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Research article

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New species of genus *Atractides* Koch, 1837 (Acari: Hydrachnidiae, Hygrobatidae) from Qinghai, China

Yu-Hao ZHANG^{1,#}, Hai-Tao LI^{2,#}, Cai-Yun LI³ & Jian-Jun GUO^{1b,4,*}

^{1,2,3,4}Institute of Entomology, Guizhou University, Scientific Observing and Experimental Station of Crop Pest in Guiyang, Ministry of Agriculture and Rural Affairs of the P.R. China, Guiyang 550025, P.R. China.

*Corresponding author: jjguo@gzu.edu.cn

¹Email: 1289568720@qq.com

²Email: lhtzlp424666@outlook.com

³Email: 1377195309@qq.com

[#]Yu-Hao Zhang and Hai-Tao Li contributed equally to this study

¹[urn:lsid:zoobank.org:author:9413E3A0-C9FB-4CCB-8F60-DE9454CF856D](https://zoobank.org/author:9413E3A0-C9FB-4CCB-8F60-DE9454CF856D)

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⁴[urn:lsid:zoobank.org:author:60680105-E469-4F51-AF3D-094BED1C361E](https://zoobank.org/author:60680105-E469-4F51-AF3D-094BED1C361E)

Abstract. The paper deals with five new species of the genus *Atractides* Koch, 1837 (Acari: Hydrachnidiae, Hygrobatidae) collected from Qinghai Province, P.R. China, *Atractides (Atractides) biprojectus* Zhang, Li & Guo sp. nov., *Atractides (Atractides) smiti* Zhang, Li & Guo sp. nov., *Atractides (Atractides) menyuanensis* Zhang, Li & Guo sp. nov., *Atractides (Atractides) longiprojectus* Zhang, Li & Guo sp. nov. and *Atractides (Atractides) xianmiensis* Zhang, Li & Guo sp. nov. All the new species are described and illustrated in detail, and all the type specimens are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Keywords. Water mite, *Atractides*, new species, taxonomy, Qinghai-Tibet Plateau.

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Introduction

Atractides Koch, 1837 are reported in all biogeographical areas except for Australia and Antarctica (Cook 1974; Gerecke 2003). Most species are known from the northern Hemisphere, and only found in clean waters where the substratum is well preserved, so they are probably sensitive to many forms of human impact (Gerecke 2003; Pešić & Smit 2011; Gülle *et al.* 2015).

Currently, the genus *Atractides* has four subgenera (*Atractides* Koch, 1837; *Tympanomegapus* Thor, 1923; *Polymegapus* K. Viets, 1926; *Maderomegapus* Lundblad, 1941), and about 405 species have been described from all over the world (K.O. Viets 1987; Gerecke 2003; Pešić *et al.* 2018; Pešić & Smit 2018, 2021a, 2021b; Smit 2020; Gülle *et al.* 2021; <http://www.watermite.org/>). Based on previous information, two subgenera and 18 species of *Atractides* have been reported for the Chinese fauna: *Atractides* s. str. with 14 species and *Tympanomegapus* Thor, 1923 with 4 species (Jin 1997; Yi *et al.* 2010; Wang & Jin 2012, 2013; Wang *et al.* 2015).

The Qinghai Province lies in the west of China, on the Qinghai-Tibet Plateau. The Qinghai-Tibet Plateau is the highest and largest plateau in the world, which has a wide range of geological, topographical and climatic gradients. Therefore, there is a greater biodiversity than in the surrounding lowlands and other high elevation regions (Sun *et al.* 2014). Through a joint investigation of water mites in Qinghai Province, five new species are found: *Atractides (Atractides) biprojectus* Zhang, Li & Guo sp. nov., *Atractides (Atractides) smiti* Zhang, Li & Guo sp. nov., *Atractides (Atractides) menyuanensis* Zhang, Li & Guo sp. nov., *Atractides (Atractides) longiprojectus* Zhang, Li & Guo sp. nov. and *Atractides (Atractides) xianmiensis* Zhang, Li & Guo sp. nov. All the new species are described and illustrated in detail.

Material and methods

Specimens in this study were all collected by Hai-Tao Li from Qinghai Province, P.R. China. Water mites were collected by hand netting, sorted on the spot from the living material, preserved in Koenike's fluid and dissected following Jin (1997) under a Motic SMZ-168 stereo microscope. Specimens were observed under a Nikon Ni-E microscope (with a Nikon DS-Ri2 camera). All illustrations were edited with Adobe Photoshop CC2018.

All measurements are given in micrometers (μm) following Gerecke (2003). Terms are modified from Jin (1997) and Gerecke (2003).

The following abbreviations are used:

a.s.l.	=	above sea level
A_1	=	preantennal glandularia
A_2	=	postantennal glandularia
Ac	=	acetabulum (pl. acetabula, numbered 1 to 3)
ACG	=	anterior coxal group (Cx-I+Cx-II)
Ap	=	acetabular plates
C_1-C_4	=	coxoglandularia 1–4
Cx-I–IV	=	coxae I–IV
D_1-D_4	=	dorsoglandularia 1–4
dL	=	dorsal length
HB	=	central height
IL	=	lateral length
I-L-1–6, etc.	=	the first–sixth segment of the first leg, etc.
L	=	length
L_1-L_4	=	lateroglandularia 1–4
mL	=	median length
O_1	=	preocularia
O_2	=	postocularia
P-1–P-5	=	the first–fifth segment of palp
PCG	=	posterior coxal group (Cx-III+Cx-IV)

S-1	=	proximal large ventral seta at I-L-5
S-2	=	distal large ventral seta at I-L-5
So_1 – So_5	=	slit organs 1–5
V_1 – V_4	=	ventroglandularia 1–4
W	=	width

Holotype and paratypes are deposited in the Institute of Entomology, Guizhou University, Guiyang, China (GUGC).

Results

Class Arachnida Lamarck, 1801
Order Trombidiformes Reuter, 1909
Superfamily Hygrobatoidea Koch, 1842
Family Hygrobatidae Koch, 1842
Genus *Atractides* Koch, 1837
Subgenus *Atractides* Koch, 1837

Atractides (Atractides) biprojectus Zhang, Li & Guo sp. nov.
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Figs 1–3

Diagnosis

Male

Dorsal muscle attachment unsclerotized. I-L-5 longish, S-1 and S-2 with blunt tips and with a narrow setal interspace between them; I-L-6 curved. Ac in an obtuse triangle, V_1 separated from V_2 . P-2 and P-3 with a ventral projection respectively; P-4 divided by two long ventral hairs in sectors 2:3:1, sword seta between two ventral hair insertions and near the terminal.

Female

Similar to male. Ventral projection of P-2 not obvious, and P-3 ventral margin nearly straight.

Etymology

The Latin prefix ‘*bi-*’ means two, in the male of the new species P-2 and P-3 are with a ventral projection respectively.

Type material

Holotype

CHINA • ♂; Qinghai Province, Huangnan Tibetan Autonomous Prefecture, Zeku County, Maixiu Town; 35°18'64" N, 101°52'32" E; 3201 m a.s.l.; 17 Jul. 2020; Hai-Tao Li leg.; running water; GUGC, Slide No. QH-HY-2020071701.

Paratypes

CHINA • 3 ♂♂; same collection data as for holotype; GUGC, Slides No. QH-HY-2020071702 to 2020071704 • 1 ♀; same collection data as for holotype; GUGC, Slide No. QH-HY-2020071705.

Description

Male (n = 4)

Idiosoma oval; dorsal muscle attachment unsclerotized, O_2 and D_1 at the same level; setae of D_1 and D_2 longer than others, setae of D_2 reaching to D_3 ; all slit organs visible, So_1 near the eye capsule and at

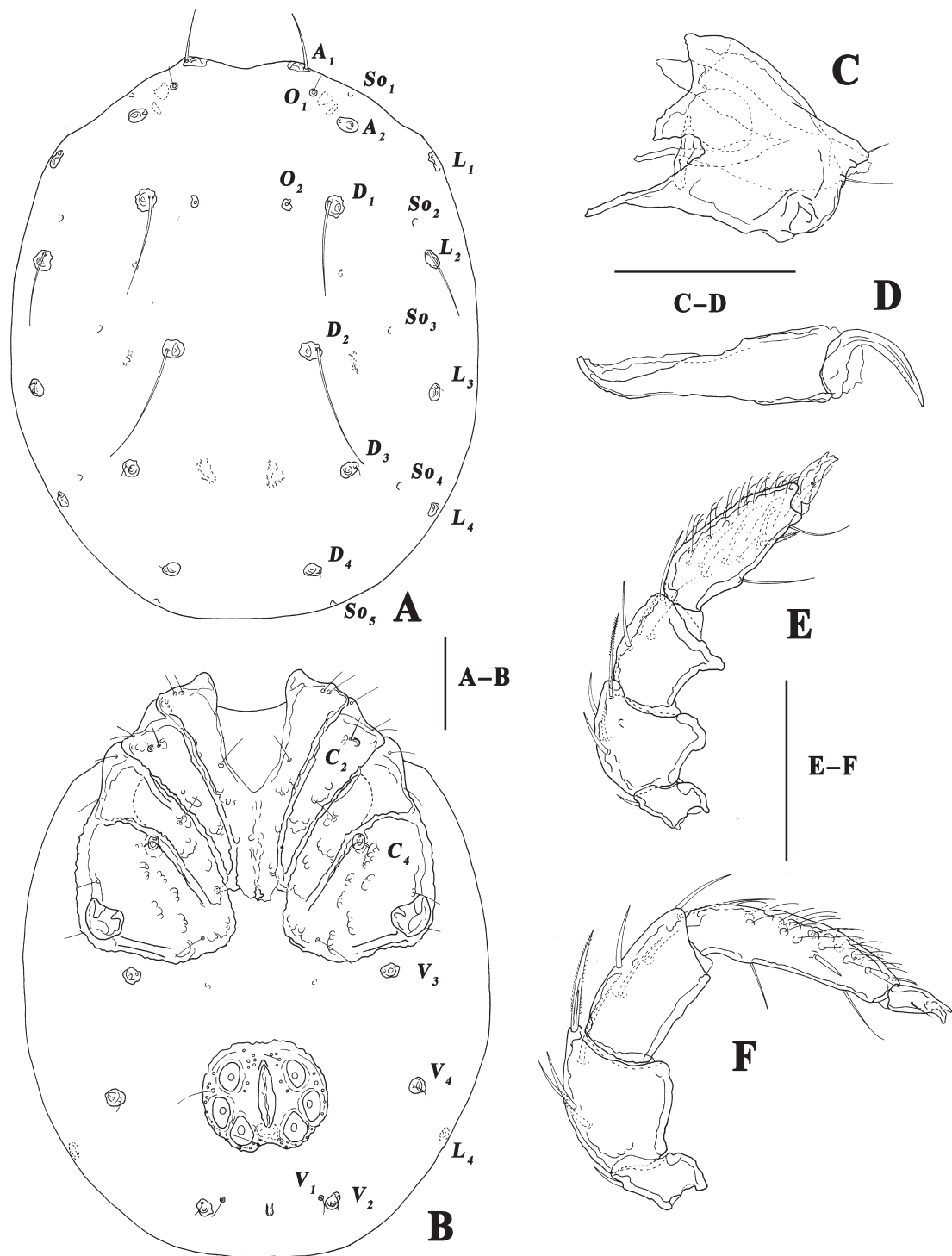


Fig. 1. *Atractides (Atractides) biprojectus* Zhang, Li & Guo sp. nov. A–E. Holotype, ♂ (GUGC, Slide No. QH-HY-2020071701). F. Paratype, ♀ (GUGC, Slide No. QH-HY-2020071705). A. Idiosoma, dorsal view. B. Idiosoma, ventral view. C. Gnathosoma. D. Chelicera. E. Palp. F. Palp. Scale bars = 100 µm.

the level of O_1 , So_2 in front of L_2 , So_3 near D_2 , So_4 at the middle of D_3 and L_4 ; So_5 behind D_4 (Fig. 1A). ACG fused together and with a suture, PCG separated; apodemes from ACG not reaching to Cx-IV. Acetabula three pairs and in an obtuse triangle; V_1 separated from V_2 ; V_3 and V_4 forming a trapezoid, V_4 at the same level as the middle of Ap (Fig. 1B). Palp five-segmented; P-2 and P-3 with a ventral projection respectively; P-4 with numerous dorsal hairs, and divided by two long ventral hairs in sectors 2:3:1, sword seta between two ventral hair insertions and near the terminal (Fig. 1E). I-L-5 longish, S-1 and S-2 both with blunt tips and with a narrow setal interspace between them; I-L-6 curved (Fig. 3A).

Female (n = 1)

Similar to male (Fig. 2). Setae of D1 and D2 shorter than that in male (Fig. 2A); ventral projection of P-2 not obvious, and P-3 ventral margin nearly straight (Fig. 1F).

Measurements

Male (n = 4)

Idiosoma L 641 (585–645), W 546 (443–546); coxal field L 316 (314–325), Cx-III W 333 (333–347), ACG IL 237 (234–239), mL 125 (107–125), W 268 (268–284); infracapitular bay L 123 (118–127); genital field L 120 (119–120), Ac1–3 L 34 (33–38), 34 (34–42), 37(37–40); chelicera L 205 (204–207); infracapitulum L 159 (140–177); palp dL: P-1 29 (29–32), P-2 74 (68–74), P-3 62(59–66), P-4 95(95–99), P-5 27 (27–29); legs segments: I-L-1 dL 48 (46–52), I-L-2 dL 93 (89–93), I-L-3 dL 80 (78–80), I-L-4 dL 119 (119–125), I-L-5 dL 163 (163–176), HB 53 (53–60), I-L-6 dL 119 (119–122), HB 22 (21–22), S-1 L 90 (78–90), S-2 L 74 (74–75); dL: II-L-1 47 (47–50), II-L-2 82 (74–82), II-L-3 71 (70–74), II-L-4 92 (92–102), II-L-5 116 (116–120), II-L-6 124 (124–127); dL: III-L-1 56 (53–57), III-L-2 90 (81–90), III-L-3 75 (73–77), III-L-4 124 (124–125), III-L-5 146 (146–154), III-L-6 141 (133–147); dL: IV-L-1 117 (117–120), IV-L-2 105 (102–113), IV-L-3 138 (135–138), IV-L-4 174 (174–180), IV-L-5 199 (199–208), IV-L-6 163 (162–170).

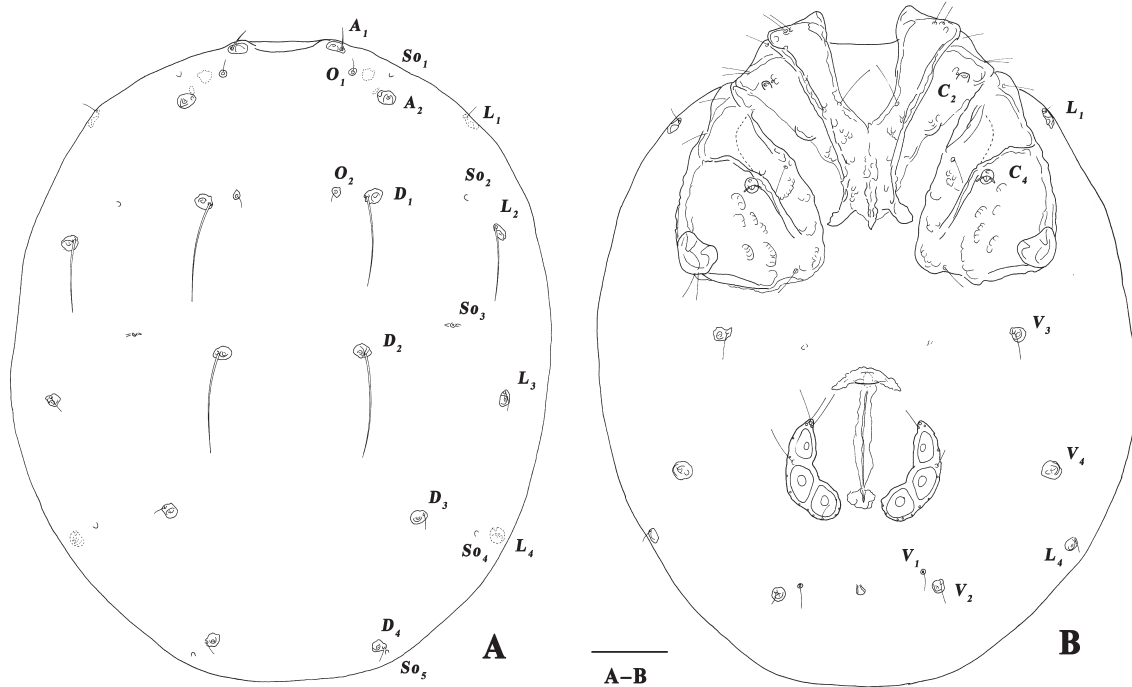


Fig. 2. *Atractides (Atractides) biprojectus* Zhang, Li & Guo sp. nov. **A–B.** Paratype, ♀ (GUGC, Slide No. QH-HY-2020071705). **A.** Idiosoma, dorsal view. **B.** Idiosoma, ventral view. Scale bar = 100 μ m.

Female (n = 1)

Idiosoma L 902, W 721; coxal field L 390, Cx-III W 477, ACG IL 272, mL 137, W 355; infracapitular bay L 165; gonopore L 146, Ap L 140, Ac1–3 L 43, 47, 47; chelicera L 267; infracapitulum L 222; palp dL: P-1 38, P-2 84, P-3 84, P-4 123, P-5 34; legs segments: I-L-1 dL 64, I-L-2 dL 113, I-L-3 dL 114, I-L-4 dL 176, I-L-5 dL 242, HB 77, I-L-6 dL 171, HB 26, S-1 L 120, S-2 L 106; dL: II-L-1 72, II-L-2

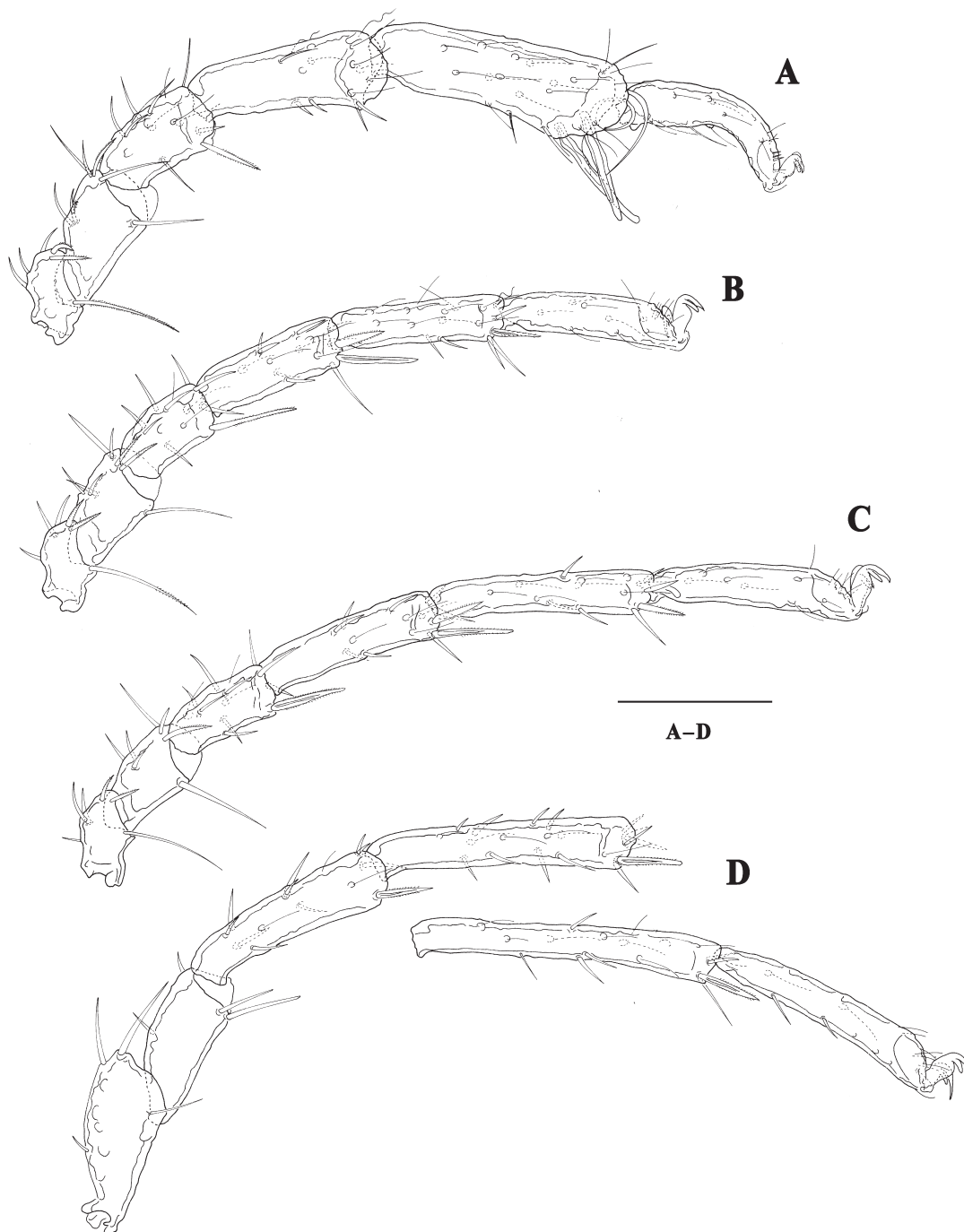


Fig. 3. *Atractides (Atractides) biprojectus* Zhang, Li & Guo sp. nov., holotype, ♂ (GUGC, Slide No. QH-HY-2020071701). **A–D.** I–L–IV–L. Scale bar = 100 μ m.

98, II-L-3 96, II-L-4 135, II-L-5 153, II-L-6 162; dL: III-L-1 69, III-L-2 100, III-L-3 107, III-L-4 168, III-L-5 193, III-L-6 181; dL: IV-L-1 153, IV-L-2 141, IV-L-3 184, IV-L-4 231, IV-L-5 267, IV-L-6 211.

Remarks

The new species *Atractides (Atractides) biprojectus* sp. nov. is similar to *Atractides yazdensis* Pešić, Smit & Saboori, 2021 in the following points: (1) male P-2 and P-3 with ventral projections; (2) setae S-1 and S-2 separated, with a narrow setal interspace; (3) V_1 separated from V_2 . However, *A. (A.) biprojectus* differs from *A. yazdensis* in following aspects: (1) P-4 sword seta between two ventral hair insertions in *A. (A.) biprojectus*, but slightly proximal to posteroventral hair in *A. yazdensis*; (2) apodemes from ACG not reaching to Cx-IV in *A. (A.) biprojectus*, but reaching to Cx-IV in *A. yazdensis*; (3) genital field of *A. (A.) biprojectus* much rounder than that of in *A. yazdensis* (Pešić *et al.* 2021).

Atractides (Atractides) smiti Zhang, Li & Guo sp. nov.

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Figs 4–5

Diagnosis

Muscle attachments between D_3 sclerotized. I-L-5 longish, S-1 and S-2 both with blunt tips and with a narrow setal interspace between them; I-L-6 curved. Ac in an obtuse triangle; V_1 fused to V_2 , excretory pore surrounded by sclerotized ring. P-2 and P-3 ventral margin slightly straight; P-4 divided by two ventral hairs in sectors 3:3:2, sword seta at the middle of P-4.

Etymology

The species is named after Dr Harry Smit in appreciation of his contributions to the taxonomy of water mites.

Type material

Holotype

CHINA • ♂; Qinghai Province, Huangnan Tibetan Autonomous Prefecture, Zeku County, Maixiu Town; 35°18'64" N, 101°52'32" E; 3201 m a.s.l.; 17 Jul. 2020; Hai-Tao Li leg.; running water; GUGC, Slide No. QH-HY-2020071706.

Description

Male

Idiosoma oval; O_2 and L_1 at the same level; setae of D_1 about two thirds of the distance from D_1 to D_2 ; setae of D_2 reaching to the level of D_3 ; muscle attachments between D_3 sclerotized; all setae surrounded by sclerites; So_1 in front of A_2 , So_2 at the same level as D_1 , So_3 near D_2 , So_4 at the same level as D_3 , So_5 behind D_4 (Fig. 4A). ACG fused together and with a suture, apodemes of ACG reaching to Cx-III; genital field with a development sclerotization, the anterior part of Ap with a projection, Ac in an obtuse triangle, Ac2 near Ac3 rather than Ac1, Ac3 the biggest; V_1 fused to V_2 , V_3 and V_4 forming a trapezoid, V_4 at the same level as the anterior of acetabular plate; excretory pore surrounded by sclerotized ring (Fig. 4B). Palp five-segmented; P-2 and P-3 ventral margins slightly straight; P-4 with numerous dorsal hairs, and divided by two ventral hairs in sectors 3:3:2, sword seta at the middle of P-4 (Fig. 4E). I-L-5 longish, S-1 and S-2 both with blunt tips and with a narrow setal interspace between them; I-L-6 curved (Fig. 5A).

Measurements

Male (n = 1)

Idiosoma L 513, W 369; coxal field L 264, Cx-III W 164, ACG IL 175, mL 103, W 216; infracapitular bay L 97; genital field L 131, Ac1–3 L 26, 28, 27; chelicera L 145; infracapitulum L 125; palp dL: P-1 23, P-2 49, P-3 49, P-4 70, P-5 26; legs segments: I-L-1 dL 38, I-L-2 dL 74, I-L-3 dL 67, I-L-4 dL 107,

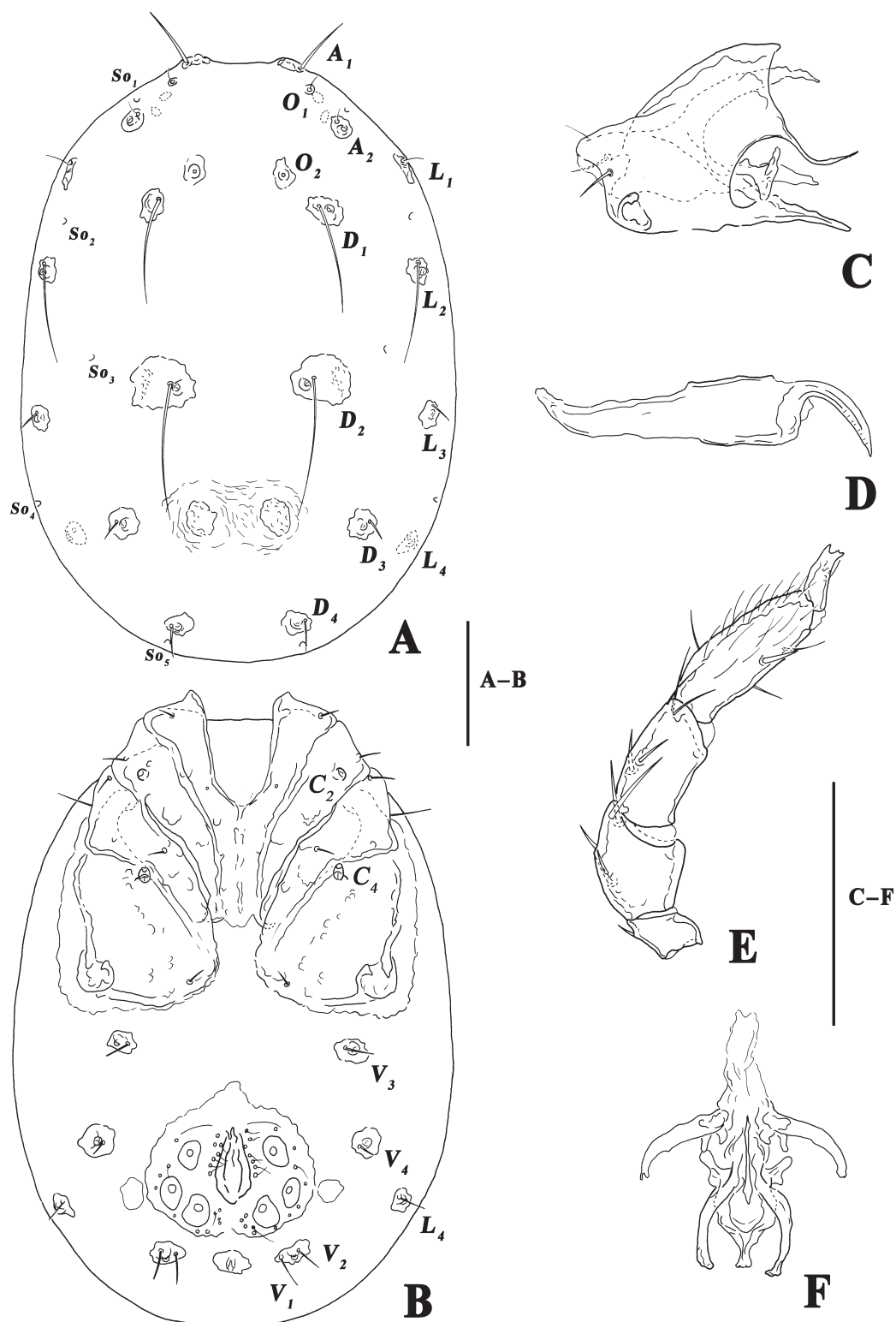


Fig. 4. *Atractides (Atractides) smiti* Zhang, Li & Guo sp. nov., holotype, ♂ (GUGC, Slide No. QH-HY-2020071706). **A.** Idiosoma, dorsal view. **B.** Idiosoma, ventral view. **C.** Gnathosoma. **D.** Chelicera. **E.** Palp. **F.** Ejaculatory complex. Scale bars = 100 μ m.

I-L-5 dL 122, HB 37, I-L-6 dL 72, HB 19, S-1 L 54, S-2 L 60; dL: II-L-1 32, II-L-2 61, II-L-3 57, II-L-4 82, II-L-5 85, II-L-6 91; dL: III-L-1 36, III-L-2 64, III-L-3 61, III-L-4 95, III-L-5 106, III-L-6 103; dL: IV-L-1 70, IV-L-2 83, IV-L-3 107, IV-L-4 138, IV-L-5 148, IV-L-6 129.

Female

Unknown.

Remarks

The new species *Atractides (Atractides) smiti* sp. nov. is similar to *Atractides protendens* K.O. Viets, 1955 in the following points: (1) P-2 and P-3 ventral margins slightly straight; (2) S-1 and S-2 with a narrow setal interspace between them; (3) the anterior part of Ap with a projection; (4) apodemes of ACG reaching to Cx-III. However, *A. (A.) smiti* differs from *A. protendens* in the following aspects: (1) V_1 fused to V_2 in *A. (A.) smiti*, but not fused in *A. protendens*; (2) excretory pore surrounded by sclerotized ring in *A. (A.) smiti*, but smooth in *A. protendens*; (3) the I-L-6 of *A. (A.) smiti* more curved than that of *A. protendens* (Gerecke 2003).

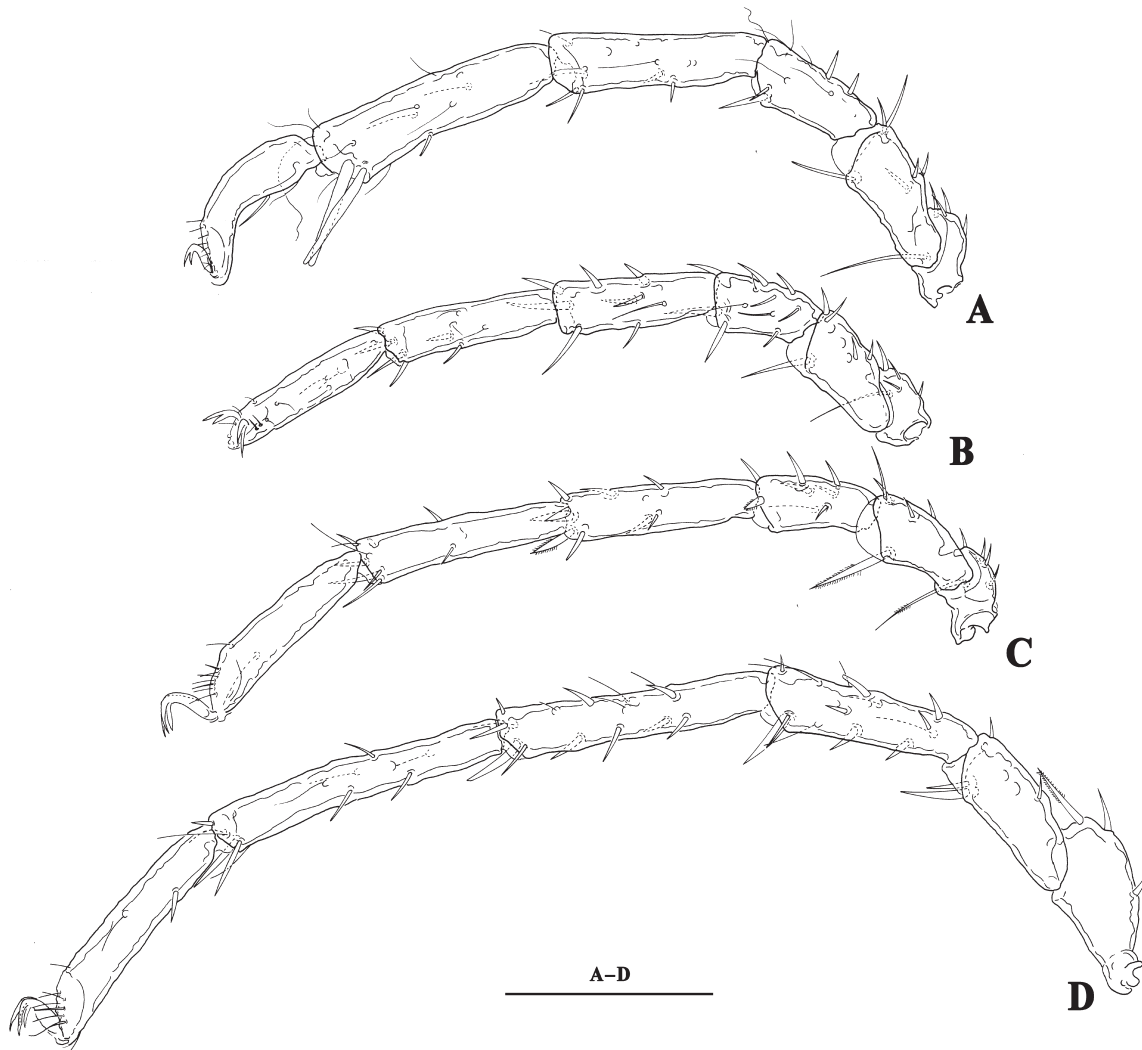


Fig. 5. *Atractides (Atractides) smiti* Zhang, Li & Guo sp. nov., holotype, ♂ (GUGC, Slide No. QH-HY-2020071706). **A–D.** I-L–IV-L. Scale bar = 100 μ m.

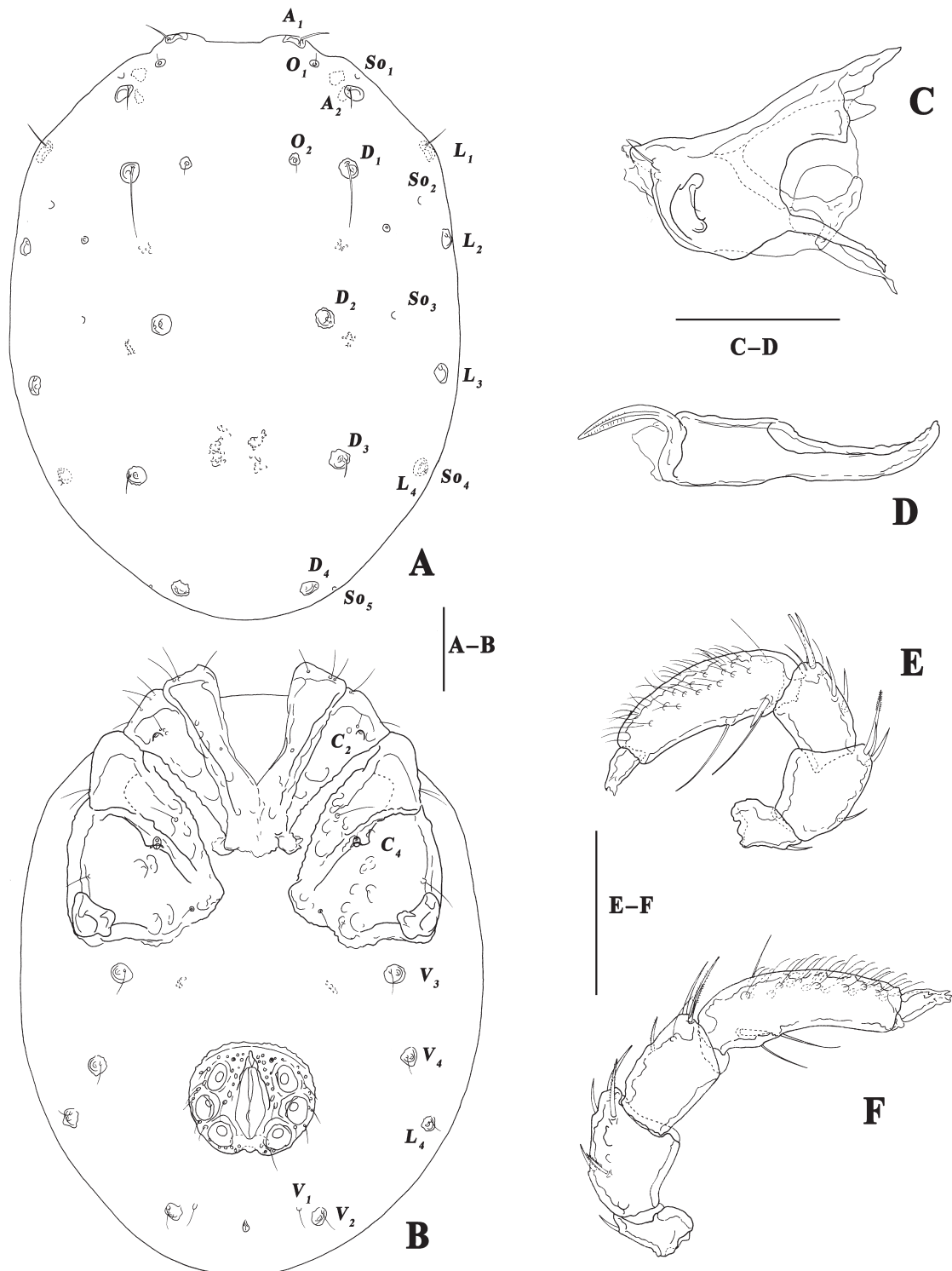


Fig. 6. *Atractides (Atractides) menyuanensis* Zhang, Li & Guo sp. nov. A–E. Holotype, ♂ (GUGC, Slide No. QH-HY-2020072901). F. Paratype, ♀ (GUGC, Slide No. QH-HY-2020072902). A. Idiosoma, dorsal view. B. Idiosoma, ventral view. C. Gnathosoma. D. Chelicera. E. Palp. F. Palp. Scale bars = 100 µm.

Atractides (Atractides) menyuanensis Zhang, Li & Guo sp. nov.
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Figs 6–8

Diagnosis

Dorsal muscle attachment unsclerotized. I-L-5 longish, S-1 close to S-2. I-L-6 curved. Ac in an obtuse triangle; V_1 separated from V_2 . P-2 ventral margin slightly convex; P-3 ventral margin nearly straight; two long hairs on the ventral surface of P-4 near the base, sword seta near the base. Ac in a weakly curved line in female.

Etymology

The new species is named after the name of Menyuan Hui Autonomous County where the specimens were collected.

Type material

Holotype

CHINA • ♂; Qinghai Province, Haibei Tibetan Autonomous Prefecture, Menyuan Hui Autonomous County; 37°31'31" N, 101°21'09" E; 2427 m a.s.l.; 29 Jul. 2020; Hai-Tao Li leg.; running water; GUGC, Slide No. QH-HY-2020072901.

Paratypes

CHINA • 5 ♀♀; same collection data as for holotype; GUGC, Slides No. QH-HY-2020072902 to 2020072906.

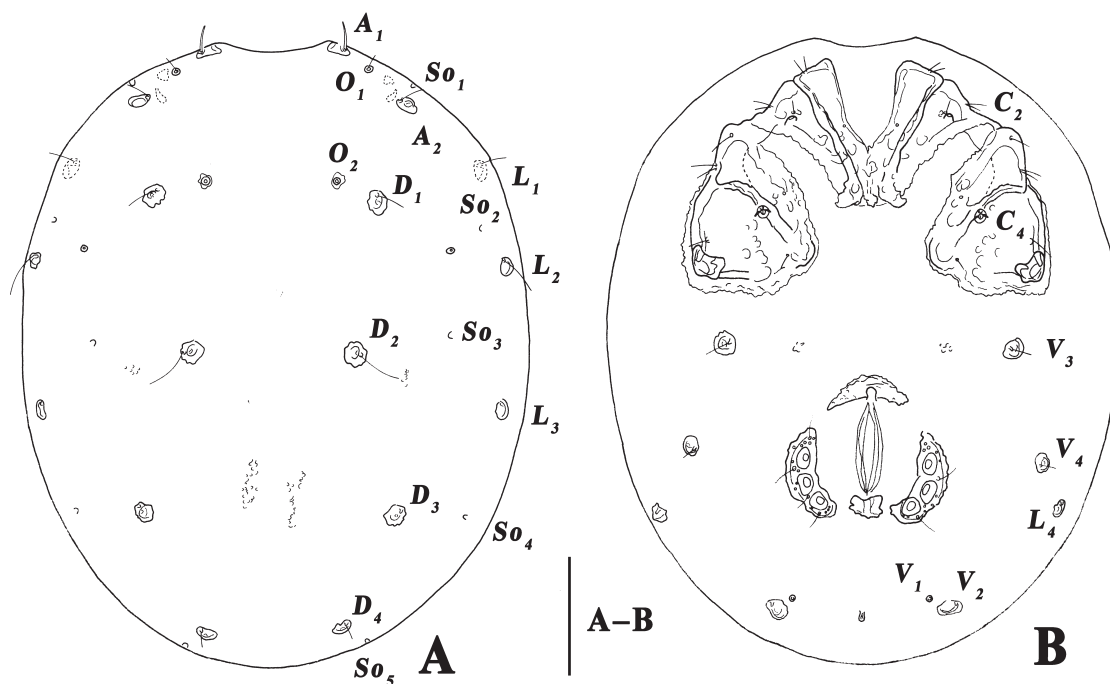


Fig. 7. *Atractides (Atractides) menyuanensis* Zhang, Li & Guo sp. nov., paratype, ♀ (GUGC, Slide No. QH-HY-2020072902). **A.** Idiosoma, dorsal view. **B.** Idiosoma, ventral view. Scale bars = 100 μ m.

Description

Male (n = 1)

Idiosoma oval, dorsal muscle attachment unsclerotized; all slit organs visible, So_1 near the eye capsule, So_2 near L_2 , So_3 at the level of D_2 , So_4 at the level of D_3 , So_5 on the outside of D_4 (Fig. 6A). ACG fused together and with a suture, PCG separated; apodemes from ACG not reaching to PCG; Ac in an obtuse

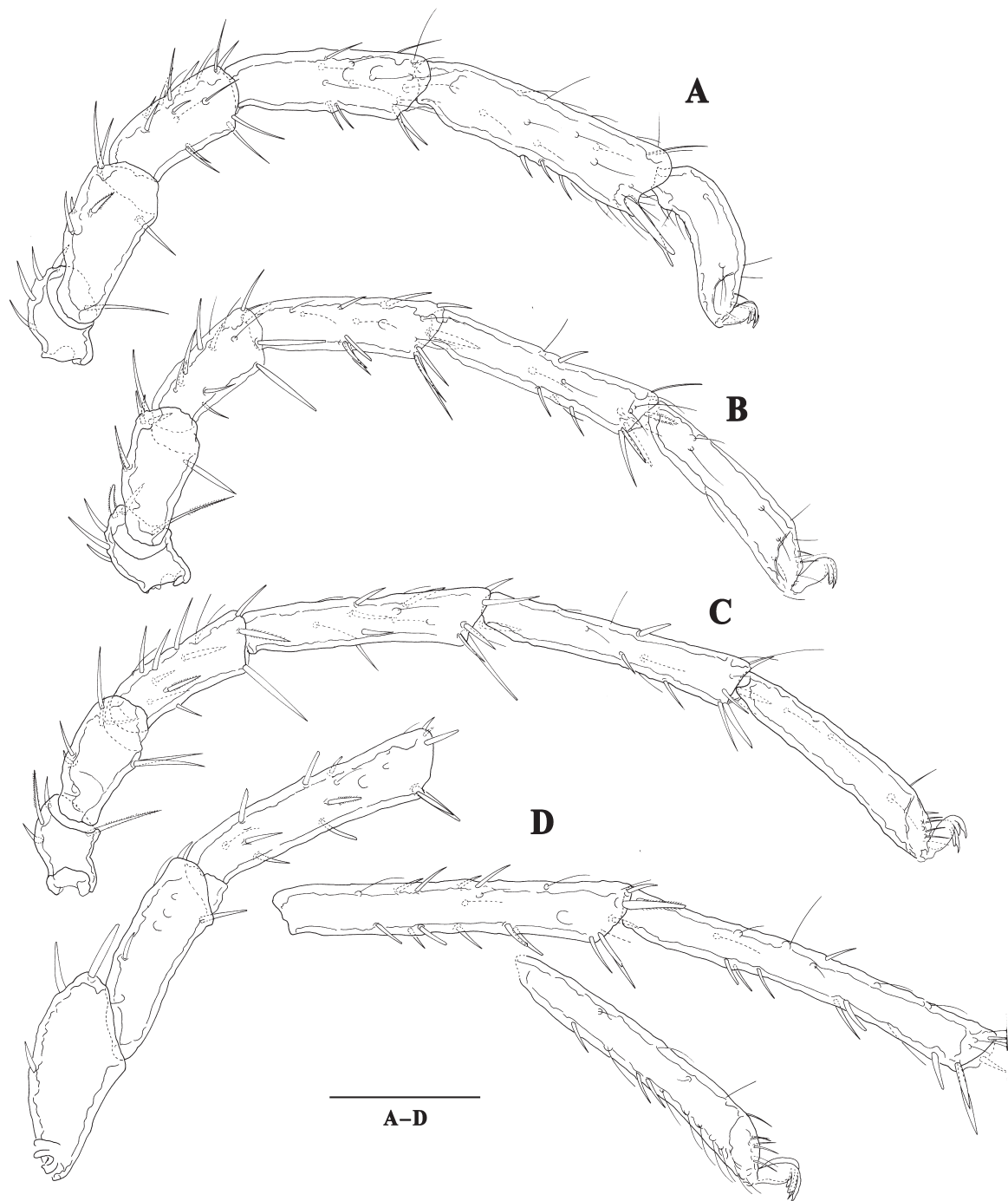


Fig. 8. *Atractides (Atractides) menyuanensis* Zhang, Li & Guo sp. nov., holotype, ♂ (GUGC, Slide No. QH-HY-2020072901). **A–D.** I–L–IV–L. Scale bar = 100 μ m.

triangle; V_1 separated from V_2 ; V_3 and V_4 forming a trapezoid, V_4 at the same level as the anterior of acetabular plate (Fig. 6B). Palp five-segmented; P-2 ventral margin slightly convex; P-3 ventral margin nearly straight; P-4 with numerous dorsal hairs, two long hairs on the ventral surface of P-4 near the base, sword seta near the base (Fig. 6E). I-L-5 longish, S-1 close to S-2; I-L-6 curved (Fig. 8A).

Female (n = 5)

Similar to male (Figs 6F, 7). Idiosoma oval; ACG and PCG significantly smaller than the male; Ac in a weakly curved line (Fig. 7B).

Measurements

Male (n = 1)

Idiosoma L 708, W 582; coxal field L 352, Cx-III W 415, ACG IL 232, mL 92, W 323; infracapitular bay L 146; genital field L 141, Ac1–3 L 35, 35, 38; chelicera L 223; infracapitulum L 210; palp dL: P-1 37, P-2 70, P-3 63, P-4 122, P-5 31; legs segments: I-L-1 dL 57, I-L-2 dL 106, I-L-3 dL 101, I-L-4 dL 139, I-L-5 dL 182, HB 50, I-L-6 dL 102, HB 32, S-1 L 58, S-2 L 58; dL: II-L-1 57, II-L-2 95, II-L-3 93, II-L-4 135, II-L-5 158, II-L-6 157; dL: III-L-1 55, III-L-2 102, III-L-3 114, III-L-4 165, III-L-5 191, III-L-6 180; dL: IV-L-1 118, IV-L-2 138, IV-L-3 181, IV-L-4 240, IV-L-5 272, IV-L-6 217.

Female (n = 5)

Idiosoma L 1074 (1050–1113), W 935 (868–935); coxal field L 385 (385–432), Cx-III W 575 (550–585), ACG IL 248 (248–299), mL 111 (111–130), W 373 (373–417); infracapitular bay L 130 (105–163); gonopore L 168 (161–190), Ap L 157 (145–171), Ac1–3 L 38 (34–48), 39 (39–49), 37 (32–48); chelicera L 264 (253–283); infracapitulum L 215 (214–244); palp dL: P-1 46 (40–46), P-2 75 (75–86), P-3 66 (66–80), P-4 126 (121–145), P-5 37 (36–37); legs segments: I-L-1 dL 62 (62–77), I-L-2 dL 106 (106–136), I-L-3 dL 107 (107–126), I-L-4 dL 153 (151–176), I-L-5 dL 200 (200–233), HB 53 (53–59), I-L-6 dL 120 (120–132), HB 31 (31–36), S-1 L 63 (62–68), S-2 L 63 (62–69); dL: II-L-1 61 (61–72), II-L-2 93 (93–109), II-L-3 109 (98–124), II-L-4 144 (142–163), II-L-5 168 (168–204), II-L-6 170 (170–191); dL: III-L-1 67 (65–84), III-L-2 102 (102–116), III-L-3 119 (115–137), III-L-4 178 (178–203), III-L-5 208 (206–233), III-L-6 200 (190–212); dL: IV-L-1 149 (129–149), IV-L-2 159 (156–179), IV-L-3 202 (191–234), IV-L-4 261 (252–294), IV-L-5 286 (276–321), IV-L-6 232 (223–255).

Remarks

The new species *Atractides (Atractides) menyuanensis* sp. nov. is similar to *Atractides algeriensis* Lundblad, 1942 in the following points: (1) apodemes from ACG not reaching to Cx-IV; (2) P-2 ventral margin slightly convex, P-3 ventral margin nearly straight; (3) Ac in a weakly curved line in female. However, *A. (A.) menyuanensis* differs from *A. algeriensis* in following aspects: (1) two long hairs on the ventral surface of P-4 near the base, sword seta near the base in *A. (A.) menyuanensis*, but the ventral surface of P-4 divided by two long ventral hairs in 1:1:1, sword seta at the middle of P-4 in *A. algeriensis*; (2) S-1 much more close to S-2 in *A. (A.) menyuanensis* than in *A. algeriensis*; (3) I-L-6 of *A. algeriensis* much longer and more slender than that of *A. (A.) menyuanensis* (Gerecke 2003).

Atractides (Atractides) longiprojectus Zhang, Li & Guo sp. nov.

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Figs 9–10

Diagnosis

Dorsal muscle attachment unsclerotized, setae of D_1 and D_2 significantly longer than others, setae of D_1 nearly reaching to D_2 , setae of D_2 extending beyond D_3 . I-L-5 longish, S-1 and S-2 with a narrow setal interspace between them, S-1 longer than S-2. I-L-6 straight. Ac in a weakly curved line; V_1 separated

from V_2 , P-2 with an unobvious ventral projection; P-3 ventral margin slightly convex; the ventral edge of P-4 divided by two long hairs in 2:1:2, sword seta at two thirds of P-4.

Etymology

The Latin prefix ‘*longi-*’ means long, ACG of the female of this new species is with a particularly long hind projection.

Type material

Holotype

CHINA • ♀; Qinghai Province, Haibei Tibetan Autonomous Prefecture, Menyuan Hui Autonomous County, Quankou Town; 37°31′31″ N, 101°81′12″ E; 2691 m a.s.l.; 29 Jul. 2020; Hai-Tao Li leg.; running water; GUGC, Slide No. QH-HY-2020072907.

Paratypes

CHINA • 2 ♀♀; same collection data as for holotype; GUGC, Slides No. QH-HY-2020072908, 2020072909.

Description

Female (n = 3)

Idiosoma oval, dorsal muscle attachment unsclerotized; O_2 and D_1 at the same level; setae of D_1 and D_2 significantly longer than others, setae of D_1 nearly reaching to D_2 , setae of D_2 extending beyond D_3 ; all slit organs visible, So_1 near the eye capsule, So_2 at the same level as D_1 , So_3 near D_2 , So_4 in front of L_p , So_5 behind of D_4 (Fig. 9A). Coxal group occupying a half of ventral surface, projections from ACG extending to Cx-IV; Ac in a weakly curved line; V_1 separated from V_2 ; V_3 and V_4 forming a rectangle, V_4 at the same level as the anterior of acetabular plate (Fig. 9B). Palp five-segmented; P-2 with an unobvious ventral projection; P-3 ventral margin slightly convex; P-4 with numerous dorsal hairs, the ventral edge of P-4 divided by two long hairs in 2:1:2, sword seta at two thirds of P-4 (Fig. 9E). I-L-5 longish, S-1 and S-2 with a narrow setal interspace, S-1 longer than S-2. I-L-6 straight (Fig. 10A).

Measurements

Female (n = 3)

Idiosoma L 530 (530–663), W 419 (419–547); coxal field L 320 (320–361), Cx-III W 353 (353–406), ACG IL 244 (244–295), mL 126 (126–163), W 297 (296–336); infracapitular bay L 143 (133–151); gonopore L 98 (98–118), Ap L 120 (118–128), Ac1–3 L 35 (35–41), 39 (39–45), 30 (30–38); chelicera L 251 (251–275); infracapitulum L 227 (226–239); palp dL: P-1 35 (32–35), P-2 68 (68–79), P-3 75 (75–82), P-4 106 (106–110), P-5 27 (27–31); legs segments: I-L-1 dL 45 (45–53), I-L-2 dL 103 (100–113), I-L-3 dL 103 (96–112), I-L-4 dL 153 (152–163), I-L-5 dL 166 (166–180), HB 37 (37–39), I-L-6 dL 134 (134–144), HB 34 (34–37), S-1 L 57 (57–72), S-2 L 47 (46–54); dL: II-L-1 53 (53–56), II-L-2 96 (89–104), II-L-3 96 (92–102), II-L-4 130 (130–141), II-L-5 140 (140–153), II-L-6 141 (140–152); dL: III-L-1 53 (51–59), III-L-2 87 (79–106), III-L-3 101 (101–115), III-L-4 154 (153–168), III-L-5 178 (170–189), III-L-6 163 (160–178); dL: IV-L-1 108 (108–120), IV-L-2 141 (135–141), IV-L-3 182 (178–195), IV-L-4 219 (219–239), IV-L-5 246 (234–255), IV-L-6 204 (197–218).

Male

Unknown.

Remarks

The new species *Atractides (Atractides) longiprojectus* sp. nov. is similar to *Atractides inflatipalpis* K. Viets, 1950 in the following points: (1) V_1 separated from V_2 ; (2) S-1 longer than S-2; (3) P-2

with an unobvious ventral projection. However, *A. (A.) longiprojectus* differs from *A. inflatipalpis* in the following aspects: (1) P-3 ventral margin slightly convex in *A. (A.) longiprojectus*, but straight in *A. inflatipalpis*; (2) I-L-6 straight in *A. (A.) longiprojectus*, but curved in *A. inflatipalpis*; (3) the pregenital sclerite of *A. inflatipalpis* in female much bigger than *A. (A.) longiprojectus* (Gerecke 2003).

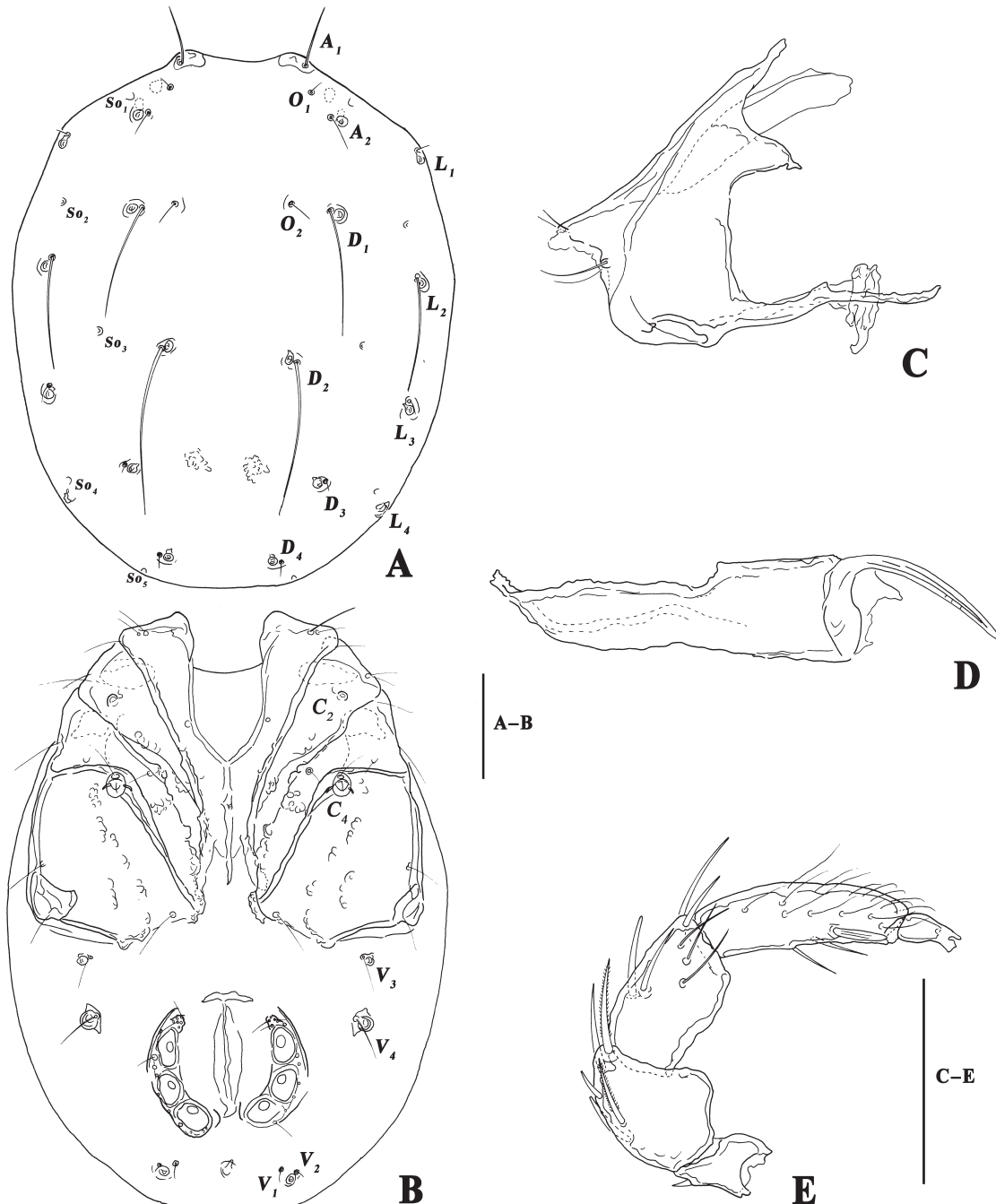


Fig. 9. *Atractides (Atractides) longiprojectus* Zhang, Li & Guo sp. nov., holotype, ♀ (GUGC, Slide No. QH-HY-2020072907). **A.** Idiosoma, dorsal view. **B.** Idiosoma, ventral view. **C.** Gnathosoma. **D.** Chelicera. **E.** Palp. Scale bars = 100 µm.

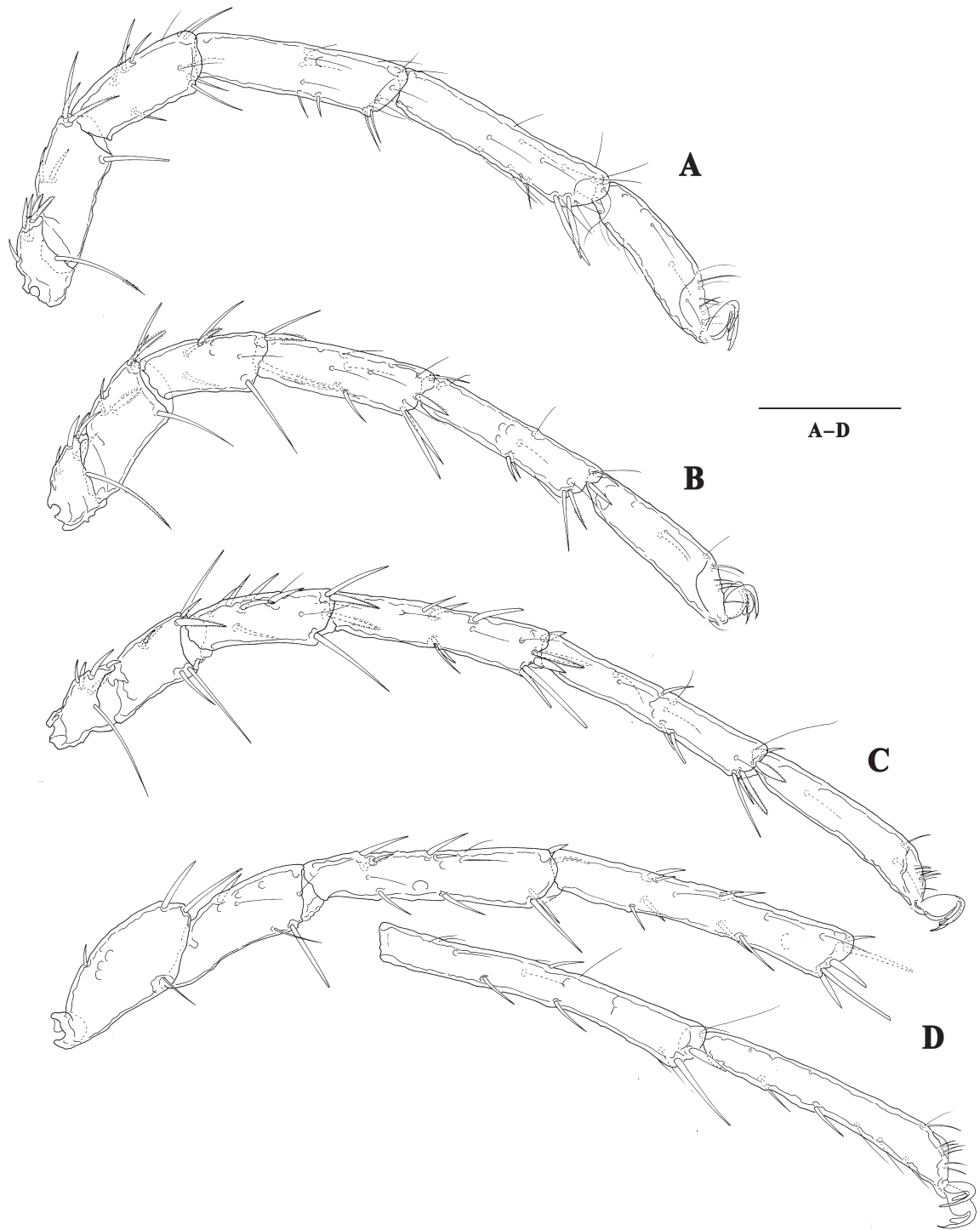


Fig. 10. *Atractides (Atractides) longiprojectus* Zhang, Li & Guo sp. nov., holotype, ♀ (GUGC, Slide No. QH-HY-2020072907). **A–D.** I-L–IV-L. Scale bar = 100 µm.

Atractides (Atractides) xianmiensis Zhang, Li & Guo sp. nov.
urn:lsid:zoobank.org:act:FB29B7EB-1A14-450E-80E2-4795C3B299EA

Figs 11–13

Diagnosis

Male

Dorsal muscle attachment unsclerotized. I-L-5 longish, S-1 and S-2 both with blunt tips and with a setal interspace between them; I-L-6 straight. Ac in an obtuse triangle; V_1 separated from V_2 . P-2 and P-3 with a ventral projection respectively, P-4 with numerous dorsal hairs, ventral hairs long, one at the middle of the surface, and the other one at the terminal of lateral edge, sword seta at the middle of P-4.

Female

Ac in a weakly curved line. P-2 with a ventral projection, P-3 ventral margin slightly convex, P-4 divided by two ventral hairs in sectors 1:1:1.

Etymology

The new species is named after the name of the Xianmi National Nature Reserve where the specimens were collected.

Type material

Holotype

CHINA • ♂; Qinghai Province, Xianmi National Nature Reserve; 37°10'56" N, 102°20'03" E; 2949 m a.s.l.; 29 Jul. 2020; Hai-Tao Li leg.; running water; GUGC, Slide No. QH-HY-2020072910.

Paratypes

CHINA • 3 ♂♂; same collection data as for holotype; GUGC, Slides No. QH-HY-2020072911 to 2020072913 • 2 ♀♀; same collection data as for holotype; GUGC, Slides No. QH-HY-2020072914, 2020072915.

Description

Male (n = 4)

Idiosoma oval, dorsal muscle attachment unsclerotized; So_1 near eye capsule; So_2 at the same level as D_1 ; So_3 at the same level as D_2 ; So_4 in front of L_4 ; So_5 behind D_4 (Fig. 11A). ACG fused together and with a suture, apodemes of ACG well developed, and reaching to Cx-III; Ac in an obtuse triangle, Ac3 biggest; V_1 separated far from V_2 , V_3 and V_4 forming a rectangle, V_4 at the same level as the anterior part of acetabular plate (Fig. 11B). Palp five-segmented; P-2 and P-3 with a ventral projection respectively, P-4 with numerous dorsal hairs, ventral hairs long, one at the middle of the surface, and the other one at the terminal of lateral edge, sword seta at the middle of P-4 (Fig. 11E). I-L-5 longish, S-1 and S-2 with blunt tips and with a setal interspace between them; I-L-6 straight (Fig. 13A).

Female (n = 2)

Similar to male (Fig. 12). Ac in a weakly curved line (Fig. 12B). P-2 with a ventral projection, P-3 ventral margin slightly convex, P-4 divided by two ventral hairs in sectors 1:1:1 (Fig. 11F).

Measurements

Male (n = 4)

Idiosoma L 724 (724–896), W 605 (605–734); coxal field L 351 (351–395), Cx-III W 426 (426–483), ACG IL 251 (251–287), mL 131 (131–159), W 329 (329–372); infracapitular bay L 132 (132–160); genital field L 131 (131–144), Ac1–3 L 39 (36–41), 32 (32–43), 36 (36–46); chelicera L 227 (227–267); infracapitulum L 207 (207–239); palp dL: P-1 30 (30–37), P-2 69 (69–80), P-3 76 (76–89), P-4 107

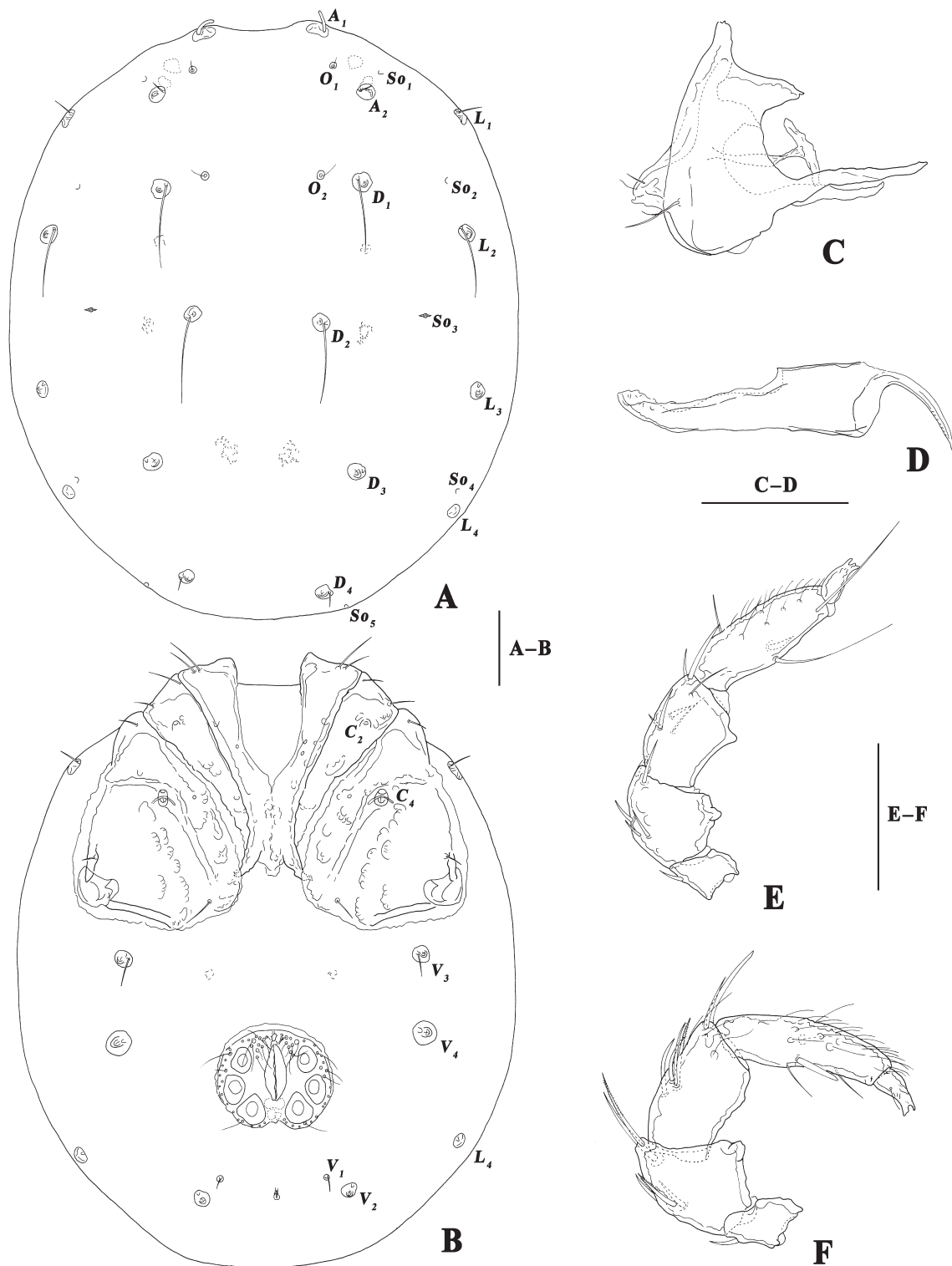


Fig. 11. *Atractides (Atractides) xianmiensis* Zhang, Li & Guo sp. nov. A–E. Holotype, ♂ (GUGC, Slide No. QH-HY-2020072910). F. Paratype, ♀ (GUGC, Slide No. QH-HY-2020072914). A. Idiosoma, dorsal view. B. Idiosoma, ventral view. C. Gnathosoma. D. Chelicera. E. Palp. F. Palp. Scale bars = 100 µm.

(107–121), P-5 34 (33–34); Legs segments: I-L-1 dL 47 (47–56), I-L-2 dL 107 (107–126), I-L-3 dL 110 (110–125), I-L-4 dL 165 (165–191), I-L-5 dL 188 (188–214), HB 42 (42–46), I-L-6 dL 145 (145–160), HB 34 (32–34), S-1 L 67 (67–73), S-2 L 58 (58–65); dL: II-L-1 55 (47–59), II-L-2 94 (94–108), II-L-3 100 (100–113), II-L-4 141 (141–162), II-L-5 161 (161–184), II-L-6 154 (154–174); dL: III-L-1 54 (51–63), III-L-2 93 (93–112), III-L-3 109 (109–124), III-L-4 166 (166–191), III-L-5 194 (194–226), III-L-6 178 (178–200); dL: IV-L-1 131 (129–137), IV-L-2 154 (154–161), IV-L-3 187 (187–211), IV-L-4 240 (240–274), IV-L-5 260 (260–303), IV-L-6 224 (224–246).

Female (n = 2)

Idiosoma L 925 (1215), W 754 (1042); coxal field L 403 (422), Cx-III W 515 (576), ACG IL 303 (323), mL 133 (131), W 405 (403); infracapitular bay L 180 (179); gonopore L 145 (190), Ap L 156 (156), Ac1–3 L 49 (48), 43 (45), 43 (46); chelicera L 291 (297); infracapitulum L 269 (268); palp dL: P-1 36 (46), P-2 84 (88), P-3 97 (103), P-4 124 (123), P-5 36 (39); legs segments: I-L-1 dL 59 (64), I-L-2 dL 122 (136), I-L-3 dL 131 (141), I-L-4 dL 193 (205), I-L-5 dL 220 (227), HB 47 (47), I-L-6 dL 165 (173), HB 39 (35), S-1 L 87 (78), S-2 L 74 (72); dL: II-L-1 64 (50), II-L-2 108 (106), II-L-3 121 (133), II-L-4 166 (180), II-L-5 188 (200), II-L-6 175 (186); dL: III-L-1 54 (68), III-L-2 114 (112), III-L-3 131 (142), III-L-4 198 (212), III-L-5 233 (241), III-L-6 208 (215); dL: IV-L-1 150 (160), IV-L-2 162 (174), IV-L-3 211 (228), IV-L-4 270 (293), IV-L-5 246 (314), IV-L-6 211 (265).

Remarks

The new species *Atractides (Atractides) xianmiensis* sp. nov. is similar to *Atractides inflatus* Walter, 1925 in the following points: (1) P-2 and P-3 of the male both with a ventral projection respectively; (2) V_1 not fused to V_2 ; (3) S-1 and S-2 both with blunt tips and with a setal interspace between them; (4) Ac in an obtuse triangle in the male and in a weakly curved line in the female. However, *A. (A.) xianmiensis*

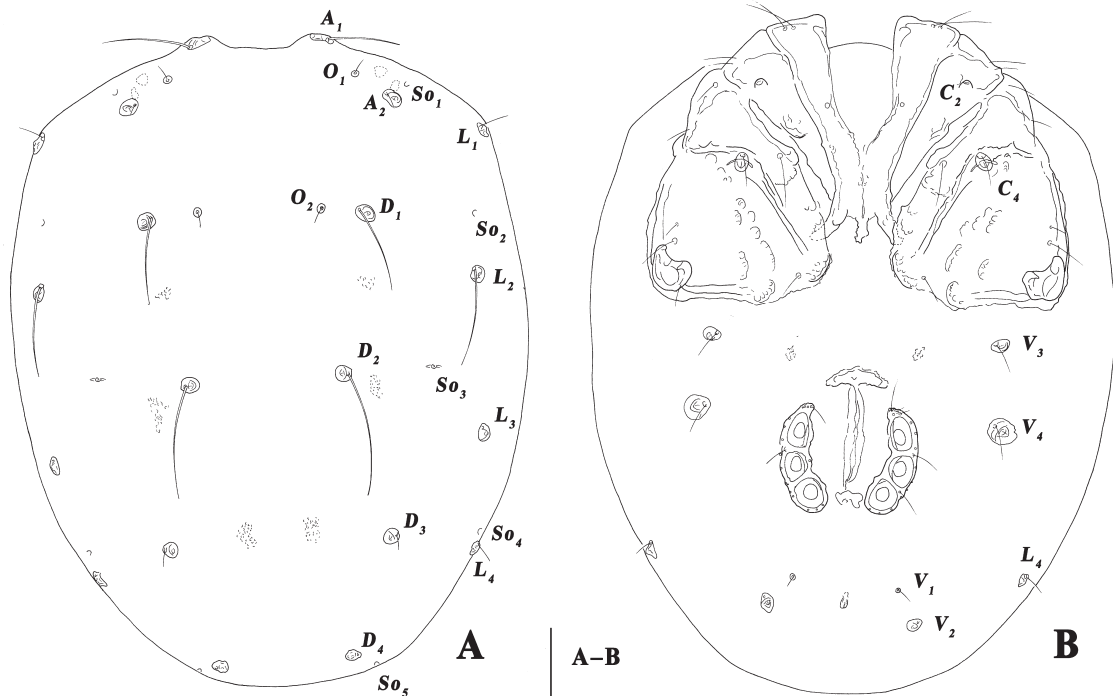


Fig. 12. *Atractides (Atractides) xianmiensis* Zhang, Li & Guo sp. nov., paratype, ♀ (GUGC, Slide No. QH-HY-2020072914). **A.** Idiosoma, dorsal view. **B.** Idiosoma, ventral view. Scale bar = 100 µm.

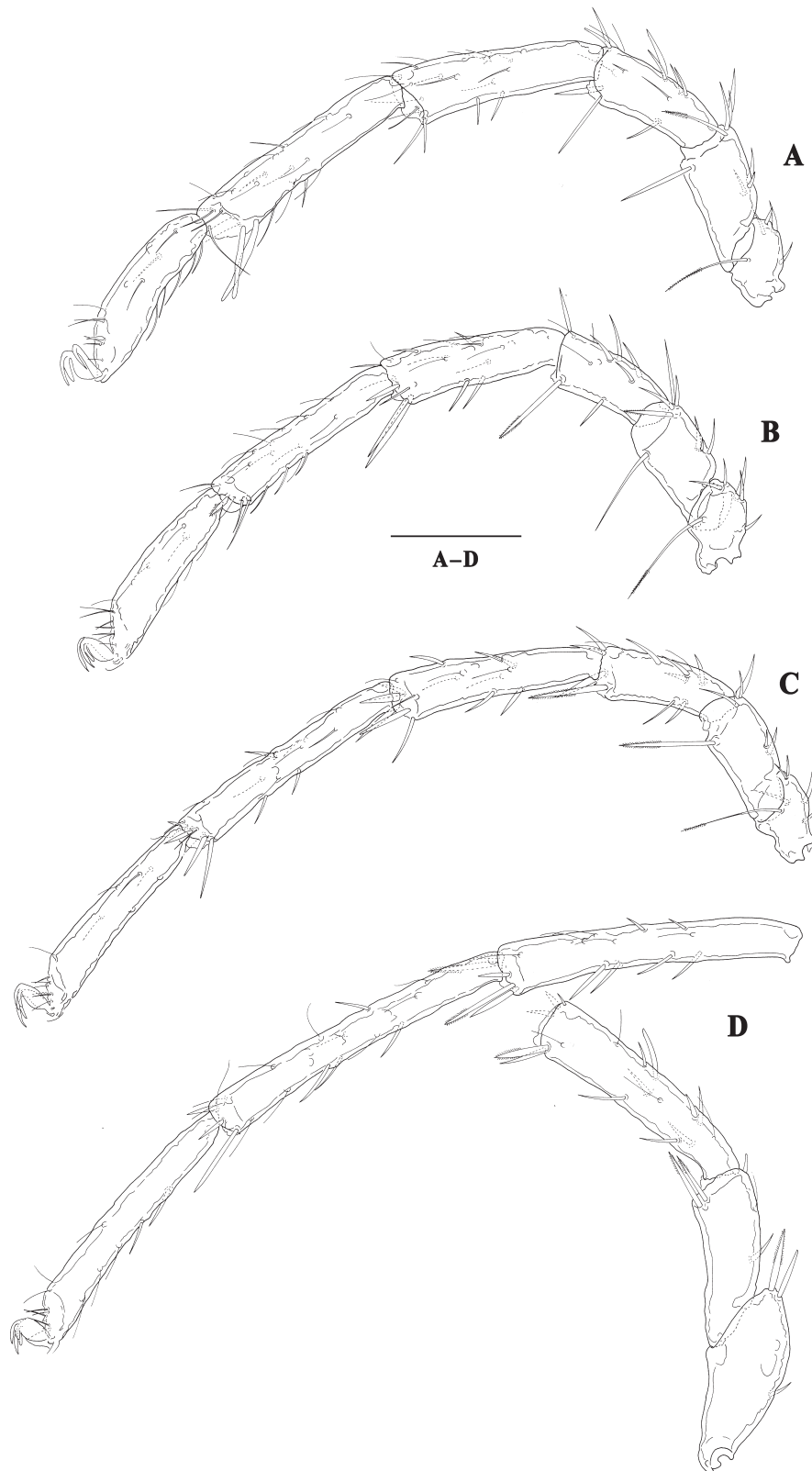


Fig. 13. *Atractides (Atractides) xianmiensis* Zhang, Li & Guo sp. nov., holotype, ♂ (GUGC, Slide No. QH-HY-2020072910). **A–D.** I-L–IV-L. Scale bar = 100 μ m.

differs from *A. inflatus* in the following aspects: (1) apodemes of ACG in female well developed and reaching to Cx-III in *A. (A.) xianmiensis*, but not reaching to Cx-III in *A. inflatus*; (2) I-L-6 straight in *A. (A.) xianmiensis*, but curved in *A. inflatus* (Gerecke 2003).

Discussion

Due to the soft body wall and few specialized structures, there are only a few taxonomic features that can be used for species identification in *Atractides*, which might cause confusion in the taxonomy of these species. So it is of great importance to search for new taxonomic features in *Atractides*. Jin (1997) mentioned that the relative position of glandularia is different in various groups of water mites, and Ramírez-Sánchez *et al.* (2016) also mentioned that glandularia in Arrenuridae Thor, 1900 could be potential taxonomic characters. So the relative position of glandularia may be among the new taxonomic features that can be used in the taxonomy of *Atractides*. For example, the coxae group and palps of *Atractides (Atractides) biprojectus* sp. nov. and *Atractides (Atractides) xianmiensis* sp. nov. are similar in morphology, but the relative position of V_3 in relation to V_4 and V_4 in relation to the genital field in *A. (A.) biprojectus* is significantly different from that in *A. (A.) xianmiensis*. Therefore, it is suggested to mention the relative position of glandularia on the body wall when describing and drawing species of *Atractides*.

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