P-4 2.5) and with strong ventral denticles distally to slightly pronounced ventral projection, P-3 with serrulate margin distally from small pointed ventral projection; capitulum with a very long rostrum; cheliceral claw relatively short (basal segment/claw ratio 12.0).

Description

Male — Idiosoma (ventral view: Fig. 6B) L 763, W 563; dorsal shield (Fig. 6A) L 675, W 466, L/W ratio 1.45; dorsal plate 634; shoulder plate L 209, W 67, L/W ratio 3.1; frontal plate L 138, W 53, L/W

ratio 2.6; shoulder/frontal plate L ratio 1.5; gnathosomal bay L 166, Cx-I total L 300, Cx-I medial L 133, Cx-II+III medial 67; ratio Cx-I L/Cx-II+III medial L 4.5; Cx-I medial L/Cx-II+III medial L 2.0; Cx-IV extended posterior to genital field; Cxgl-4 anterior to Cxgl-2 and located adjacent to Leg-II socket; genital field L/W 144/125, L/W ratio 1.15, ejaculatory complex (Fig. 6E) L 162; distance genital field-excretory pore 199, genital field-caudal idiosoma margin 241; capitulum (Fig. 7A) with long rostrum, ventral L 628; chelicera (Fig. 7B) L 663, basal segment L 634, claw L 53, basal segment/claw ratio L 12.0; palp (Figs. 6C-D) total L 620, L and %L (in parentheses): P-1, 88 (14.2); P-2, 297 (47.9); P-3, 91 (14.7); P-4, 119 (19.2); P-5, 25 (4.0); P-2/P-4 ratio 2.5; P-2 with well developed ventral denticles distally to slightly pronounced ventral projection bearing long seta, P-3 with serrulate margin distally from small pointed ventral projection bearing seta.

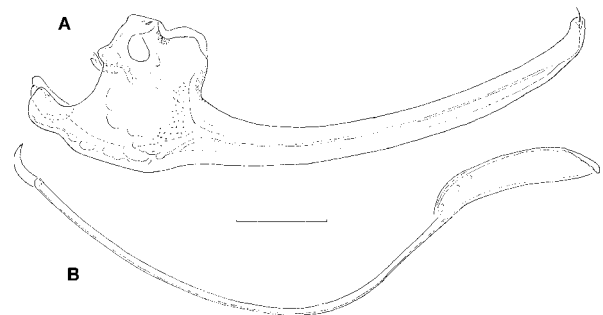


FIGURE 7: *Torrenticola omanensis* n. sp., male: (A) – capitulum; (B) – chelicera. Scale bar = 100 μ m.

Female — unknown.

Remarks. The new species can be distinguished from other members of the subgenus *Megapalpis* Halbert, 1944 in the combination of the characteristic shape of the palp (P-2 very long and with ventral denticles distally to slightly pronounced ventral projection, P-3 with serrulate margin distally from small pointed ventral projection), capitulum with very long rostrum, a relatively short cheliceral claw (basal segment/claw ratio 12.0) and Cx-IV greatly extended posterior to genital field.

Etymology — The species is named for its occurrence in Oman.

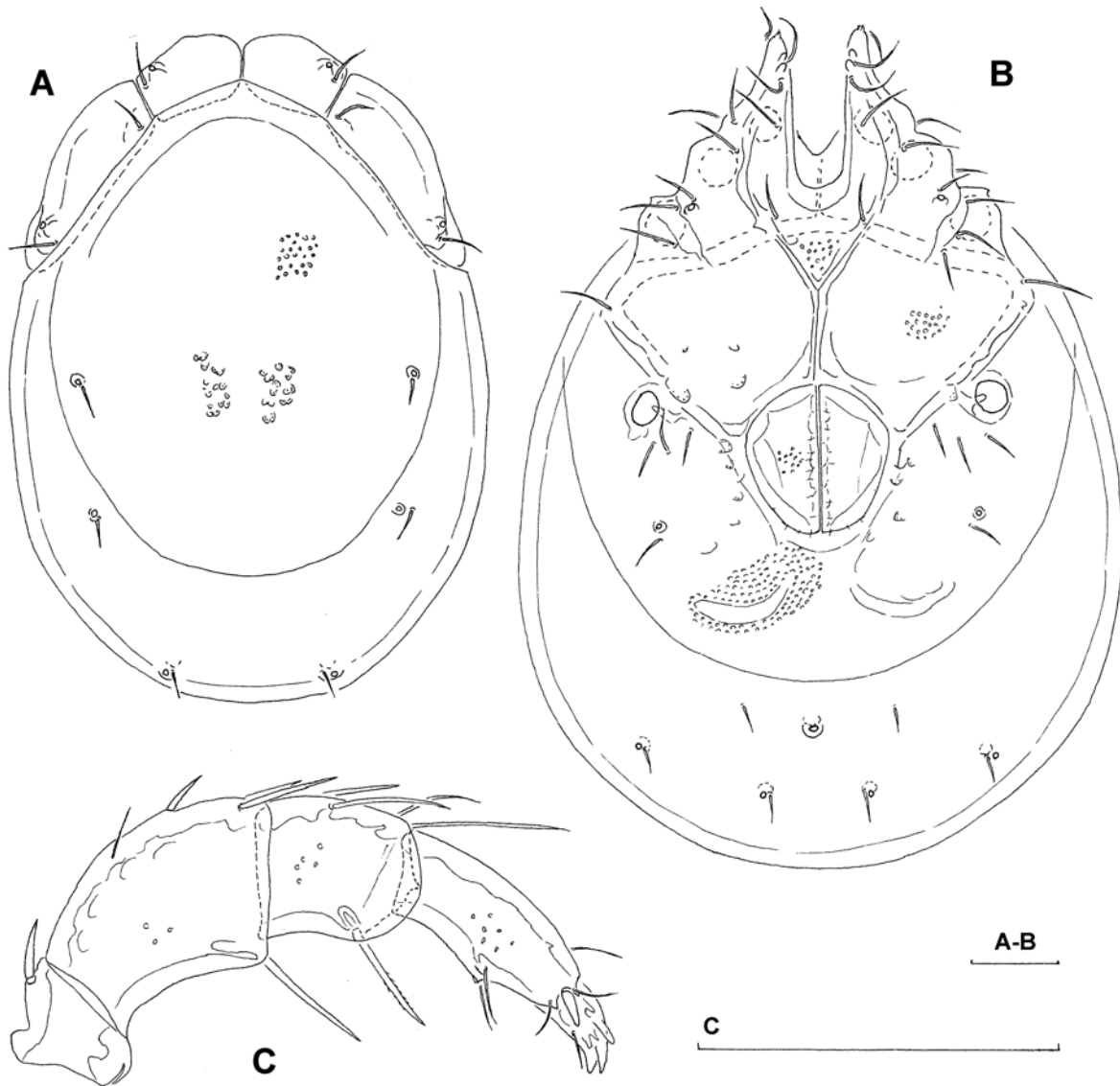


FIGURE 8: *Monatractides oman* Gerecke, 2004, female: (A) – dorsal shield; (B) – idiosoma, ventral view; (C) – palp, medial view. Scale bars = 100 μ m.

Distribution — Oman.

Genus *Monatractides* K. Viets, 1926

***Monatractides oman* Gerecke, 2004**

(Figures 8A-C)

Material examined — 4/5/1 (1/1/0 mounted), stream Wadi Bani Auf, 23°16.699 N 57°27.690 E,

alt. 571 m, 13-xi-2008; 0/2/0 (0/1/0 mounted), Ayn Tabraq, captured spring, 17°06.034 N 54°19.599 E, 7-xi-2008; 3/1/0 (1/0/0 mounted), Ayn Tabraq, stream, 17°06.034 N 54°19.599 E, 7-xi-2008; 9/9/1, Ayn Hamran, captured spring, 17°05.842 N 54°16.886 E, 3-xi-2008; 0/1/0, stream Hatta Pools, 24°41.165 N 56°09.556 E, alt. 421 m, 15-xi-2008; 2/0/0, Wadi Hanna, 17°04.236 N 54°36.489 E, 4-xi-2008; 1 juvenile/0/1, small cascading stream Wadi

Ghul, 23°09.702 N 57°12.151 E, 12-xi-2008; 6/3/0 (1/0/0 mounted), Ayn Razat, 17°07.807 N 54°14.231 E, 3-xi-2008; 3/8/0, stream Wadi Ghul, 23°10.297 N 57°11.996 E, alt. 805 m, 12-xi-2008.

Description

Male — (from Wadi Bani Auf, in parentheses specimen from Ayn Tabraq). Idiosoma L 881 (963), W 650 (788); dorsal shield L 734 (794), W 500 (619), L/W ratio 1.47 (1.28); dorsal plate L 675 (719); shoulder plate L 239 (255), W 84 (94), L/W ratio 2.9 (2.7); frontal plate L 126 (119), W 81 (94) ratio 1.6 (1.3); shoulder/frontal plate L ratio 1.9 (2.1); capitular bay L 164 (189); total L 267 (319), Cx-I medial L 103 (131), Cx-II+III medial 128 (125); ratio Cx-I L/Cx-II+III medial L 2.1 (2.6); Cx-I medial L/Cx-II+III medial L 0.8 (1.05); genital field L/W 144 (164)/120 (141), L/W ratio 1.2 (1.16); ejaculatory complex L 173 (219); distance genital field-excretory pore 188 (205), genital field-caudal idiosoma margin 328 (344); capitulum ventral L 205 (218); chelicera L 235 (270), basal segment L/H (222/33), claw L (49), basal segment/claw ratio (4.5), L/H ratio (6.7); palp: total L 227 (250), L: P-1, 26 (29); P-2, 72 (83); P-3, 43 (47); P-4, 58 (63); P-5, 28 (28); %L: P-1, 11.5 (11.6); P-2, 31.7 (33.2); P-3, 18.9 (18.8); P-4, 25.6 (25.2); P-5, 12.3 (11.2); P-2/P-4 ratio 1.24 (1.3).

Female — (from Wadi Bani Auf). Idiosoma (ventral view: Fig. 8B) L 938, W 681; dorsal shield (Fig. 8A) L 744, W 538, L/W ratio 1.38; dorsal plate L 694; shoulder plate L 237, W 75, L/W ratio 3.16; frontal plate L 126, W 78, L/W ratio 1.6; shoulder/frontal plate L ratio 1.9; capitular bay L 175; Cx-I total L 280, Cx-I medial L 104, Cx-II+III medial 100; ratio Cx-I L/Cx-II+III medial L 2.8; Cx-I medial L/Cx-II+III medial L 1.04; genital field L/W 165/159, L/W ratio 1.04; egg maximum diameter L 206; distance genital field-excretory pore 213, genital field-caudal idiosoma margin 366; capitulum ventral L 209; chelicera L 243; palp (Fig. 8C): total L 237, L and %L (in parentheses): P-1, 29 (12.2); P-2, 75 (31.6); P-3, 43 (18.1); P-4, 62 (26.2); P-5, 28 (11.8); P-2/P-4 ratio 1.2.

Remarks — The original description (Gerecke, 2004) of this species was based on a single male and two juvenile female specimens from Rustaq, Wadi Al Fara, Oman (23°28'06" N 57°27'00" E). Gerecke (2004) stated that the juvenile females are proba-

bly atypical in idiosoma shape and therefore not included in the type series. As no illustration has been given of the mature female we give additional figures here based on the specimen from Wadi Bani Auf.

Distribution — Oman.

Family Limnesiidae Thor, 1900

Subfamily Limnesiinae Thor, 1900

Genus *Limnesia* Koch, 1836

Limnesia (Limnesia) kochi n. sp.

(Figures 9A-E)

Type material — Holotype male, unnamed stream crossing road to Al Fay, near Ray, Oman, 24°38.703 N 56°06.760 E, alt. 562 m, 15-xi-2008. Paratypes: 2/1/3, same data as holotype; 2/0/0, stream Hatta Pools, Oman, alt. 421 m, 24°41.165 N 56°09.556 E, 15-xi-2008.

Diagnosis — Ventral setal tubercle of P-2 located far anteriorly, Glandula Limnesiae located near anterior margin of Cx-III; genital field of male indented anteriorly.

Description

Male — Idiosoma soft, L 494 (462-616), W 401 (365-494). Integument lineated. Dorsum with a small posterior platelet, 50 in diameter. Cx-I with short apodemes, not fused medially. Cx-III medially with a narrow, secondary sclerotization. Glandulae Limnesiae located close to anterior margin of Cx-III. Genital field with three pairs of acetabula and 10 small setae, indented anteriorly and posteriorly, L 106, W 98, gonopore L 62, W 26. Palp (Fig. 9B): total L 286; L: P-1, 18; P-2, 66; P-3, 66; P-4, 104; P-5, 32; P-2 with a ventral setal tubercle located far anteriorly, peg-like seta on tubercle small; P-4 with three small setal tubercles, two larger and one smaller. L of I-Leg-4-6: 76, 86, 72. L of IV-Leg-4-6: 124, 136, 152; IV-Leg-6 with a large distal seta and two smaller setae (Fig. 9D). IV-Leg-5 with four swimming setae, IV-Leg-4 with three swimming setae, III-Leg-4 and III-Leg-5 with three and two swimming setae respectively.

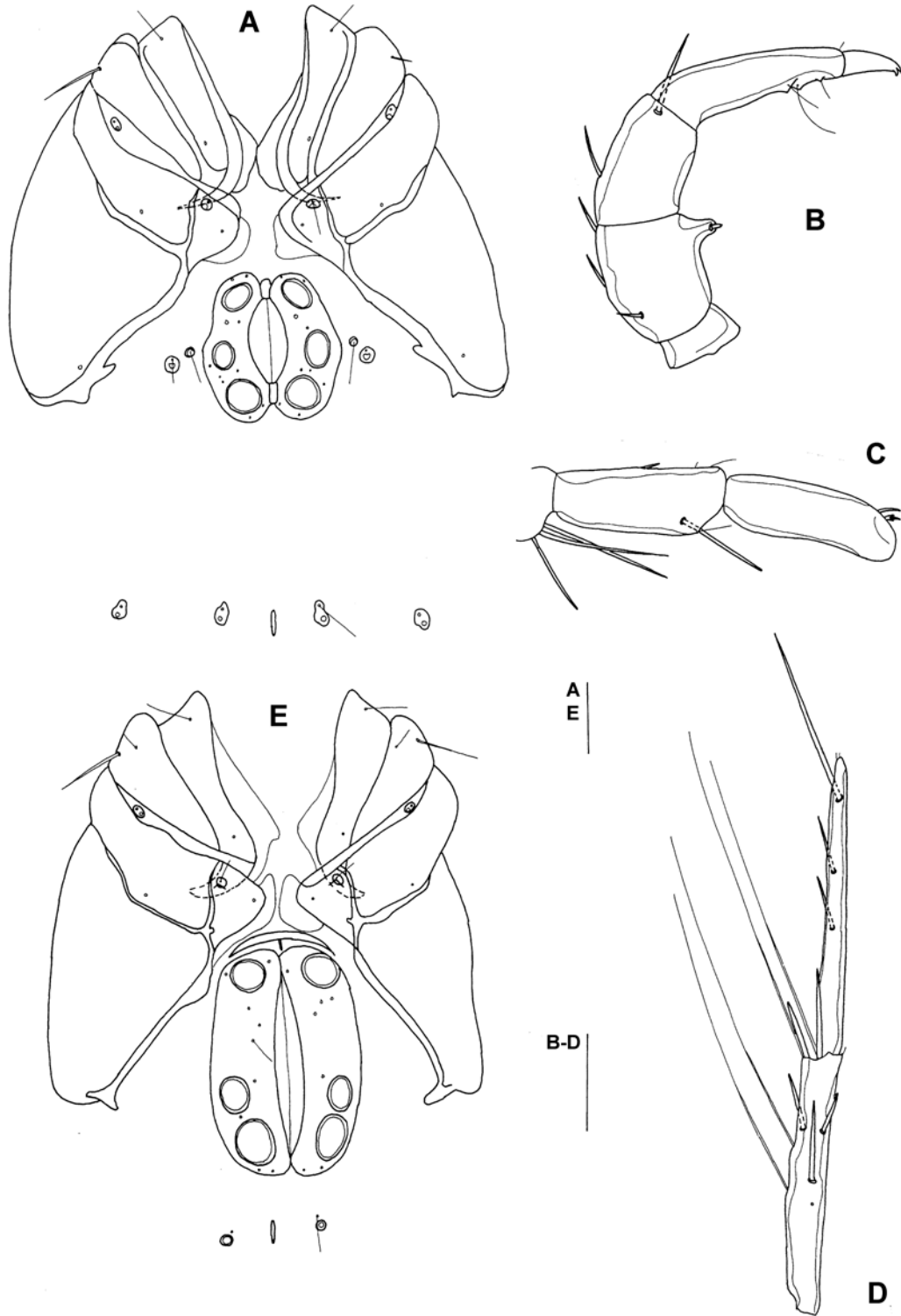


FIGURE 9: *Limnesia kochii* n. sp. (A-D: male, E: female): (A, E) – coxal and genital field; (B) – palp; (C) – I-Leg-5-6; (D) – IV-Leg-5-6. Scale bars = 50 μ m (A-D).

Female — Idiosoma soft, L 429, W 324. Female juvenile, no platelet visible. Cx-I with short apodemes, not fused medially. Cx-III medially with a narrow, secondary sclerotization. Glandulae *Limnesiae* located close to anterior margin of Cx-III. Genital field L 158, W 110, with three pairs of acetabula and 8-9 small setae, first pair of acetabula distanced from two posterior pairs. Pregenital sclerite slender. Palp: total L 324; L: P-1, 18; P-2, 90; P-3, 74; P-4, 110; P-5, 32; palp as in male. L of I-Leg-4-6: 78, 88, 66 (93 to tip). L of IV-Leg-4-6: 120, 140, 130. IV-Leg-5 with five swimming setae, IV-Leg-4 with two swimming setae, III-Leg-4 and III-Leg-5 with three and two swimming setae respectively.

Etymology — Named after the German acarologist C.L. Koch (1778-1857), who erected the genus *Limnesia*.

Remarks — The location of the Glandulae *Limnesiae* is unusual within the genus. Its normal location is medial of the suture line of the Cx-III and Cx-IV. Moreover, the location of the setal tubercle of P-2 is also unusual, as it is normally located in the middle of the segment.

***Limnesia (Tetralimnesia) pinguipalpis* Cook, 1967**

(Figures 10A-C, E-G, 11A-C)

Material examined — 1/0/0, Wadi Hanna, 17°03.236 N 54°36.489 E, 4-xi-2008; 1/0/0, Wadi upstream of Al Mughsayl, 16°54.810 N 53°44.860 E, 5-xi-2008; 4/10/0, pools upstream of Khwar Al Mughsayl, 16°53.366 N 53°46.796 E, 5-xi-2008; 13/17/3 (0/1/1 mounted), Ayn Sahalnoot, 17°08.787 N 54°10.701 E, 6-xi-2008; 0/1/0, stream Wadi Bani Auf, 23°16.699 N 57°27.690 E, 13-xi-2008; 5/11/0, pools Wadi Bani Auf, 23°13.464 N 57°25.083 E, 13-xi-2008; 0/5/0, "*Limnesia [Tetralimnesia] sp.*" (ZMAN), Halban, open well, diesel pump, UTM 0605256/2607586 (23°34'31" N 58°01'53"E), 28-iii-1996, leg. Stock, Vermeulen & Al Nofli.

Other material — 1/0/0 (1/0/0 mounted), India, Uttaranchal, Garhwal Himalayas, Dhundeshwargad stream, a tributary of Alaknanda River, viii-2006 leg. Kumar.

Remarks — The specimens from Oman fit the description of *Limnesia pinguipalpis*, described from

the Oriental part of India (Maharashtra, Karnataka, Tamil Nadu - Cook, 1967). The only non-Oriental record from India comes from Garhwal Himalayas (see above). *Limnesia pinguipalpis* is similar to *L. monodi* but differs in the more extensive secondary sclerotization associated with the posterior end of the male genital field (Fig. 10B), and the ventral margin of P-2 more or less straight (Fig. 10C, 10E) vs. convexly protruding in *L. monodi* (see Fig. 10D).

Distribution — India; Oman ("*Limnesia [Tetralimnesia] sp.*" Gerecke, 2004).

Subfamily Protolimnesiinae Viets, 1940

Genus *Protolimnesia* Lundblad, 1927

***Protolimnesia (s.s.) inexpectata* n. sp.**

(Figures 12A-F, 13A-D)

Type material — Holotype male (idiosoma in fluid, gnathosoma and palps, first and fourth leg mounted), Wadi upstream of Al Mughsayl, 16°54.810 N 53°44.860 E, 5-xi-2008.

Diagnosis — Integument with with papillae arranged in a reticulated pattern; IV-Leg-6 with a heavy terminal seta, P-4 with six small setal tubercles, claws of legs with a few small teeth.

Description

Male — Idiosoma soft, L 881, W 669, integument with papillae arranged in a reticulated pattern. Dorsum with posterior muscle attachment platelet (Fig. 12A), 125 maximum in diameter. The two pair of eyes lenses lying below the integument. Coxae in four groups, Cx-I separated medially, Cx-I and Cx-II anteriorly with three setae. Glandulae *Limnesiae* located closer to anterior margin of Cx-III than to posterior margin. Medial margin of Cx-III+IV indented (Fig. 12B). Genital field (Fig. 12F) with three pairs of acetabula located on genital flaps, L 183, W 166. Genital field with a small pre- and post-genital sclerite. Excretory pore smooth. Palp: total L 446; L: P-1, 37; P-2, 129; P-3, 88; P-4, 146; P-5, 46; P-2 with a anteroventral seta on a small bulge, P-4 with six small setae on a small setal tubercle and one larger seta (Fig. 12C-D); capitulum (Fig. 11E) L 166; chelicera L 280. L of I-Leg-4-2-6 (Fig. 13A): 90, 107, 116,

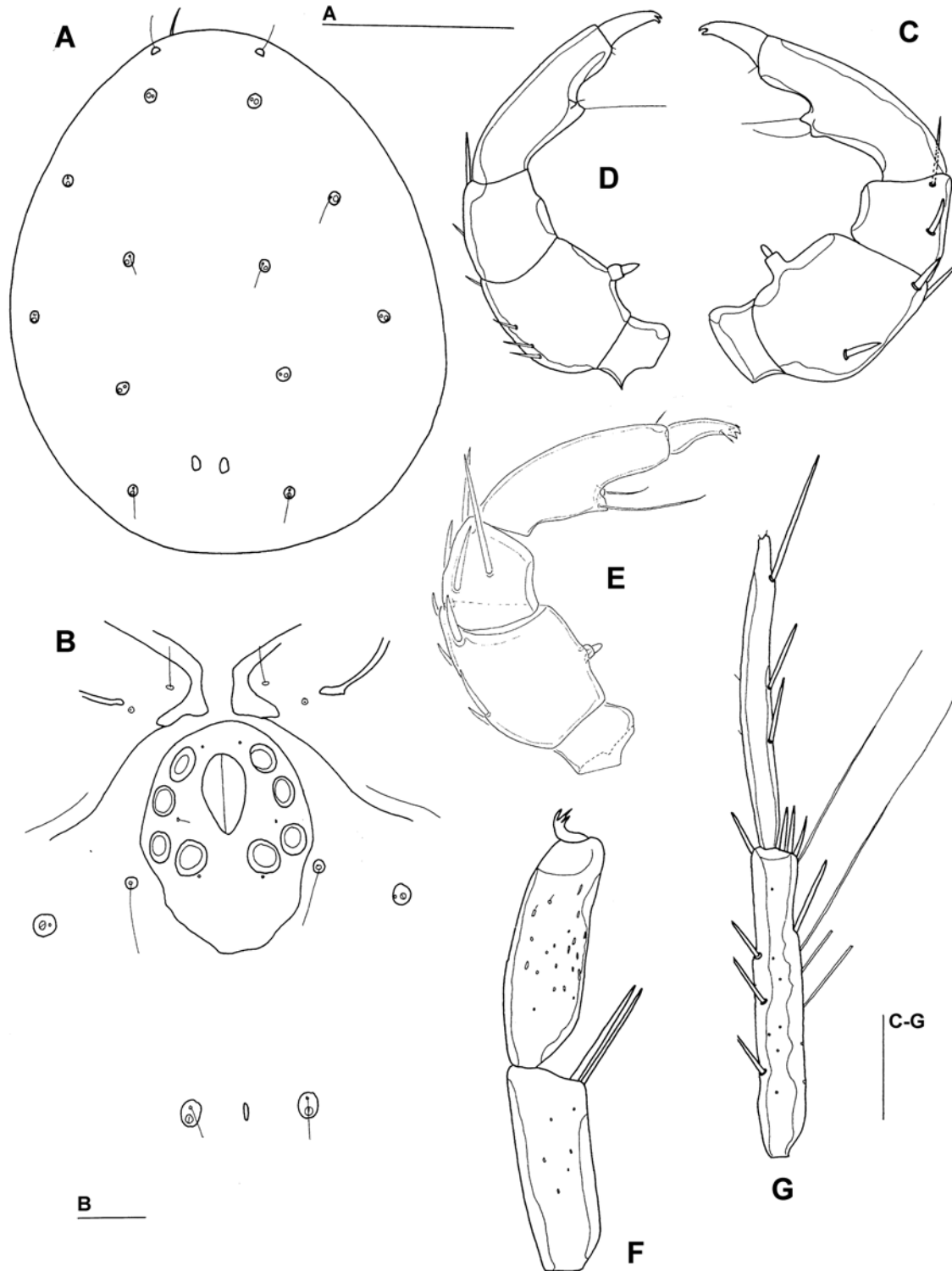


FIGURE 10: *Limnesia pinguipalpis* Cook, male (A-C, F-G: specimens from Oman, E: specimen from India): (A) – idiosoma, dorsal view; (B) – genital field; (C, E) – palp; (F) – I-Leg-5-6; (G) – IV-Leg-5-6. D. *Limnesia monodi*, Zaire, lake Kivu, male: (D) – palp. Scale bars = 200 μ m (A), 50 μ m (B-G).

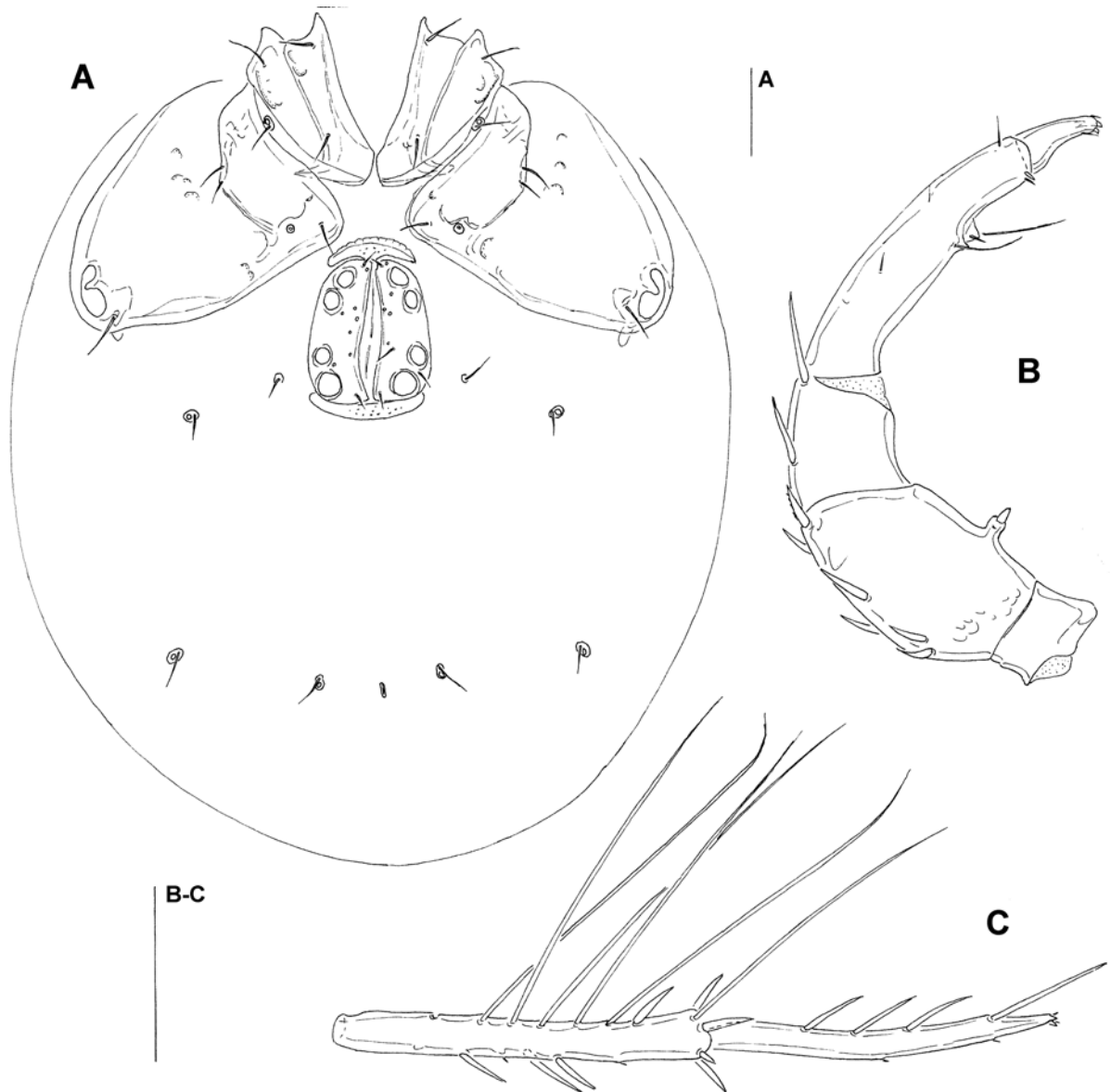


FIGURE 11: *Limnesia pinguipalpis* Cook, female: (A) – idiosoma, dorsal view; (B) – palp; (C) – IV-Leg-5-6. Scale bars = 200 μm (A), 50 μm (B-C).

143, 163; I-Leg-4 and -5 with two anteroventral setae. L of IV-Leg-2-6 (Fig. 13C): 127, 152, 209, 242, 234; IV-Leg-6 with claws and a heavy terminal setae (Fig. 13D). Claws of fourth leg simple, without clawlet and teeth, claws of other legs with a clawlet and a few small teeth (Fig. 13B).

Female — Unknown.

Etymology — Named for its unexpected finding.

Discussion — The water mite subfamily Protolimnesiinae appeared to have thus far a New World distribution (Goldschmidt 2004), and its occurrence in Oman is therefore unexpected. The similarity of the new species with previously described species of the genus is striking. This applies especially to the shape of the palp and venter. The new species from Oman is close to some South

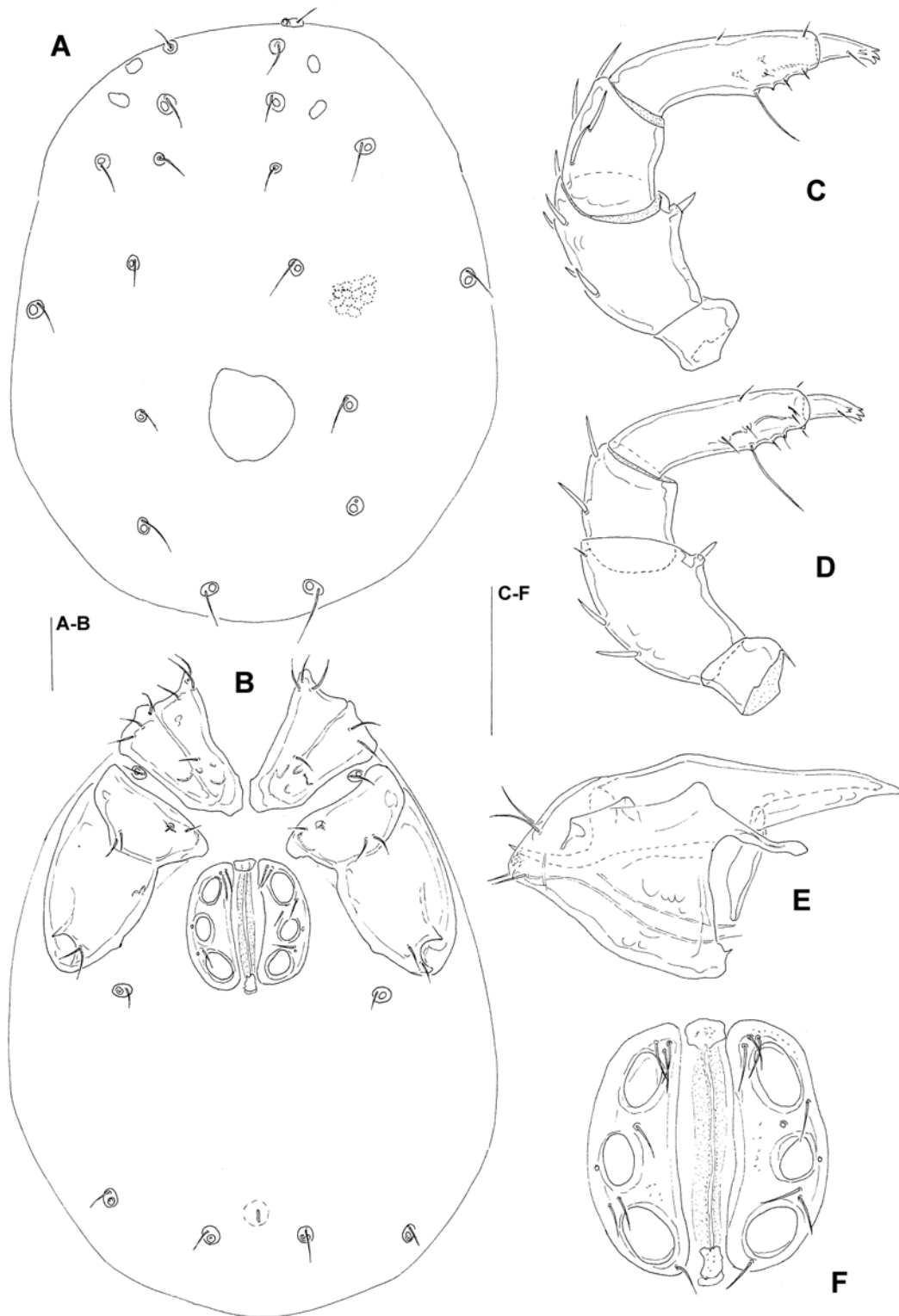


FIGURE 12: *Protolimnesia inexpectata* n. sp., male: (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C-D) – palp; (E) – capitulum and chelicera; (F) – genital field. Scale bars = 100 μ m.

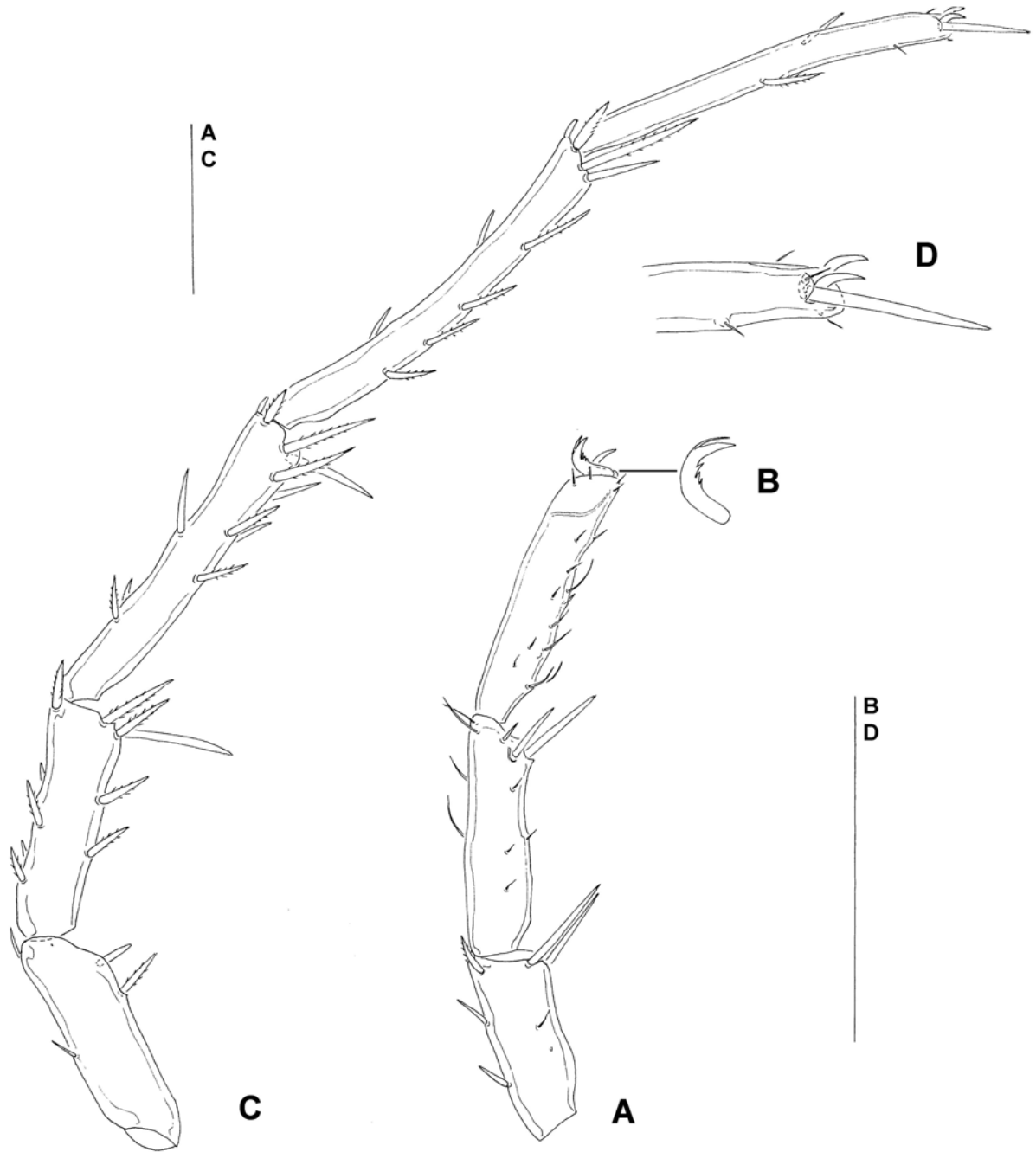


FIGURE 13: *Protolimnesia inexpectata* n. sp., male: (A) – I-Leg-4-6; (B) – claws of I-Leg, (C) – IV-Leg-2-6; (D) – anterior part of IV-Leg-6; (E) – anterior part of IV-Leg-6. Scale bars = 100 μ m.

and Central American species of the subgenus *Protolimnesia* with genital field reaching or surpassing the caudal margin of Cx-IV, rounded and medium-sized acetabula, and distance between the acetabula approximately equal in males, e.g. *P. oculata* Goldschmidt, *P. setifera* Cook and *P. pampaensis* Smit (see Goldschmidt, 2004), but differs in the indented third+ fourth coxae, the stronger terminal seta of IV-Leg-6 and reticulate pattern of the integument.

Family Hygrobatidae Koch, 1842

Genus *Atractides* Koch, 1837

Atractides (Atractides) arabicus n. sp.

(Figures 14A-D, 15A-E)

Type material — Holotype: male, stream Wadi Ghul, Oman, 23°10.297'N 57°11.996' E, alt. 805 m, 12-xi-2008. Paratypes: 12/5/0 (0/1/0 mounted), same data as holotype; 4/1/0 (0/1/0 mounted), small cascading stream Wadi Ghul, Oman, 23°09.702'N 57°12.151' E, alt. 805 m, 12-xi-2008; 1/0/0 (1/0/0 mounted), stream Hatta Pools, Oman, 24°41.165'N 56°09.556' E, alt. 421 m, 15-xi-2008.

Diagnosis — Genital field in the male with anterior margin concavely indented and Ac-3 distanced from anterior two acetabula on each side, I-Leg-5 with S-1 and -2 far distanced (> 40 in both sexes), S-1 curved, with blunt tip, S-2 with strongly developed dorsal projection.

Description

General features — Dorsal integument: striated; muscle attachment plates smooth. Coxal field: mediocaudal margin of Cx-I+II with a large, slightly indented area between the laterally directed apodemes of Cx-II. Genital field: Ac in a weakly curved line. Palp: weak sexual dimorphism, P-2 ventral margin slightly convex, P-3 straight, P-4 sword seta near distal hair. I-Leg: I-Leg-5 with S-1 and -2 strongly heteromorphic and distanced, ventral seta close to insertion of S-1, curved, with blunt tip, S-2 with strongly developed dorsal projection, bluntly pointed, I-Leg-6 long and slender, only slightly narrowed from the base to the tip.

Male — (holotype, in parentheses measurements of specimen from stream Hatta Pools). Idiosoma L/W 553 (566)/366 (381). Coxal field (Fig. 14B): L 303 (316), Cx-III W 319 (325), Cx-I+II mL 71 (72), Cx-I+2 IL 169 (178). Palp (Fig. 14D): palp total L 302 (317), dL: P-1, 29 (30); P-2, 66 (71); P-3, 71 (77); P-4, 102 (105); P-5, 34 (34); %L: P-1, 9.6 (9.5); P-2, 21.9 (23.1); P-3, 23.5 (24.3); P-4, 33.8 (33.1); P-5, 11.3 (10.7); L P-2/P-4 0.65 (0.68); P-4 ventral hairs long. Genital field (Fig. 14C): anterior margin concavely indented, lateral margin weakly indented between Ac-2 and Ac-3, L/W 89 (95)/94 (102), Ac-3 rather small, distanced from anterior two acetabula on each side, L Ac-1-3: 26 (26), 28 (28), 22 (25).

I-Leg (Fig. 14A): I-Leg-5 dL 212 (218), vL 114 (124), dL/vL 1.86 (1.76), HB 50 (50), dL/HB 4.2 (4.4), S-1 L 100 (103), L/W 8.6 (8.9), S-2 L 63 (67), L/W 5.4 (7.3), distance of sword setae at I-Leg-5 43 (43), L S-1/2 1.59 (1.54); I-Leg-6 L 159 (157), HB 15 (15), L/HB 10.3 (10.2); L I-Leg-5/6 1.34 (1.39).

Female — (from stream Wadi Ghul, in parentheses measurement of specimen from small cascading stream Wadi Ghul). Idiosoma L/W 944 (700)/663 (519). Coxal field (Fig. 15D): L 400 (378), Cx-III W 448 (389), Cx-I+II mL 78 (79), Cx-I+II IL 213 (204); apodemes Cx-II directed caudolaterally. Palp (Fig. 15C): palp total L 386 (373), dL: P-1, 34 (34); P-2, 85 (82); P-3, 102 (99); P-4, 128 (122); P-5, 37 (36); %L: P-1, 8.8 (9.1); P-2, 22.0 (22.0); P-3, 26.4 (26.5); P-4, 33.2 (32.7); P-5, 9.6 (9.7); L P-2/P-4 0.66 (0.67). Genital field (Fig. 15E): L 163 (135), genital plates slightly indented between Ac, genital plate L 109 (100), L Ac-1-3: 35 (33), 34 (32), 35 (34).

I-Leg (Fig. 15A-B): I-Leg-5 dL 295 (294), vL 151 (154), dL/vL 2.0 (1.9), HB 76 (79), dL/HB 3.9 (3.7), S-1 L 119 (119), L/W 8.6 (7.4), S-2 L 74 (75), L/W 5.3 (5.4), distance of sword setae at I-Leg-5 77 (69), L S-1/2 1.6 (1.6); I-Leg-6 L 209 (199), HB 18 (17), L/HB 11.8 (11.7); L I-Leg-5/6 1.4 (1.48).

Remarks — *Atractides arabicus* n. sp. is unique within the genus due to the particular shape of S-2 (with a well developed dent on the outer margin of seta). In addition, the male is characterized by the anterior margin of genital field concavely indented, with rather small Ac-3 distanced from the two anterior acetabula on each side.

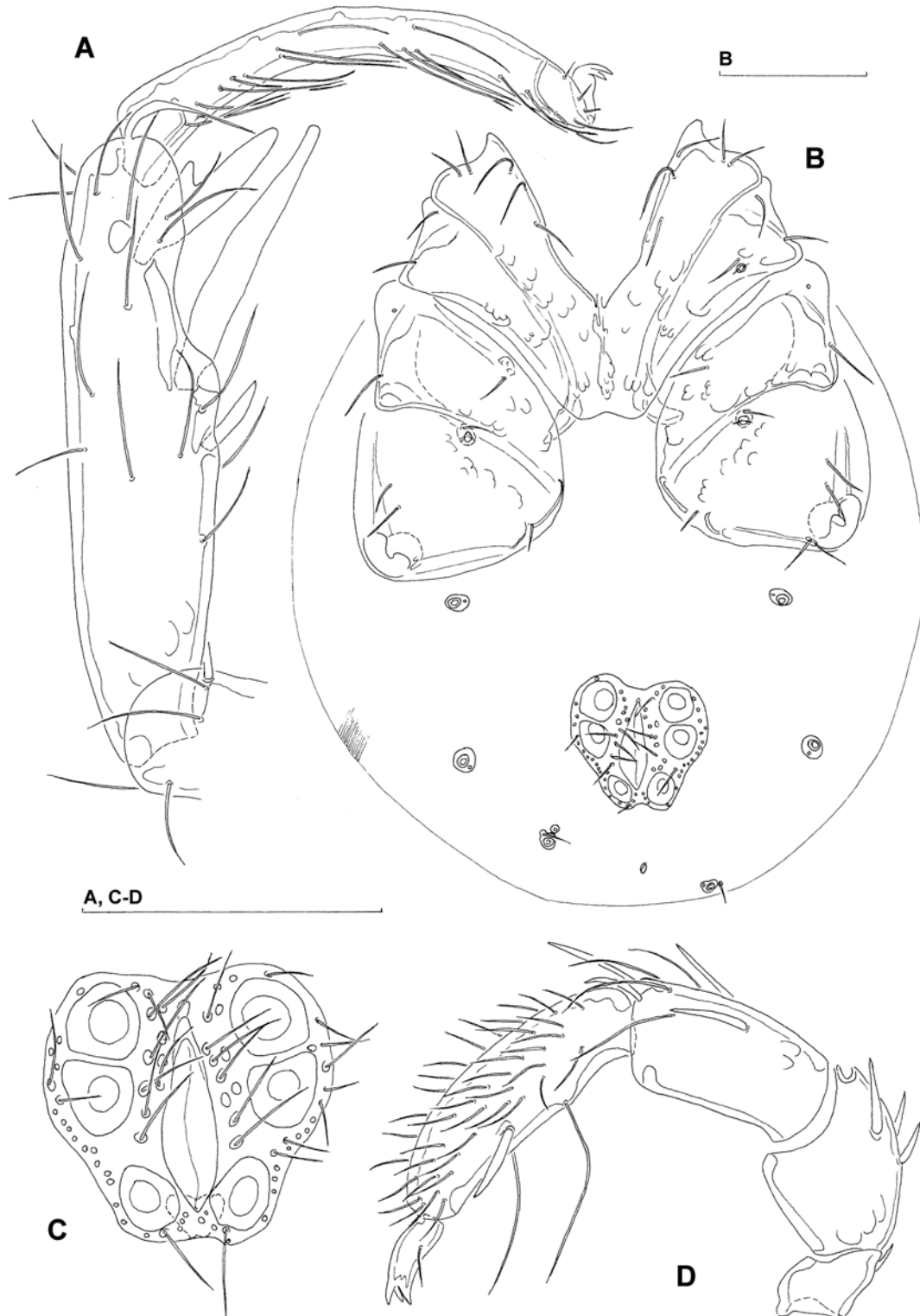


FIGURE 14: *Atractides arabicus* n. sp., male (A-B, D holotype, C paratype): (A) – I-Leg-5 and -6; (B) – idiosoma, ventral view; (C) – genital field; (D) – palp, medial view. Scale bars = 100 μ m.

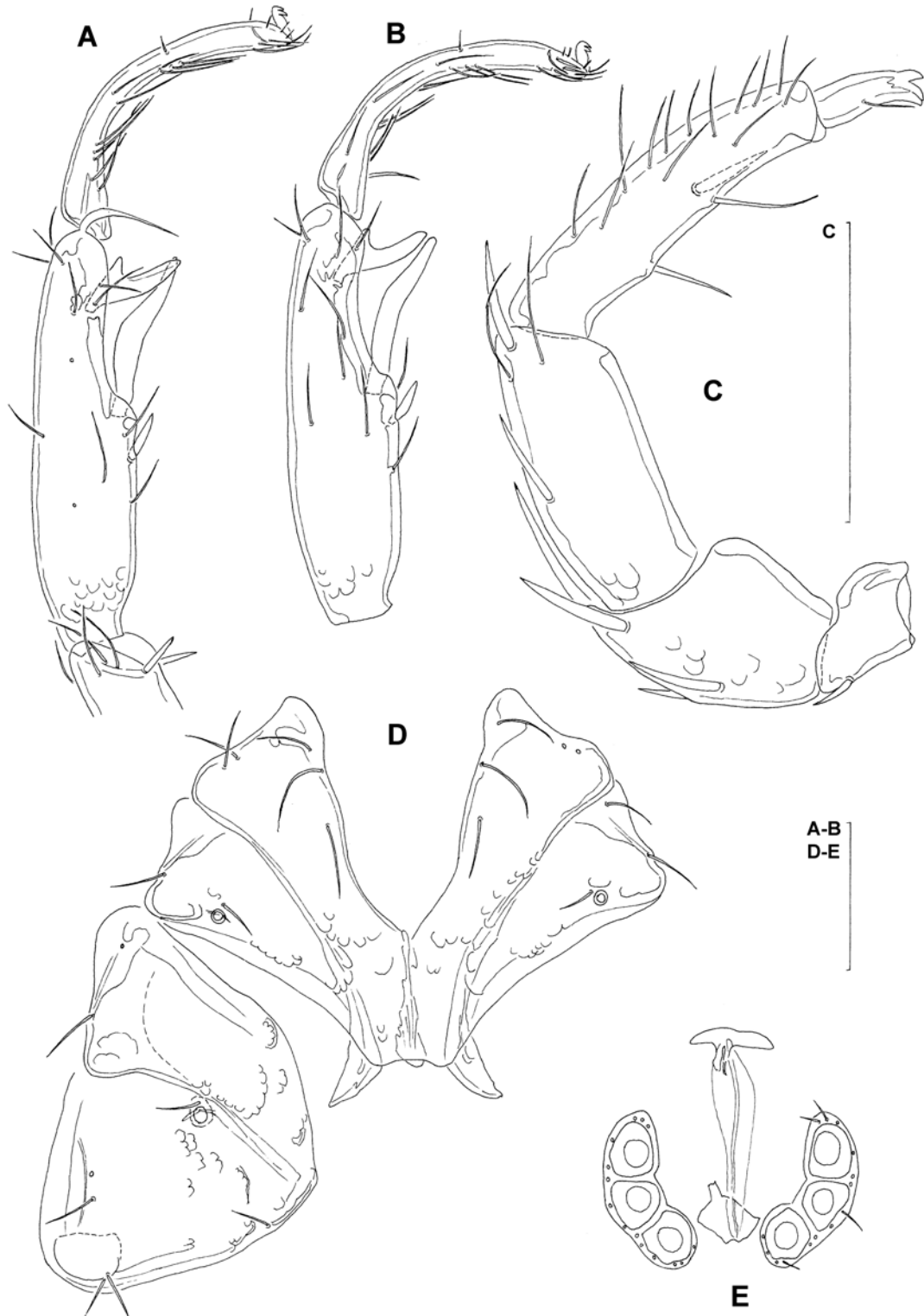


FIGURE 15: *Atractides arabicus* n. sp., female: (A-B) – I-Leg- 5 and - 6; (C) – palp, lateral view; (D) – coxal field; (E) – genital field. Scale bars = 100 μ m.

Etymology — The species is named for its occurrence on the Arabian peninsula.

Distribution — Oman.

Atractides (Tympanomegapus) omanensis n. sp.

(Figures 16A-E, 17, 18, 19A-D)

Type material — Holotype: male, unnamed stream crossing road to Al Fay, near Ray, Oman, 24°38.703 N 56°06.760 E, alt. 562 m, 15-xi-2008. Paratypes: 0/1/0 (0/1/0 mounted), same data as holotype; 1/0/0 (1/0/0 mounted), stream Wadi Ghul, Oman, 23°10.297 N 57°11.996 E, alt. 805 m, 12-xi-2008.

Diagnosis — Muscle attachments sclerotized, cheliceral claw relatively strong, P-3 ventral margins with one seta, little enlarged, sword seta on P-4 enlarged, not hair-like, on the level of distoventral hair, P-5 without cheeks; excretory pore sclerotized; leg claws with dorsal clawlet.

Description

General features — Dorsal integument: striated; muscle attachment plates: sexual dimorphism in the dorsal area. Genital field: Ac in triangular arrangement. Palp: weak sexual dimorphism, P-3 ventral margin with one seta, P-4 sword seta enlarged, inserted on level of the distoventral hair, P-5 without cheeks. I-Leg: setae S-1 and -2 inserted on the same level, distally truncate; leg claws with dorsal clawlet.

Male — (holotype, in parentheses measurement of specimen from stream Wadi Ghul). Idiosoma L/W (422)/(288). Dorsal shield (Fig. 16A) L/W 381 (372)/247 (247) including postoc and Dgl-3-6; ventral shield (Fig. 16B) L/W 394 (400)/344 (331), including coxae, Vgl-3 and -4, genital field, excretory pore and Vgl-1 and -2; coxal field: completely fused: Cx-III W 255. Palp (Fig. 16C): total L 189 (198), dL: P-1, 24 (25); P-2, 40 (45); P-3, 42 (42); P-4, 60 (63); P-5, 23 (23); %L: P-1, 12.7 (12.6); P-2, 21.2 (22.7); P-3, 22.2 (21.2); P-4, 31.8 (31.8); P-5, 12.2 (11.6); L P-2/P-4 0.67 (0.71); chelicera total L 142 (151), basal segment L 97 (108), claw L 49 (49), L ratio basal segment/claw 2.0 (2.2); capitulum ventral L 82 (83). Genital field: fused with the ventral shield, but suture lines still

evident, W 89 (95), L Ac-1-3: 15 (13), 12 (12-14), 17 (15).

I-Leg (Fig. 16D-E): I-Leg-5 dL 79 (82), vL 62 (63), dL/vL 1.3 (1.3), HB 27 (28), dL/HB 2.9 (2.9), S-1 L 32 (36), L/W 10.3 (7.8), S-2 L 32 (36), L/W 10.3 (7.8), distance of sword setae at I-Leg-5 0 (0), L S-1/2 1.0 (1.0); I-Leg-6 L 80 (82), HB 19 (21), L/HB 4.3 (3.8); L I-Leg-5/6 0.98 (1.03).

Female — Idiosoma L/W 694/475; muscle attachment plates (Fig. 17): Postoc and D-1 fused to a longish platelet, Dgl-3-6 separate, D-2-5 sclerotized, D-2 and -5 as roundish platelets, D-3 and -4 as longish platelets, V-1-3 sclerotized. Coxal field (Fig. 18): posterior margin of Cx-I truncated, apodemes of Cx-II forming an acute angle, coxae with borders of secondary sclerite; L 319, Cx-III W 380, Cx-I+II mL 134, Cx-I+II IL 233. Palp (Figs. 19B): palp total L 274, dL and %L (in parentheses): P-1, 32 (11.7); P-2, 62 (22.6); P-3, 63 (23.0); P-4, 82 (29.9); P-5, 35 (12.8); L P-2/P-4 0.76; chelicera (Fig. 19D) total L 292, basal segment L 195, claw L 108, L ratio basal segment/claw 1.8; capitulum (Fig. 19A) ventral L 129. Genital field (Fig. 18): L/W 137/153, pregenital robust, halfmoon-shaped, L 117, genital plate L 75, L Ac-1-3: 24, 24, 27; egg maximum diameter (n=6) 113-118; excretory pore sclerotized; Vgl-1 fused to Vgl-2.

I-Leg (Fig. 19C): I-Leg-5 dL 111, vL 86, dL/vL 1.29, HB 34, dL/HB 3.3, S-1 L 42, L/W 9.1, S-2 L 42, L/W 9.1, distance of sword setae at I-Leg-5 0, L S-1/2 1.0; I-Leg-6 L 106, HB 23, L/HB 4.6; L I-Leg-5/6 1.05.

Remarks — Due to the presence of dorsal shield and the ventral surface covered by an extended shield including coxae, Vgl-3 and -4, excretory pore and genital field in the male, and gnathosoma with elongated rostrum, the new species is similar to *Atractides yukii* Cook, 1967 (India). From the latter it can be distinguished in the following features: gnathosomal rostrum more slender and pointed, P-3 ventral margins with one seta, sword seta on P-4 enlarged, not hair-like, setae S-1 and -2 inserted on the same level and presence of dorsal leg clawlets.

Etymology — The species is named for its occurrence in Oman.

Distribution — Oman.

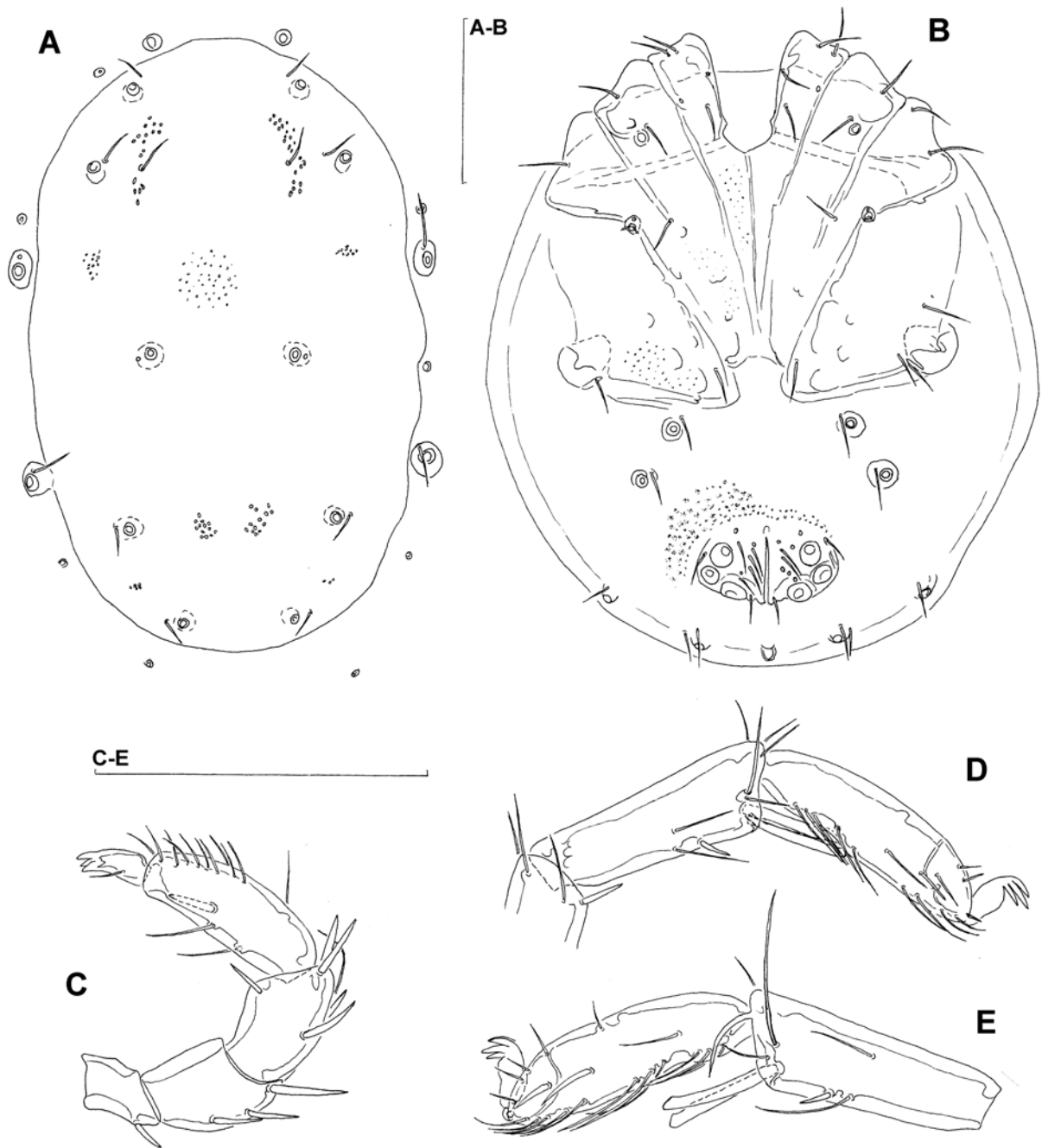


FIGURE 16: *Atractides omanensis* n. sp., male (A-D holotype, E paratype): (A) – dorsal shield; (B) – idiosoma, ventral view; (C) – palp, lateral view; (D-E) – I-Leg- 5 and - 6. Scale bars = 100 μ m.

Hygrobates (Hygrobates) soari K. Viets, 1911

2008.

Material examined — 6/8/2, stream Hatta Pools, 24°41.165N 56°09.556 E, alt. 421 m, 15-xi-

Remarks — A widespread species in Africa, previously reported from Oman by Gerecke (2004).

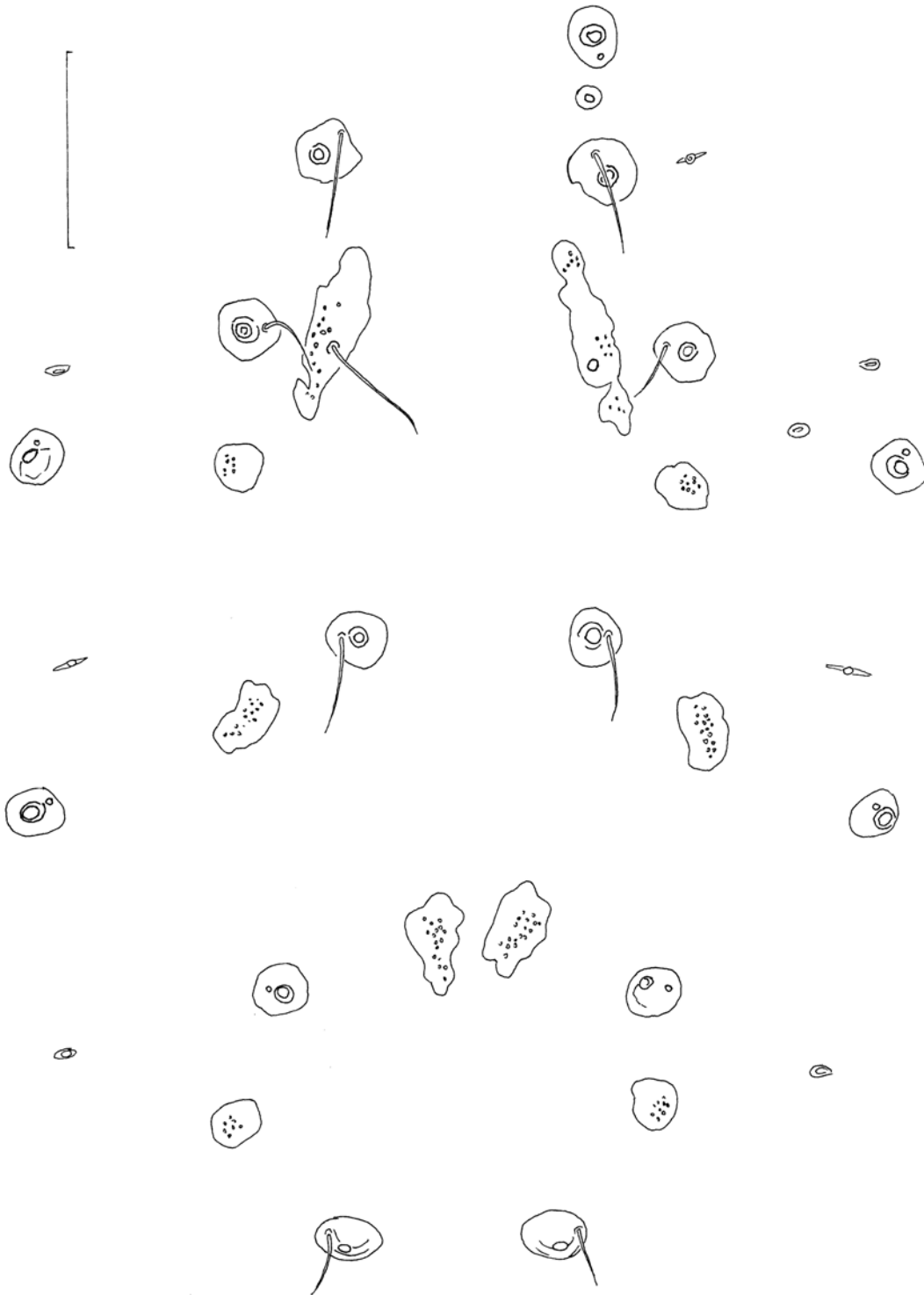


FIGURE 17: *Atractides omanensis* n. sp., female: idiosoma, dorsal view. Scale bar = 100 μ m.

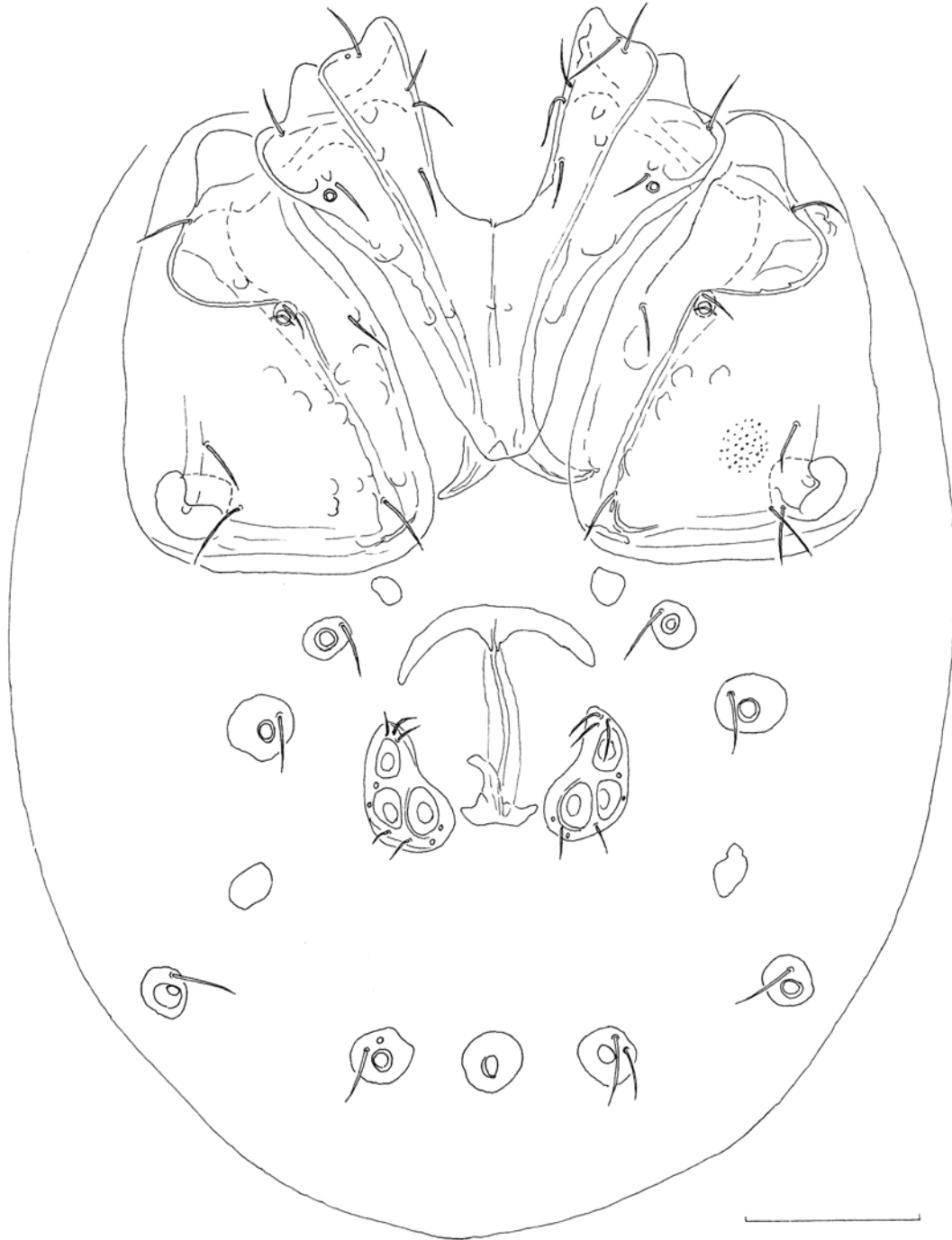


FIGURE 18: *Atractides omanensis* n. sp., female: idiosoma, ventral view. Scale bar = 100 μ m.

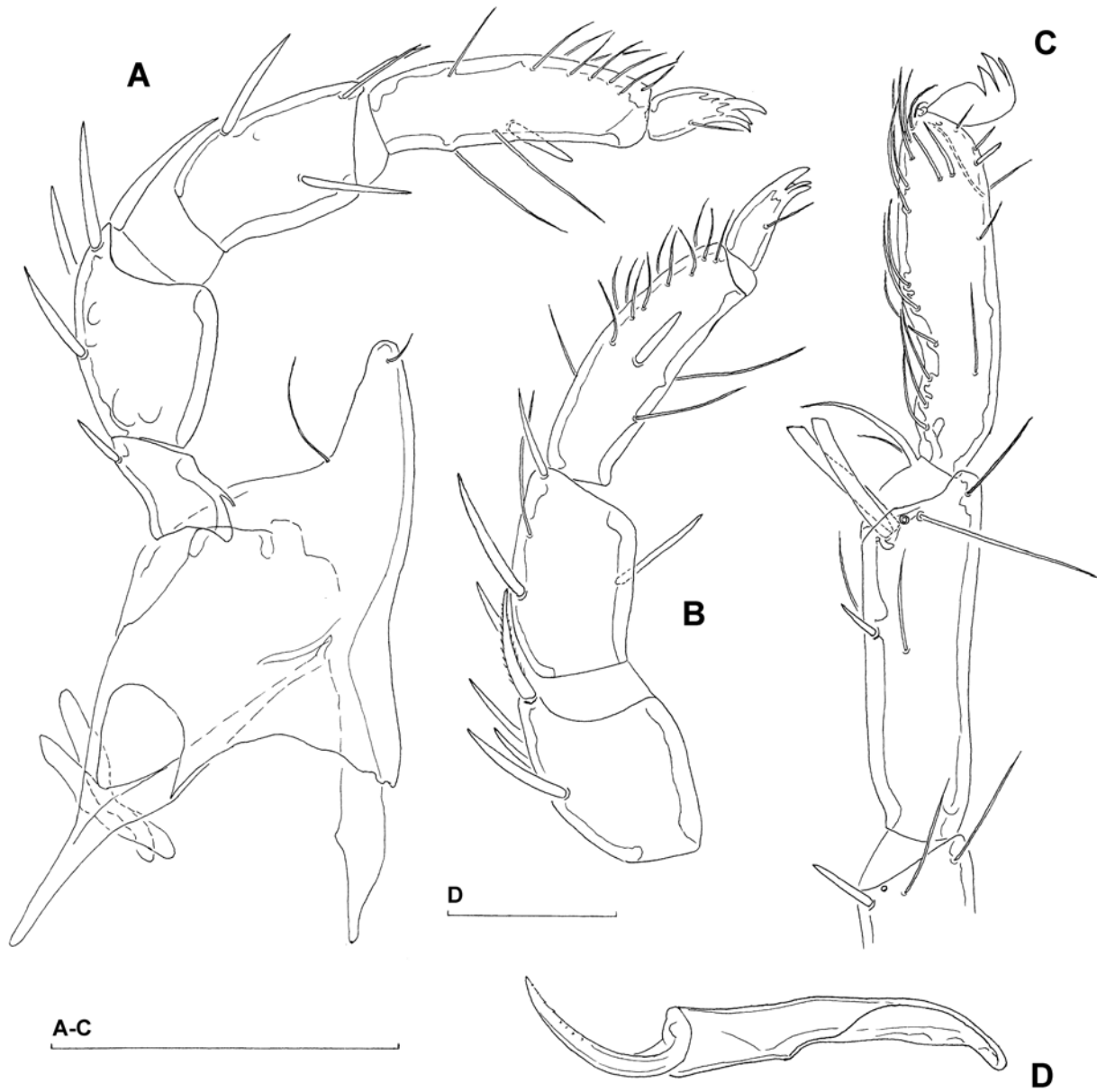


FIGURE 19: *Atractides omanensis* n. sp., female: (A) – capitulum and palp, lateral view; (B) – palp, medial view; (C) – I-Leg- 5 and - 6; (D) – chelicera. Scale bars = 100 μ m.

Family Unionicolidae Oudemans, 1909

Genus *Neumania* Lebert, 1879

***Neumania (Neumania) indentata* n. sp.**

(Figures 20A-E)

Type material — Holotype male, unnamed stream crossing road tyo Al Fay, near Ray, Oman,

24°38.709 N 56°06.760 E, alt. 562 m, 15-xi-2008.

Paratype: 0/1 juvenile/0, same data as holotype; 0/2/0, polls Wadi Bani Auf, 23°13.464 N 57°25.083 E, 13-xi-2008.

Diagnosis — Male with IV-Legs modified in shape and setation.

Description

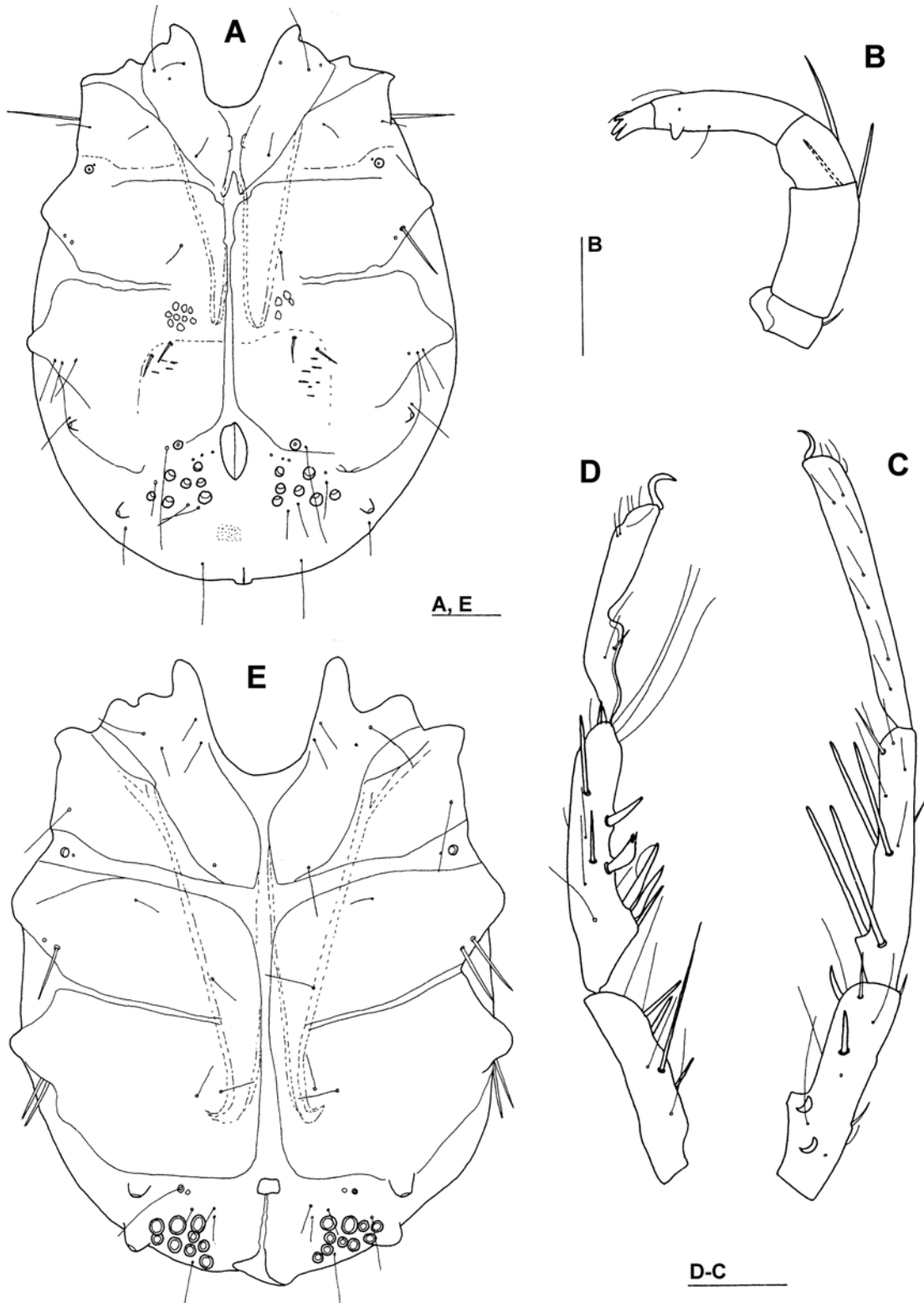


FIGURE 20: *Neumania indentata* n. sp. (A-D: male, E: female): (A, E) – idiosoma, ventral view; (B) – palp; (C) – I-Leg-4-6; (D) – IV-Leg-4-6. Scale bars = 50 μ m (A-E).

Male — Idiosoma dorsally soft, ventrally sclerotized; L ventrally 384, W 294, dorsal idiosoma L 373. Coxal plates reticulated, posteromedial corner of Cx-IV without such reticulation. Apodemes of Cx-I long, reaching onto Cx-IV (Fig. 20A). Cx-II and Cx-IV laterally with stout seta. Gonopore L 40. Genital field with seven pairs of acetabula. Palp (Fig. 20B): total L 203; L: P-1, 17; P-2, 60; P-3, 38; P-4, 64; P-5, 24; P-4 with a short anteroventral tubercle. L of I-Leg-4-6: 114, 130, 130. L of IV-Leg-4-6: 104, 136, 94. Ventral margin of IV-Leg-5 proximally with a triangular projection, in distal 2/3 concave, with five strong, broad setae, one of these very broad, with denticulated tip. Ventral margin of IV-Leg-6 proximally undulating, in the centre indented (Fig. 20D). First and second leg with long fluted or grooved setae. Swimming setae numbers: III-Leg-4 six, III-Leg-5 two, IV-Leg-3 one, IV-Leg-4 two and IV-Leg-5 three. Claws of legs without clawlet and claw blade.

Female — Idiosoma soft, ventrally L 458 (530–608), W 348 (429–551), dorsally L 454 (532–660). Apodemes of Cx-I extending to middle of Cx-IV (Fig. 20E). Posterolateral corners of Cx-III and Cx-IV with a pair of stout setae. Coxal plates reticulated as in male. Genital field with 10 pairs of acetabula. Palp: total L 290; L: P-1, 26; P-2, 92; P-3, 50; P-4, 90; P-5, 32; palp as in male. L of I-Leg-4-6: 170, 168, 142. L of IV-Leg-4-6: 134, 162, 140. First and second legs with long grooved or fluted setae. Swimming setae numbers: III-Leg-3 one, III-Leg-4 five, III-Leg-5 two, IV-Leg-3 two, IV-Leg-4 and -5 three. Claws of legs without clawlet and claw blade.

Etymology — Named for the indented sixth segment of the fourth leg of the male.

Remarks — The shape and chaetotaxy of the fourth leg is not found in any other *Neumania* species. The female is not characteristic, and very likely not separable from related species (e.g. *N. ambigua* Piersig).

Family Aturidae Thor, 1900

Genus *Axonopsis* Piersig, 1893

Axonopsis (Brachypodopsis) omanensis n. sp.

(Figures 21A–G, 28B–C)

Type series — Holotype: male, stream Hatta Pools, Oman, 15.xi.2008, 24°41.165 N 56°09.556 E, alt. 421 m. Paratypes: 2/2/0 (1/1/0 mounted), same data as holotype.

Other material — 0/5/0 (0/1/0 mounted), unnamed stream crossing road to Al Fay, near Ray, Oman, 15.xi.2008, 24°38.703 N 56°06.760 E, alt. 562 m.

Diagnosis — Colour pattern consisting of a light yellowish central area; dorsal shield with an weakly defined ridge on each side extending anterolaterally to the region of the anterior muscle scars; second, third and fourth legs with swimming setae (III-Leg-5 with 4 swimming setae; IV-Leg-5 with 3 swimming setae).

Description

Male — Dorsal and ventral shields anteriorly fused; dorsal shield L 341 (341), W 263 (269); eye pigment well developed; dorsal shield with seven pairs of glandularia (the seventh pair of glandularia inconspicuous, flanking the excretory pore); postocularia well distanced from anterior margin; colour pattern consisting of a light yellowish central area (Fig. 28B); dorsal shield with a weakly defined ridge on each side extending anterolaterally in the region of the anterior muscle scars (shown as broken lines on Fig. 21A); excretory pore located at posterior end of dorsal shield; ventral shield L 322 (326), W (322); capitular bay L 87 (82); two pairs of glandularia lying between the genital field and insertions of the fourth legs, these relatively close together; three pairs of acetabula, arranged in an arc; width between most lateral pair of acetabula 104 (111); gonopore W 13 (15); palp (Fig. 21D–E): palp total L 184 (179), dL: P-1, 27 (28); P-2, 40 (39); P-3, 26 (25); P-4, 66 (64); P-5, 25 (23); %L: P-1, 14.7 (15.6); P-2, 21.7 (21.8); P-3, 14.1 (14.0); P-4, 35.9 (35.8); P-5, 13.6 (12.9); L P-2/P-4 ratio 0.61 (0.61); ventral margin of P-2 convex, distal margin of P-3 with well developed hyaline extensions, P-4 ventrally dilated near insertions of a pair of setae (one hair-like and one relatively heavy seta), and with a more robust spine near distal margin of the segment. Legs: L of I-Leg-3-6: 26 (28), 39 (45), 62 (62), 68 (66); L of IV-Leg-2-6: 65 (66), 44 (51), 68 (65), 79 (78), 69 (74);

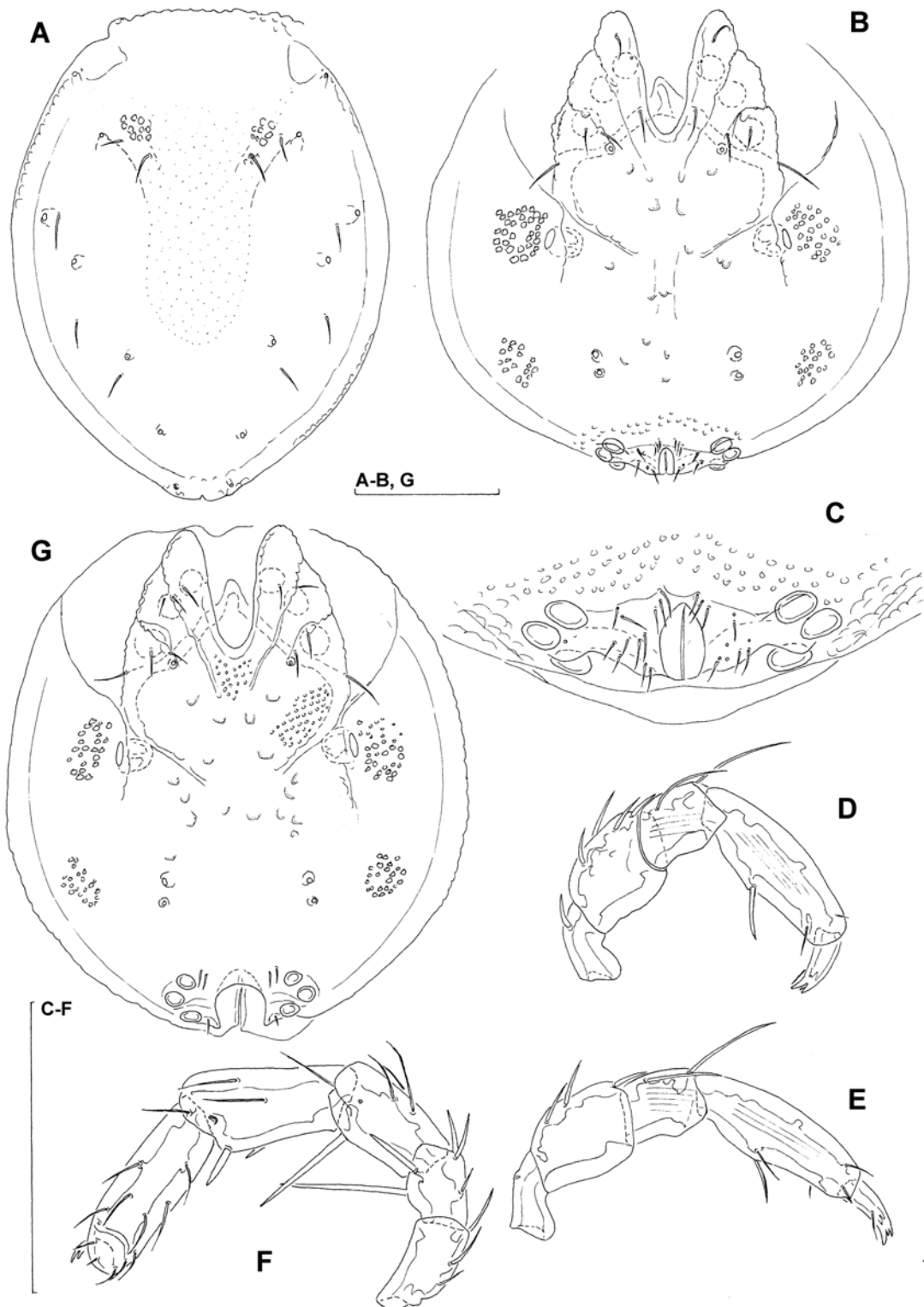


FIGURE 21: *Axonopsis omanensis* n. sp. (A-F male [A-B, D-F holotype, C paratype], G female): (A) – dorsal shield; (B, G) – idiosoma, ventral view; (C) – genital field; (D-E) – palp; (F) – I-Leg. Scale bars = 100 μ m.

swimming setae distributed as follows: II-Leg-5 2, III-Leg-4 2, III-Leg-5 4, IV-Leg-4 2, IV-Leg-5 3.

Female — similar to male, except in shape of the genital field (Fig. 21G); dorsal shield L 366, W 266; ventral shield L 350, W 331; capitular bay L 83; width between most lateral pair of acetabula 109; gonopore W 38; palp: total L 179, dL and %L (in parentheses): P-1, 27 (15.1); P-2, 40 (22.3); P-3, 25 (14.0); P-4, 63 (35.2); P-5, 24 (13.4); L P-2/P-4 ratio 0.64. Legs: L of I-Leg-2-6: 30, 29, 45, 59, 60; L of IV-Leg-4-6: 61, 72, 71; number of swimming setae on the legs as in the male.

Etymology — The species is named for its occurrence in Oman.

Remarks — Due to the presence of two pairs of glandularia lying between the genital field and insertions of the fourth legs and similar shape of the palp, *Axonopsis omanensis* n. sp. resembles *A. guadaramensis* Valdecasas, 1981, a species described originally from Sierra de Guadarrama (Central Spain, Valdecasas 1981), and later recorded from Greece (Pešić and Gerecke, 2003). The new species resembles specimens from Greece also in the presence and distribution of swimming setae on the legs. However in *A. guadaramensis*, according to Valdecasas (1981), all legs are without swimming setae. Most probably, the specimens from Greece therefore represent a species new to science.

The new species from Oman differs from specimens from Greece in its characteristic colour pattern (compare Figs. 28A and B) and the ridge on each side of the dorsal shield in the region of the anterior muscle scars being less prominent (this ridge more prominent in the specimens from Greece). A further difference is found in the well delineated suture line visible between genital field and ventral shield in the male specimen from Greece.

Distribution — Oman.

Axonopsis (Brachypodopsis) arabica n. sp.

(Figures 22A-E, 23A-B, 28D)

Type series — Holotype: female, stream Hatta Pools, Oman, 15.xi.2008, 24°41.165 N 56°09.556 E, alt. 421 m. Paratype: 1/0/0 (1/0/0 mounted),

Oman, unnamed stream crossing road to Al Fay, near Ray, 15.xi.2008, 24°38.703 N 56°06.760 E, alt. 562 m.

Diagnosis — Two pairs of glandularia lying between the genital field and insertions of the fourth legs, the posterior pair closely approaching the genital field in the male; P-4 club-shaped, with a pair of hair like setae on its ventral margin; relatively large gonopore in female; II-leg-5 with two swimming setae, III-Leg-5 with two swimming setae, IV-Leg-5 with three swimming setae.

Description

Female — Dorsal and ventral shields anteriorly fused; dorsal shield L 391, W 303, with seven pairs of glandularia (Fig. 22A); postocularia well distanced from anterior margin; dorsal shield without a colour pattern and without prominent ridges, eye pigment well developed; excretory pore located at posterior end of dorsal shield; ventral shield (Fig. 22B) L 412, W 395; capitular bay L 111; two pairs of glandularia lying between the genital field and insertions of the fourth legs; three pairs of genital acetabula, these arranged in an arc; width between most lateral pair of acetabula 157; gonopore relatively large, W 101; palp (Fig. 22C-D): total L 217, dL and %L (in parentheses): P-1, 34 (15.7); P-2, 50 (23.0); P-3, 29 (13.4); P-4, 79 (36.4); P-5, 25 (11.5); L P-2/P-4 ratio 0.63; ventral margin of P-2 convex, P-4 club-shaped, with a hair like setae on the ventral side. Legs: L of I-Leg-2-6 (Fig. 22E): 36, 32, 55, 65, 62; L of IV-Leg: 52, 68, 59, 69, 85, 79; swimming setae numbers: II-Leg-5 2 (rather short), III-Leg-4 2, III-Leg-5 2, IV-Leg-4 2, IV-Leg-5 3.

Male — similar to female, except in shape of the genital field (Fig. 23A); dorsal shield L 372, W 309; ventral shield L 372, W 378; capitular bay L 111; the posterior pair of glandularia lying between the genital field and insertions of the fourth legs closely approaching the genital field; width between most lateral pair of acetabula 112; gonopore W 23; palp (Fig. 23B): total L 214, dL and %L (in parentheses): P-1, 36 (16.8); P-2, 49 (22.9); P-3, 28 (13.1); P-4, 78 (36.4); P-5, 23 (10.7); L P-2/P-4 ratio 0.63. Legs: L of I-Leg-2-6: 37, 32, 57, 67, 63; L of IV-Leg: 54, 66, 63, 75, 88, 78; number of swimming setae of the legs as in the female.

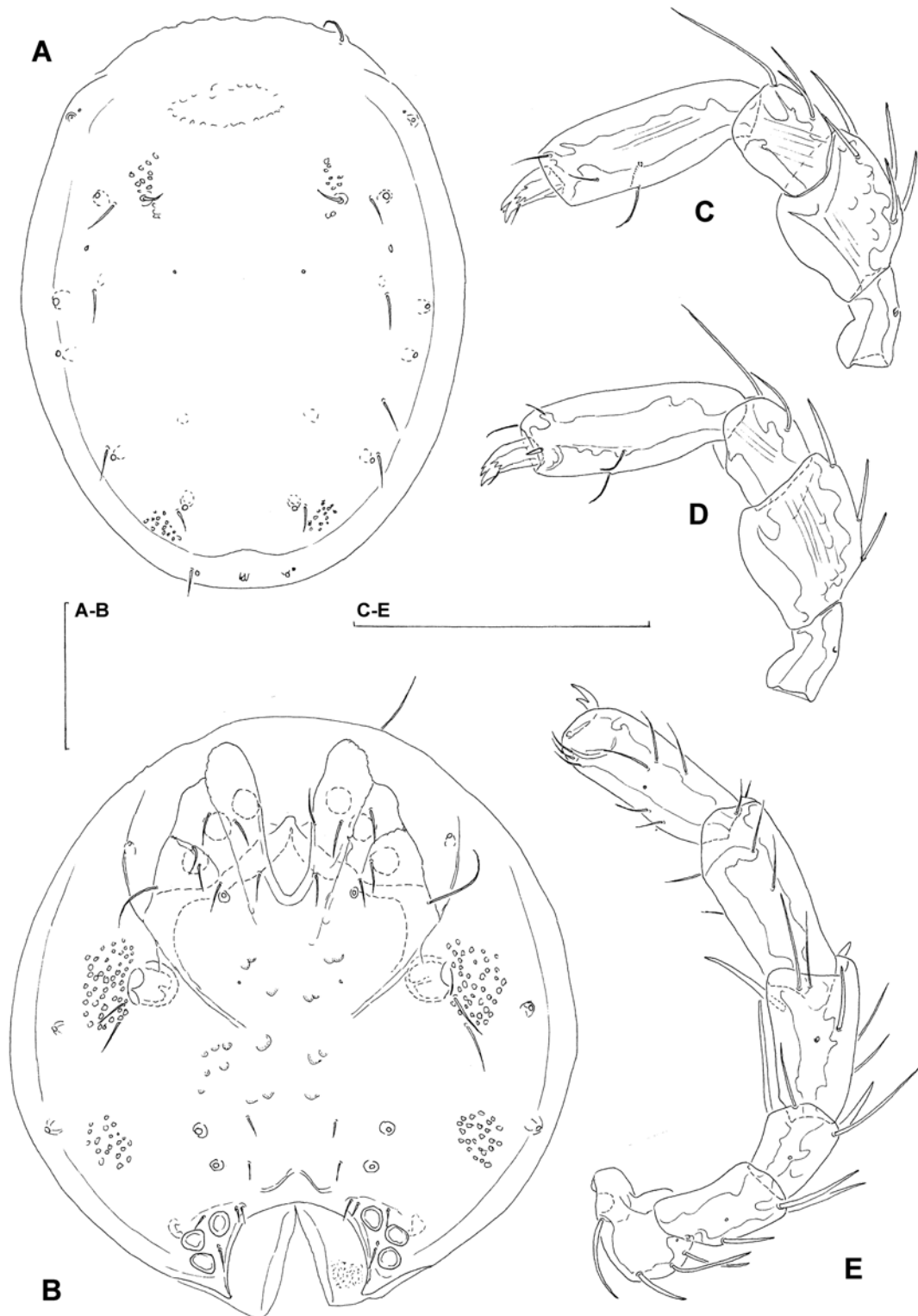


FIGURE 22: *Axonopsis arabica* n. sp., female: (A) – dorsal shield, (B) – idiosoma, ventral view; (C-D) – palp; (E) – I-Leg. Scale bars = 100 μ m.

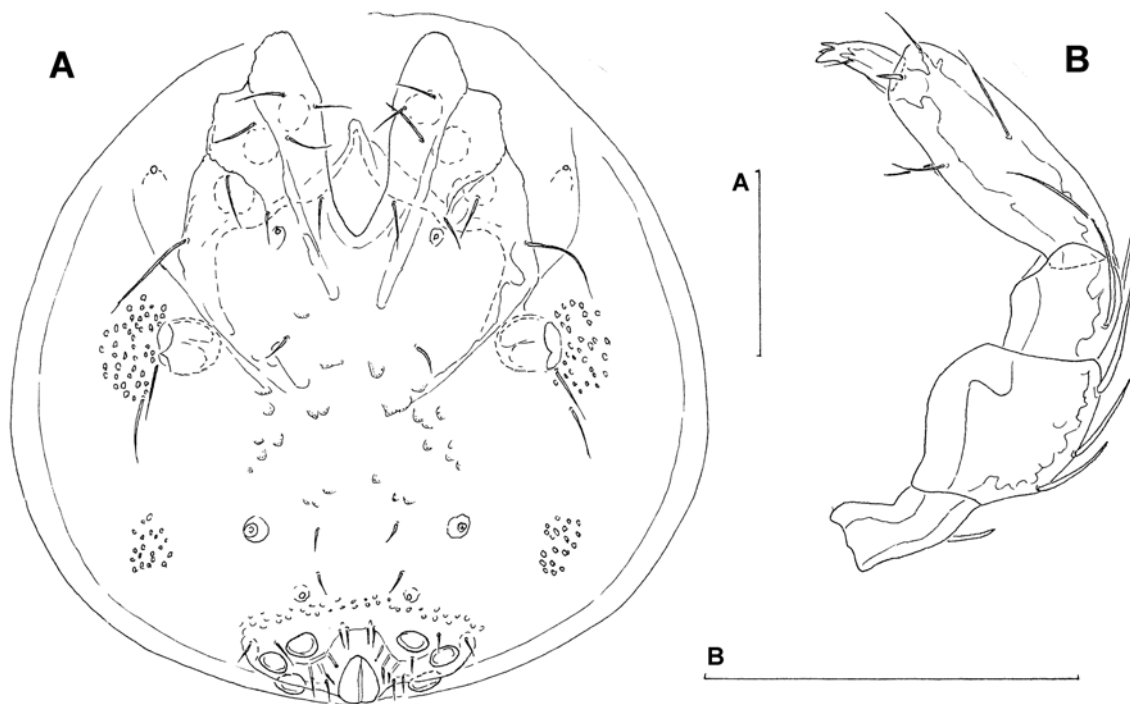


FIGURE 23: *Axonopsis arabica* n. sp., male: (A) – idiosoma, ventral view; (B) – palp. Scale bars = 100 µm.

Remarks — Due to the presence of two pairs of glandularia lying between the genital field and insertions of the fourth legs and swimming setae on the second, third and fourth legs, *Axonopsis arabica* n. sp., resembles *A. omanensis* n. sp. from which it can be distinguished in the following features: P-4 club-shaped, not distally tapering, presence of a hair-like, not heavy seta on the ventral side of P-4, female gonopore relatively large and the posterior pair of glandularia lying between the genital field and insertions of the fourth legs shifted closely to the genital field in the male.

Etymology — The species is named for its occurrence in Arabian Peninsula.

Distribution — Oman.

***Axonopsis (Paraxonopsis) balneatoris* n. sp.**

(Figures 24A-F, 25A-B, 28E)

Type series — Holotype: male, stream Wadi Bani Auf, Oman, 13.xi.2008, 23°16.699 N 57°27.690 E,

alt. 571 m, leg. Smit. Paratype: 1/0/0 (1/0/0 mounted), same data as holotype; 0/1/0 (0/1/0 mounted), stream Wadi Ghul, 12.xi.2008, 23°10.297 N 57°11.996 E, alt. 805 m, leg. Smit.

Diagnosis — Idiosoma slender (L/W about 1.5 in both sexes) with subparallel lateral margins; IV-Leg-6 strongly inflated distally (L/H 2.7-2.8), with concave dorsal margin in its proximal part.

Description

Male — (holotype, in parentheses measurements of paratype). Dorsal and ventral shields anteriorly fused; dorsal shield L 397 (397), W 262 (259); dorsal shield (Fig. 24A) bearing six pairs of glandularia (the sixth pair inconspicuous, flanking the excretory pore); postocularia well distanced from anterior margin; dorsal shield with a central ridge and a lateral ridge on each side lateral to the glandularia; eye pigment well developed; excretory pore located at posterior end of dorsal shield; ventral shield (Fig. 24B) L 441 (445), W 291 (284), L/W ratio 1.52 (1.57) with subparallel lateral margins; ca-

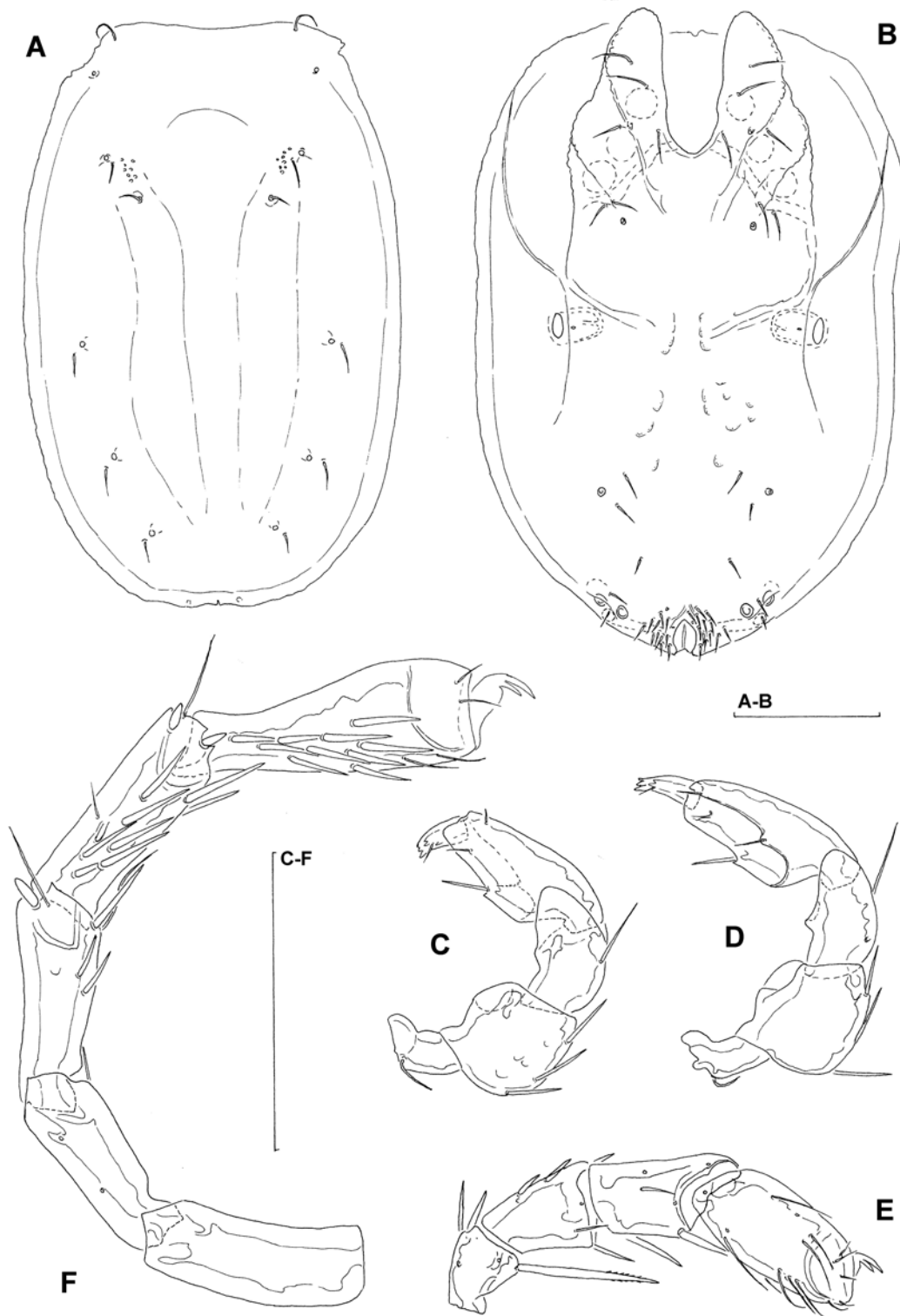


FIGURE 24: *Axonopsis balneatoris* n. sp., male (B-C, E-F holotype, A, D paratype): (A) – dorsal shield, (B) – idiosoma, ventral view; (C-D) – palp; (E) – I-Leg-4-6; (F) – IV-Leg-2-6. Scale bars = 100 μ m.

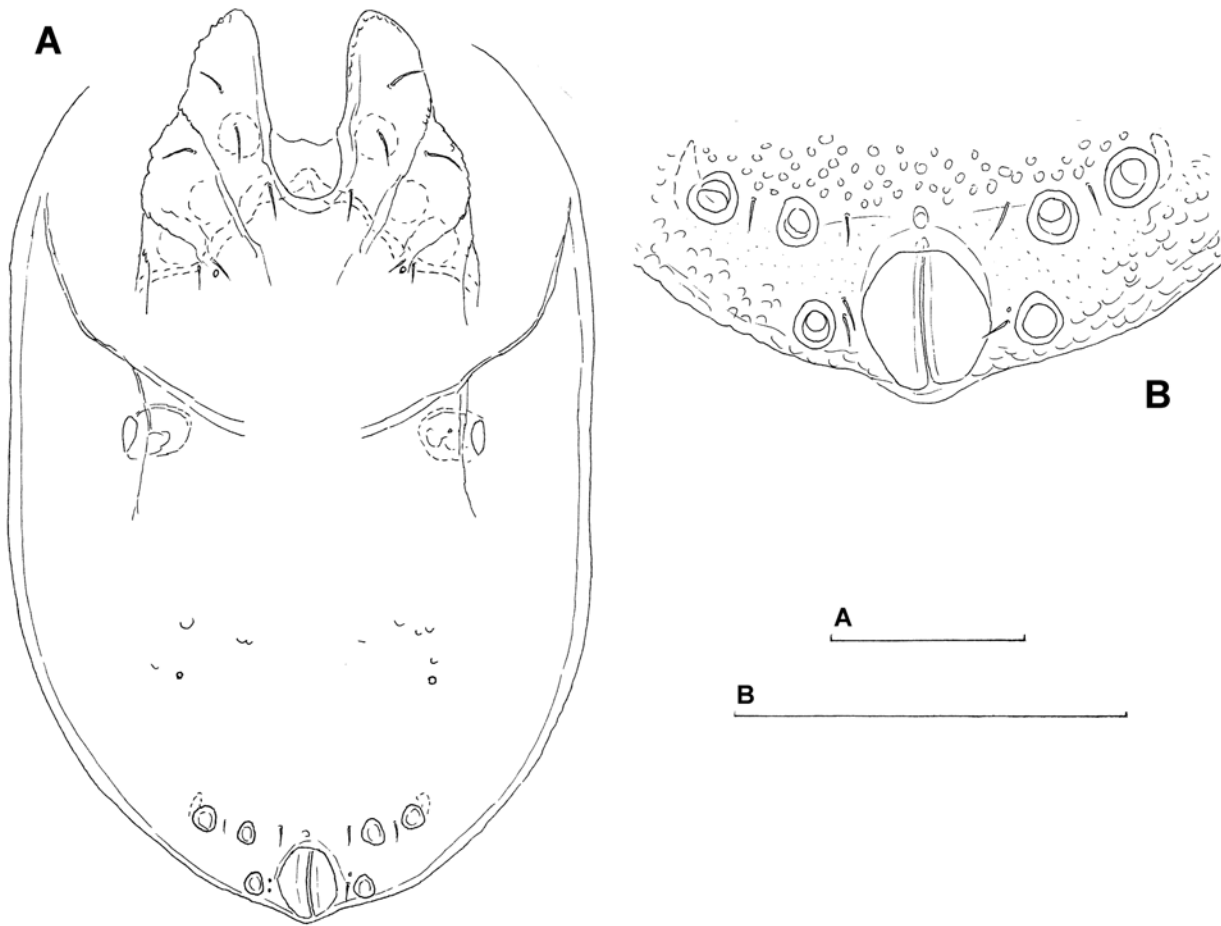


FIGURE 25: *Axonopsis balneatoris* n. sp., female: (A) – idiosoma, ventral view; (B) – genital field. Scale bars = 100 µm.

pitular bay L 96 (100); one pair of glandularia lying between the genital field and insertions of the fourth legs, three pairs of acetabula, arranged in an arc; width between most lateral pair of acetabula 128 (128); gonopore W 15.5 (16); ejaculatory complex L 87 (89); palp (Fig. 24C-D): total L 178 (185), dL: P-1, 25 (25); P-2, 41 (44); P-3, 29 (31); P-4, 62 (63); P-5, 21 (22); %L: P-1, 14.0 (13.5); P-2, 23.0 (23.8); P-3, 16.3 (16.8); P-4, 34.8 (34.1); P-5, 11.8 (11.9); L P-2/P-4 ratio 0.66 (0.7); distal margin of P-3 with well developed hyaline extensions, middle of ventral side of P-4 expanded, bearing a relatively heavy seta which lies on a small pointed tubercle. Legs: L of I-Leg-3-6 (Fig. 24E): 41 (45), 50 (48), 60 (62); I-Leg-6 L/H 2.0 (2.1); L of IV-Leg-2-6 (Fig. 23E): 75 (74), 65 (62), 69 (65), 80 (82), 99 (99); IV-Leg-6 (Fig. 24F) strongly el-

evated distally, L/H 2.7 (2.8), with concave dorsal margin; legs without swimming setae.

Female — similar to male except for the shape of the genital field (Fig. 25B); dorsal shield L 428, W 234; ventral shield L 469, W 305, capitular bay L 99; width between most lateral pair of acetabula 123; gonopore relatively small, W 34; palp: total L 191, dL and %L (in parentheses): P-1, 28 (14.7); P-2, 42 (22.0); P-3, 32 (16.8); P-4, 65 (34.0); P-5, 24 (12.6); L P-2/P-4 ratio 0.65; legs: L of I-Leg-4-6: 42, 49, 63; I-Leg-6 L/H 1.8; L of IV-Leg-3-6: 65, 69, 82, 108; IV-Leg-6 L/H 2.7; leg and palp chaetotaxy as in the male.

Etymology — *balneator* (lat.) = 'Bader'. Named after Dr Carl Bader who made the first contribution

to the knowledge of the water mite fauna of the Arabian peninsula.

Remarks — The new species resembles *Axonopsis vietsi* Motaş and Tanasachi, 1947, a hyporheobiotic species known from the Central Europe and the Mediterranean area (Pešić and Gerecke, 2003). *Axonopsis balneatoris* n. sp., can be distinguished from *A. vietsi* by the more slender idiosoma with subparallel lateral margins. A further difference is found in the shape of IV-Leg-6 which is less elevated distally and with a straight dorsal margin in *A. vietsi* (Gerecke pers. comm.).

Distribution — Oman.

Barbaxonella sp.

Material examined — 0/3/0, stream Wadi Ghul, 23°10.297 N 57°11.996 E, alt. 805 m, 12-xi-2008.

Remarks — At the present state of knowledge, females of this genus cannot be identified (Pešić and Gerecke, 2003). However, this record extends the distribution area of *Barbaxonella* considerably.

Omanaxonopsis gen. nov.

Diagnosis — Characters of the Aturidae and the subfamily Axonopsinae. Dorsal and ventral shields anteriorly fused; dorsal shield with four pairs of glandularia and a pair of postocularia; no ridge on each side extending anteriorly from area of insertion of fourth coxae; lateral margins of ventral shield with an irregular truncate projection on each side located considerably posterior to the insertions of the fourth leg; one pair of glandularia lying between the genital field and insertions of the fourth legs; genital field with 5-6 pairs of acetabula, acetabular plates fused with the ventral shield; leg claws with dorsal and ventral clawlets.

Type species — *Omanaxonopsis arabica* n. sp.

Remarks — The new genus appears to be close to *Axonopsis* Piersig, but differs from it in the genital field with 5-6 pairs of acetabula, lateral margins of ventral shield with an irregular truncate projection on each side and leg claws with dorsal and ventral clawlets.

Omanaxonopsis arabica n. sp.

(Figures 26A-G, 27A-B, 28F)

Type series — Holotype: female, spring Al Khremh, crossing road to United Arab Emirates border, Oman, 15.xi.2008, 24°47.421 N 55°56.503 E.

Diagnosis — As for genus.

Description

Female — Dorsal and ventral shields anteriorly fused; dorsal shield L 364, W 270; eye pigment well developed; dorsal shield (Fig. 26A) with four pairs of glandularia; postocularia well distanced from anterior margin; excretory pore located at posterior end of dorsal shield; ventral shield (Fig. 26B) L 378, W 331; lateral margins of ventral shield with an irregular truncate projection on each side located considerably posterior to the insertions of the fourth leg; capitular bay L 91; one pair of glandularia lying between the genital field and insertions of the fourth legs; acetabula difficult to see in the rugose integument but 5-6 pairs appear to be present, width between most lateral pair of acetabula 104; gonopore relatively large, W 42; chelicera (Fig. 26G) total L 118, basal segment L 84, claw L 38, L ratio basal segment/claw 2.2; capitulum (Fig. 26D) ventral L 62; palp (Fig. 26E-F): total L 196, dL and %L (in parentheses): P-1, 29 (14.8); P-2, 46 (23.5); P-3, 26 (13.3); P-4, 72 (36.7); P-5, 23 (11.7); L P-2/P-4 ratio 0.64; distoventral portion of P-2 expanded. Legs: L of I-Leg (Fig. 27A): 32, 37, 32, 46, 63, 66; L of IV-Leg (Fig. 27B): 54, 68, 62, 69, 93, 80; IV-Leg-5 with two swimming hairs; the claws with dorsal and ventral clawlets.

Male — Unknown.

Etymology — Named for its occurrence on the Arabian peninsula.

Genus *Arrenurus* Dugès, 1834

Arrenurus (Arrenurus) dugesi n. sp.

(Figures 29A-F)

Type material — Holotype male, Wadi Hanna, Oman, 17°03.236 N 54°36.489 E, 4-xi-2008. Paratypes: 12/8/0, same data as holotype.

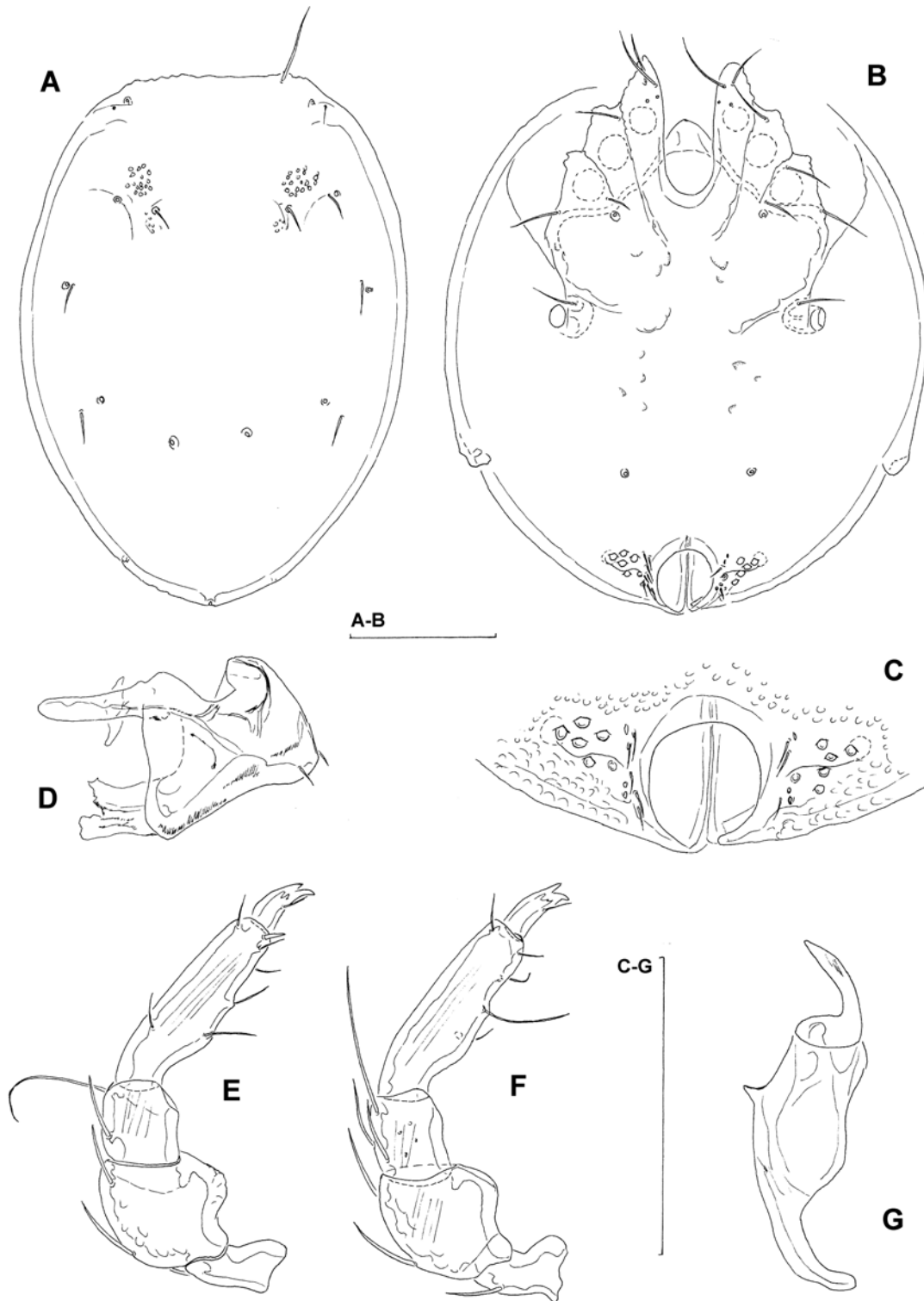


FIGURE 26: *Omanaxonopsis arabica* n. sp., female: (A) – dorsal shield; (B) – idiosoma, ventral view; (C) – genital field; (D) – capitulum; (E-F) – palp; (G) – chelicera. Scale bars = 100 μ m.

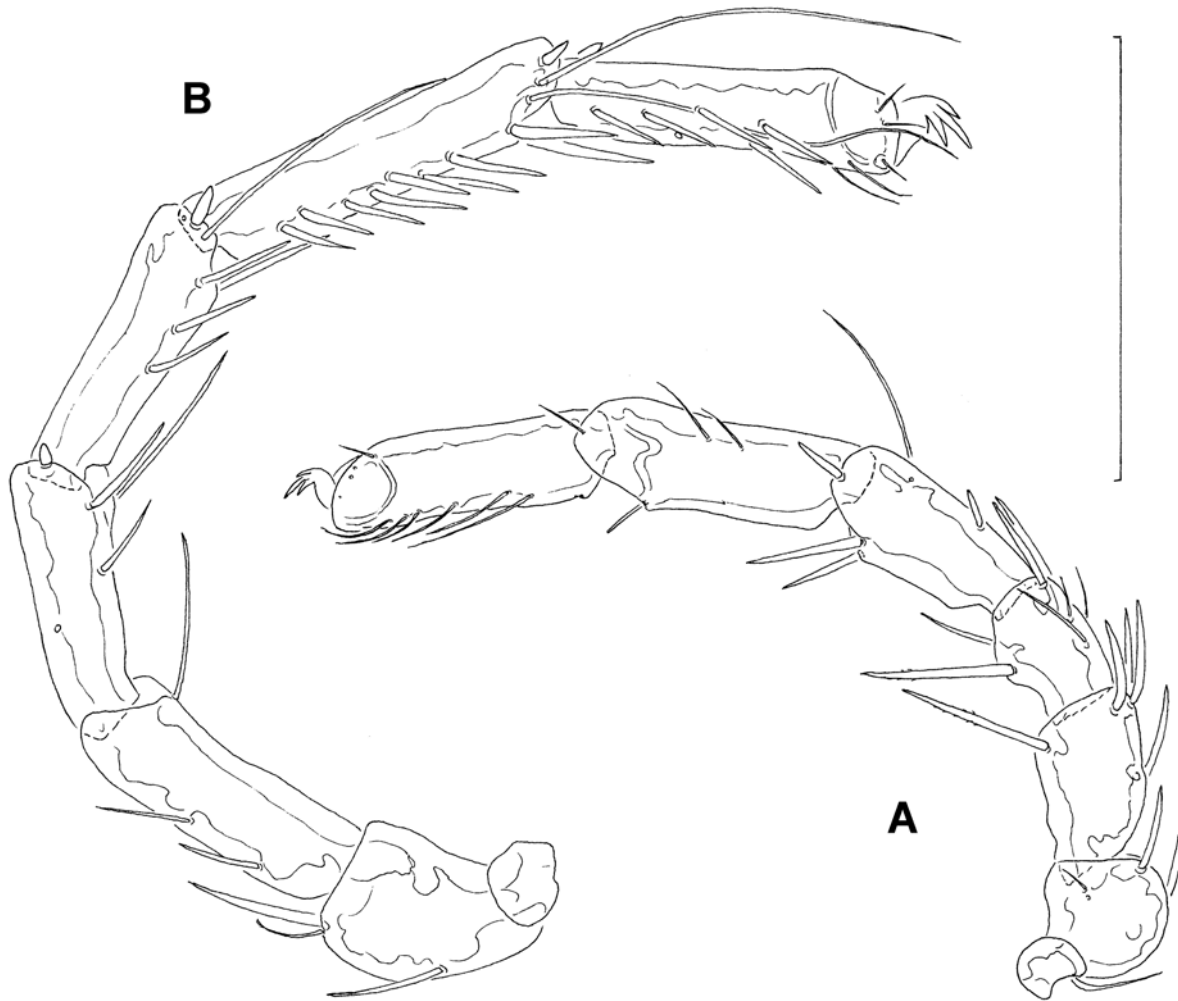


FIGURE 27: *Omanaxonopsis arabica* n. sp., female: (A) – I-Leg; (B) – IV-Leg. Scale bar = 100 μ m.

Diagnosis — Male: cauda short; pygal lobes distinct; hyaline membrane with pointed angles; petiole rounded posteriorly; ligulate process of petiole rounded, lying well distanced from posterior margin of petiole. Female: Genital plates short, tapering laterally, sloping towards posterolateral idiosoma margin.

Description

Male — Idiosoma greenish, L (including petiole) 1073 (932-1154), W 802 (701-850), posterior margin slightly concave. D1 on small humps. Dorsal shield (Fig. 29A) W 437 (397-486). Cauda short, pygal lobes distinct. Hyaline membrane with pointed an-

gles, posterior margin concave. Petiole (Fig. 29C) rounded posteriorly, ligulate process rounded, well distanced from posterior margin of petiole, uplifted only slightly. Petiole ventrally with two lateral rows of irregularly shaped denticles. Setae associated with petiole bifurcated, these setae longer than petiole. Cx-I not extending to anterior idiosoma margin (Fig. 29B). Gonopore L 58. Genital plates narrow, extending to lateral idiosoma margin. Palp (Fig. 29E): total L 364; L: P-1, 40; P-2, 94; P-3, 70; P-4, 100; P-5, 60; P-2 with two setae in anteroventral corner and two medial setae more anterodorsally. L of I-Leg-4-6: 190, 186, 176. L of IV-Leg-4-6: 316, 114, 124; IV-Leg-4 with a long spur. Claws of legs with a

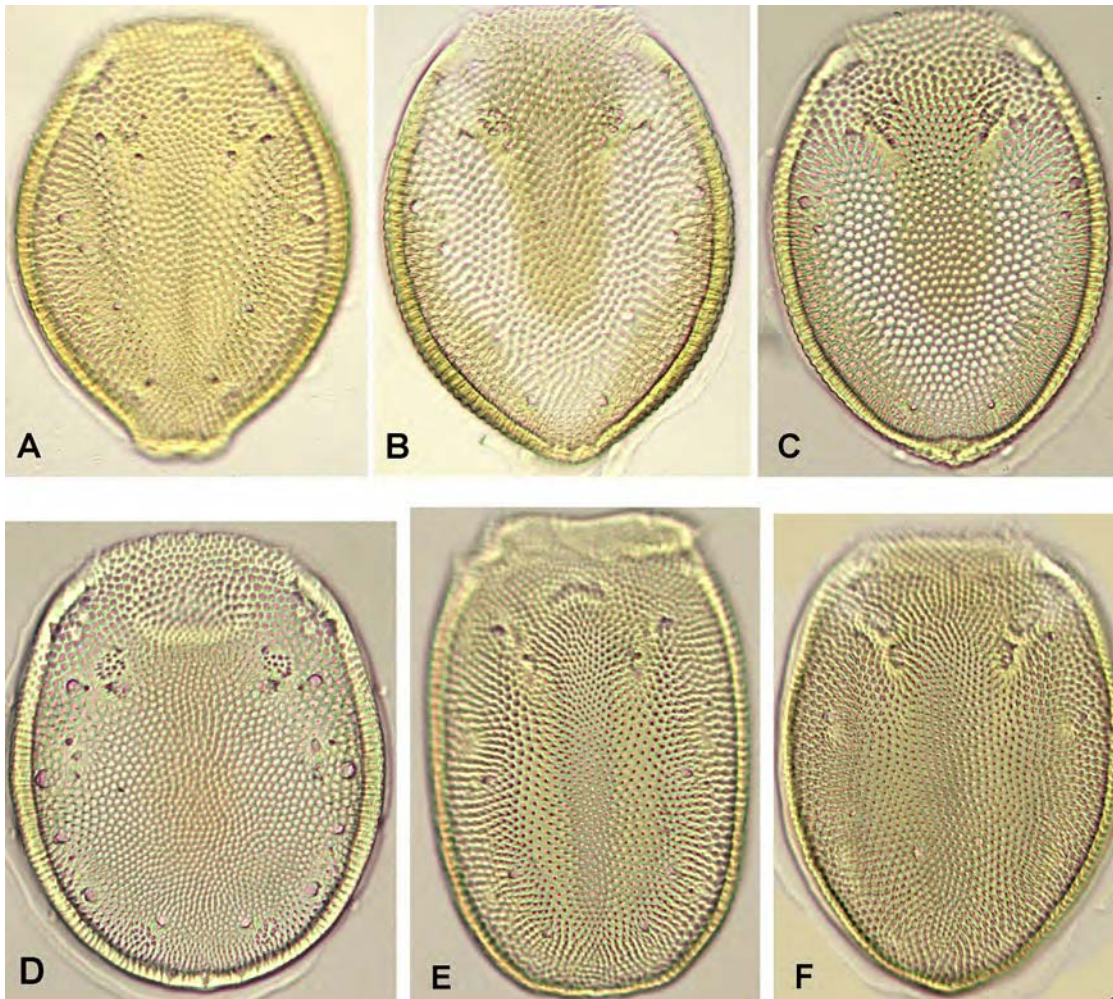


FIGURE 28: Dorsal shield: (A) – *Axonopsis quadarramensis* sensu Pešić & Gerecke, 2003; (B) – *A. omanensis* n. sp., male; (C) – *A. omanensis* n. sp., female; (D) – *A. arabica* n. sp., female; (E) – *A. balneatoris* n. sp., male; (F) – *Omanaxonopsis arabica* n. sp., female.

clawlet as large as claw, third and fourth legs with numerous swimming setae.

Females — Idiosoma greenish-brownish, L 1045 (948-1175), W 932 (850-1037). Anterior margin of idiosoma straight, posterolateral corners of idiosoma indistinct. Dorsal shield complete, L 664 (599-774), W 543 (494-616). D1 on small humps, setae of D4 long. Cx-I plates extending beyond anterior margin of idiosoma. Medial margin of Cx-IV longer than medial margin of Cx-III. Medial distance of Cx-IV shorter than width of one genital valve. Gonopore L 164, width of gonopore 186, genital valves with small sclerotized patches. Genital plates short, shorter than width of gonopore, sloping towards

posterolateral idiosoma margin (Fig. 29F). Palp: total L 330; L: P-1, 32; P-2, 92; P-3, 62; P-4, 92; P-5, 52; P-2 with two anteromedial setae and two setae located more anterodorsally. L of I-Leg-4-6: 195, 160, 148. L of IV-Leg-4-6: 230, 182, 160. Claws of legs with a clawlet as large as claw, third and fourth legs with numerous swimming setae.

Etymology — Named after the French acarologist Antoine-Louis Delsecautz Dugès (1797-1838), who erected the genus *Arrenurus*.

Remarks — Two *Arrenurus* species having also a petiole with a row of ventral teeth differ as follows: *A. glenifferensis* Lundblad, 1941 from southern Africa has a long cauda and a triangular ligulate

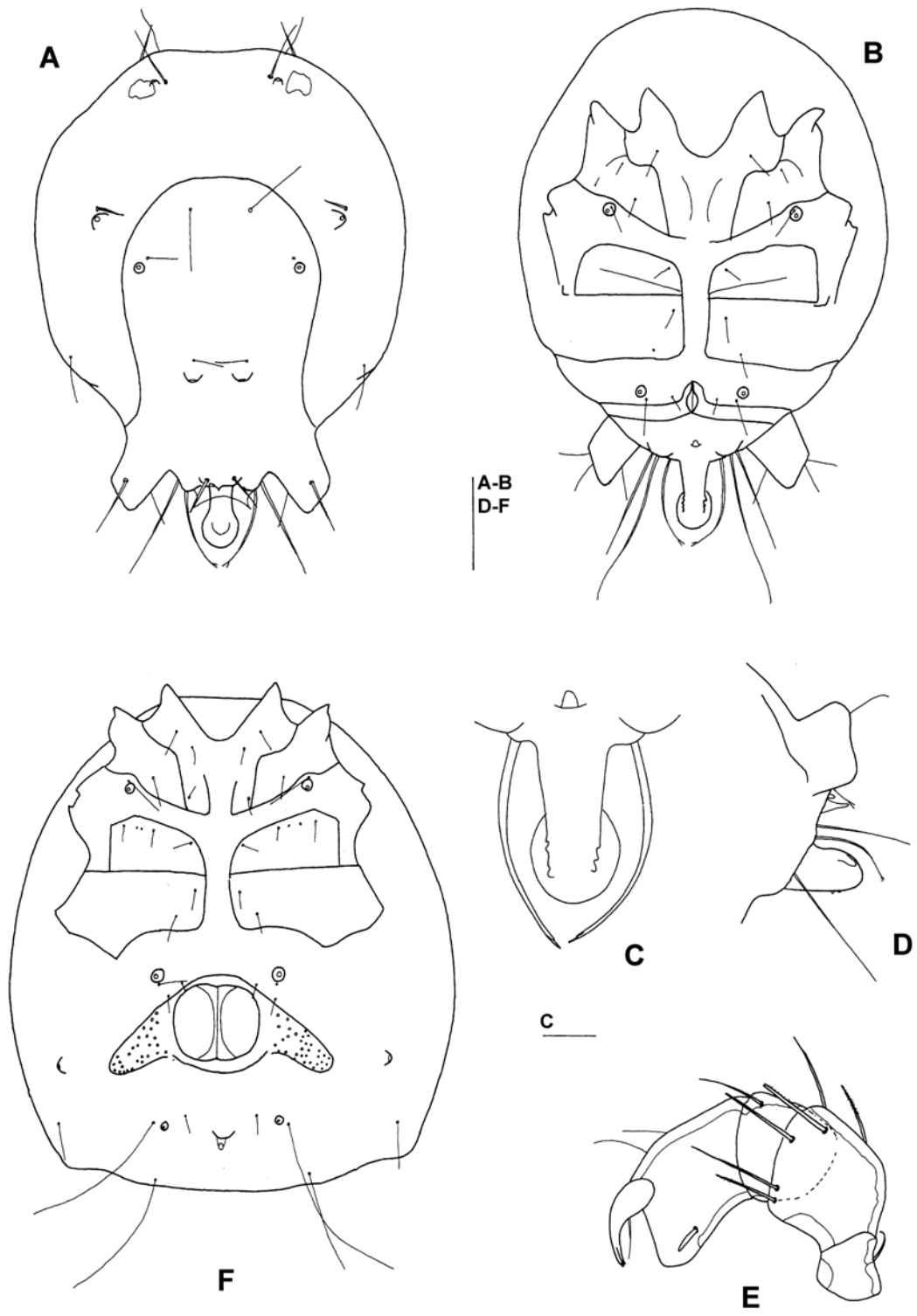


FIGURE 29: *Arrenurus dugesi* n. sp. (A-E: male, F: female): (A) – idiosoma, dorsal view; (B, F) – idiosoma, ventral view; (C) – petiole, ventral view; (D) – petiole, lateral view; (E) – palp. Scale bars = 200 μ m (A-B, F), 50 μ m (C-E).

process, *A. denticulatus* Motaş, 1927 from the Western Palaearctic has also a long cauda and a more angular-shaped petiole and ligulate process. The assignment of the female is uncertain, as two types of the females were collected on the type locality. The most common of these have been assigned to the new species, the less common to *A. ortali* Smit (see below). Moreover, the females here assigned to *A. ortali* Smit share with males of the same number and arrangement of medial setae on P-2.

***Arrenurus (Arrenurus) ortali* Smit, 2000**

(Figure 30)

Type material — Holotype male, Ein Yirka, Sinai, Israel, 21-viii-1969, leg. Margalith (ZMAN!).

Other material — 1/4/0, Wadi Hanna, Oman, 17°03.236 N 54°36.489 E, 4-xi-2008.

Description

Male — Described in Smit *et al.* (2000). The male from Oman is slightly larger than the types (given in parentheses): Idiosoma 1089 (1038-1057) long and 664 (660-669) wide. Following the original description the petiole should have grooves, but in fact these are short, stiff curved setae.

Female — Idiosoma greenish-brownish, L 1085 (1049-1175), W 923 (915-1021). Anterior margin of idiosoma convex. Dorsal shield complete, L 842 (810-899), W 632 (624-688). Cx-I extending beyond anterior margin of idiosoma (Fig. 30). Medial margin of Cx-IV longer than medial margin of Cx-III. Medial distance of Cx-IV longer than width of one genital valve. Gonopore L 136, W 154, genital valves with very small sclerotized patches. Genital plates tapering laterally, directed perpendicularly towards lateral idiosoma margin. Palp: total L 384; L: P-1, 46; P-2, 102; P-3, 66; P-4, 106; P-5, 64; P-2 anteroventrally with three setae (as in male), more anterodorsally one more seta and dorsal margin with three setae. L of I-Leg-4-6: 156, 166, 144. L of IV-Leg-4-5: 208, 192. Third and fourth legs with numerous swimming setae. Claws of legs with large clawlet and claw blade.

Remarks — The female was not known before (but see note at the preceding species). Previously

known from the Sinai (Israel, nowadays Egypt) and the Negev (Israel) (Smit *et al.* 2000).

***Arrenurus (Brevicaudaturus) rectituberculatus* n. sp.**

(Figures 31A-E, 32A-C)

Type material — Holotype male, Wadi Hanna, Oman, 17°03.236 N 54°36.489 E, 4-xi-2008. Paratypes: 1/2/0, same data as holotype.

Diagnosis — Male with a large rectangular hump near posterior margin, between pygal lobes; dorsal furrow very short. Female with laterally widened genital plates.

Description

Male — Idiosoma yellowish, L 1183 (1183), W (including humps) 1110 (1134). Anterior idiosoma margin straight to slightly convex. Eyes on small humps, D1 on very large humps. Cauda short, pygal lobes distinct. Between pygal lobes, dorsally a rectangular hump, which extends beyond posterior idiosoma margin. Dorsal shield incomplete, dorsal furrow very short, lying between D1 (Fig. 31A). Cx-I extending beyond anterior idiosoma margin. Suture lines between coxal plates indistinct. Gonopore L 90. Genital field wing-shaped, indistinct, posterior margin with a row of long setae (Fig. 31B). Palp (Fig. 31D-E): total L 364; L: P-1, 40; P-2, 102; P-3, 66; P-4, 106; P-5, 50; P-2 anteroventrally with three setae, more medially another seta; P-3 anterodorsally with one seta. L of I-Leg-4-6: 178, 194, 267. L of IV-Leg-4-6: 259, 227, 203; IV-Leg-4 without spur. Third and fourth legs with numerous swimming setae.

Female — Idiosoma L 1539, W 1458. Anterior margin slightly concave. D1, D4 and L4 on large humps, L3, V2 and V3 on smaller humps. Posterior idiosoma margin indented. Dorsal shield (Fig. 32A) complete, L 786, W 867. Cx-I extending just beyond anterior idiosoma margin (Fig. 32B). Suture lines of coxal plates indistinct. Medial corner of Cx-IV rounded. Genital plates indistinct (and therefore not illustrated in lateral view), long and bowed, widened laterally. Gonopore L 156. Palp: total L 403; L: P-1, 48; P-2, 114; P-3, 60; P-4, 129; P-5, 52; palp as in male. L of I-Leg-4-6: 211, 211, 259. L of

IV-Leg-4-6: 284, 255, 211. Third and fourth legs with numerous swimming setae.

Etymology — Named after the rectangular posterodorsal hump of the male.

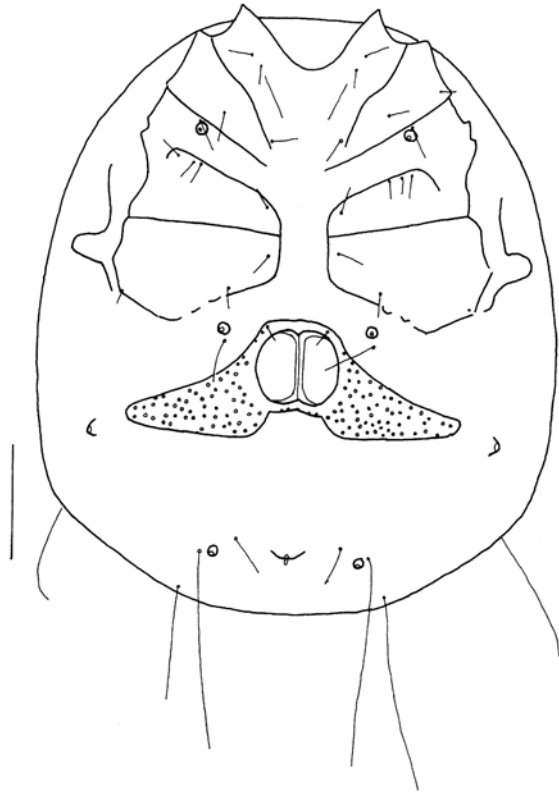


FIGURE 30: *Arrenurus ortali* Smit, female: idiosoma, ventral view. Scale bar = 200 μ m.

Remarks — The very short dorsal furrow of the male, resulting in the almost absence of a dorsal shield, is quite unusual. Complete absence of a dorsal shield is also found within the genus *Thorophoracarus* Viets. Cook (1974) postulated the hypotheses that *Thorophoracarus* has arisen several times from divergent *Arrenurus* stock. The male of the new species, with hardly a dorsal furrow, could support this hypotheses. The female shares some characters with other *Brevicaudaturus* species, like the long bowed genital plates and the shape of the posterior idiosoma margin. It is most close to *A. moorei* Green, 1974 from Cameroon, an insufficiently described species, only known from the female sex. The female of the new species differs from *A. moorei*

in the laterally widened and shorter genital plates (not widened and longer in *A. moorei*).

ZOOGEOGRAPHICAL NOTES

With the results presented we can conclude that the water mite fauna of the Arabian peninsula is incompletely known. Of the 23 species reported in this paper, only 7 were known to science (30%), the remaining species are new to science. Nevertheless, a few conclusions can be drawn. In the northern part of Oman (locations north of 23°N), some typical Oriental genera were found. The genera *Bharatvolzia* and *Tiramideopsis* are only known from the Oriental region (including the south of Iran).

Bharatohydracarus was thus far only known from the Oriental region. Gerecke (2004) found one species of this genus in the north and one in the south, but they represent two distinct evolutionary lines. In the south of Oman (locations south of 16°N) one widespread Afrotropical species, *Hygrobates soari*, is found. However, this species occurs in northern Oman as well. There are no records of this species from the Oriental region. No typical Ethiopian genera or species were found in southern Oman. *Limnesia pinguipalpis* is an Oriental species, but it occurs in southern Oman as well. The record of the *Protolimnesia* species from southern Oman is very unusual, as all members known of the genus thus far were recorded from the southern United States to South America.

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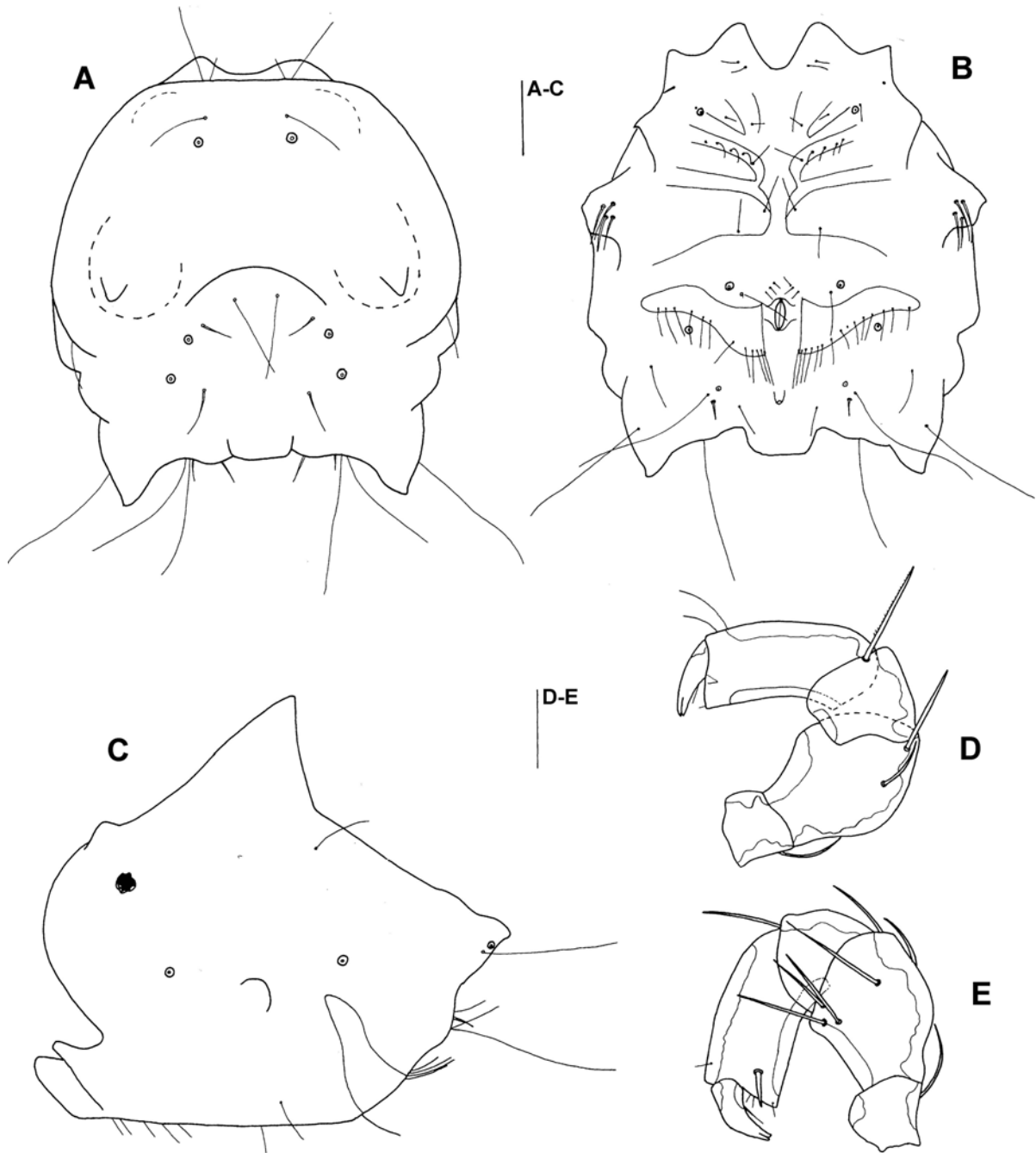


FIGURE 31: *Arrenurus rectituberculatus* n. sp., male: (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C) – idiosoma, lateral view; (D-E) – palp. Scale bars = 200 μ m (A-C), 50 μ m (D-E).

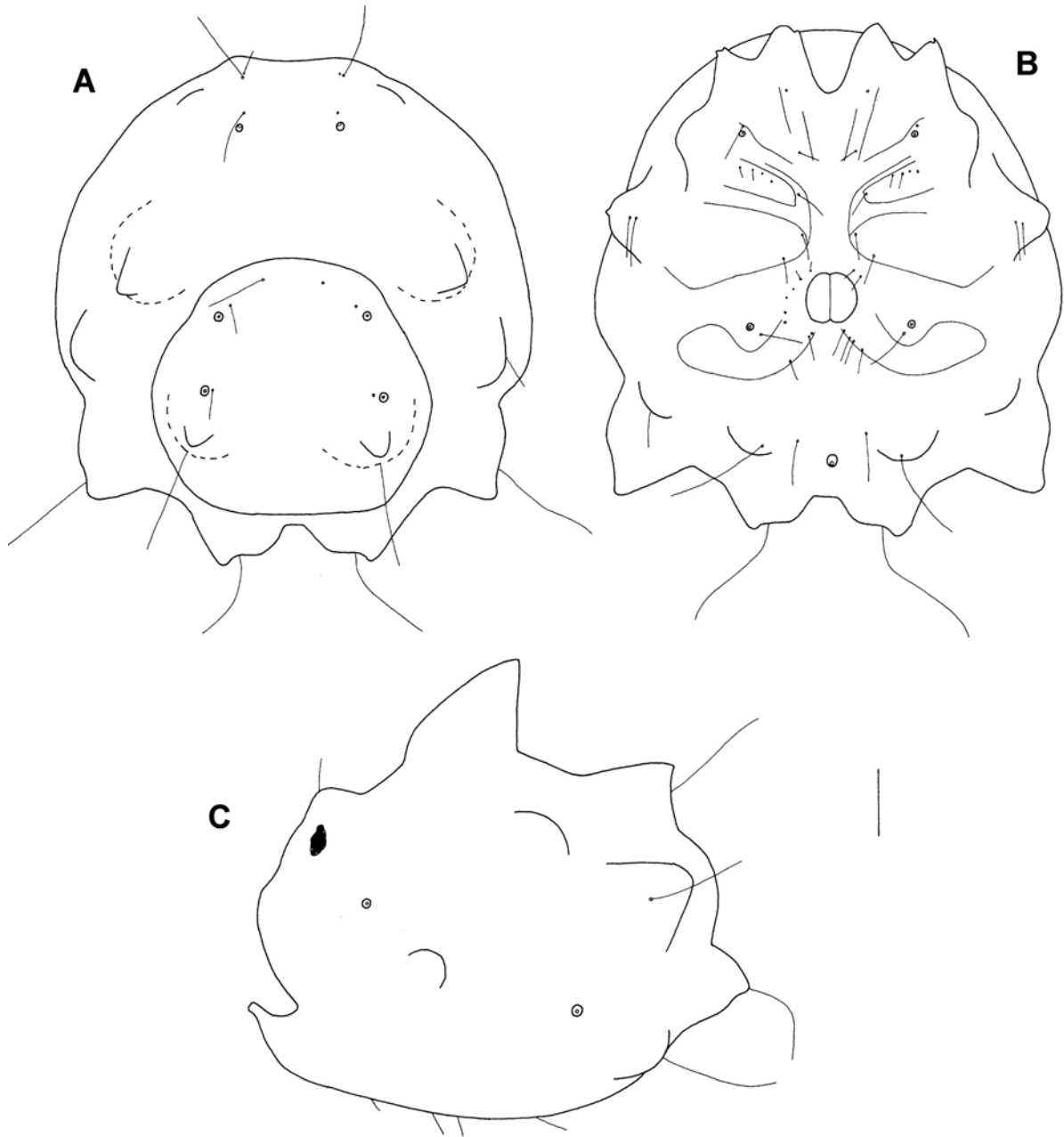



FIGURE 32: *Arrenurus rectituberculatus* n. sp., female: (A) – idiosoma, dorsal view; (B) – idiosoma, ventral view; (C) – idiosoma, lateral view. Scale bars = 200 μ m.

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