Three new species and one new record of Torrenticolidae (Acari, Hydrachnidia) from Wuyishan with an updated key for Chinese fauna

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Abstract. New data of Torrenticolidae Piersig, 1902 are presented in this paper from Wuyishan National Nature Reserve, P. R. China. Three new species, Torrenticola suptilisrostrum Gu & Guo sp. nov., Torrenticola spinextension Gu & Guo sp. nov. and Torrenticola wuyiensis Gu & Guo sp. nov. are described and illustrated in detail, and one new record for Chinese fauna is given, Torrenticola dentifera Wiles, 1991, which was originally described from Malaysia. In addition, an updated key is provided to all species of Torrenticolidae in China.

Keywords. Hydrachnidia, Torrenticolidae, new species, new record, Chinese fauna.

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Introduction

Torrenticolidae Piersig, 1902 is diverse in species, and distributes all six zoogeographic kingdoms worldwide. To date, there are more than 600 species all over the world, while only 28 species from China, which shows a big gap between the international and Chinese research levels (Gu & Guo 2019).

China is the third biggest country in the world, and rich in animal species. During a survey of water mites, four species are added to Chinese fauna from Wuyishan National Nature Reserve, of which three species are described and illustrated as new to science, Torrenticola suptilisrostrum Gu & Guo sp. nov., Torrenticola spinextension Gu & Guo sp. nov. and Torrenticola wuyiensis Gu & Guo sp. nov., and
one new record for Chinese fauna is given, *Torrenticola dentifera* Wiles, 1991, which was originally described from Malaysia.

**Material and methods**

Water mites were collected, preserved, cleaned and mounted following Jin (1997). Abbreviations used for morphological terms follow Jin (1997), Goldschmidt (2007). Abbreviations used for the chaetotaxy and nomenclature of glandularia used follows Jin (1997). Abbreviations of dorsal plate arrangements used follows Wiles (1997). Abbreviations used for institutional abbreviations follow Zhang (2018).

**Abbreviations used for morphological terms**

| Abbreviation | Definition |
|--------------|------------|
| aL           | apical length |
| Ap           | anal pore   |
| bs           | basal segment of chelicera |
| Cx-I–Cx-IV   | coxae I–IV |
| dL           | dorsal length |
| Gf           | Genital field |
| I-L-1–6, etc.| first leg segments 1–6, etc. |
| L            | length |
| mL           | medial length |
| P-1–5        | palp segment 1–5 |
| vL           | ventral length |
| W            | width |

**Abbreviations used for the chaetotaxy and nomenclature of glandularia**

| Abbreviation | Definition |
|--------------|------------|
| A₂           | postantennal glandularia |
| D₁–D₄        | dorsoglandularia 1–4 |
| E₂,E₄        | epimeroglandularia 2, 4 |
| L₁–L₄        | lateroglandularia 1–4 |
| O₃           | postocularia |
| V₁–V₄        | ventroglandularia 1–4 |

**Abbreviations used for dorsal plate arrangements**

| Abbreviation | Definition |
|--------------|------------|
| 2+1          | three plates: two anterior platelets and a single large dorsal plate, the posterior platelets are fused to the large dorsal plate |
| 4+1          | five plates: four anterior platelets and a single large dorsal plate |
| 2+2p+1       | five plates with the posterior pair of anterior platelets partially fused to the dorsal plate |

All measurements are given in μm, length of palp and leg segments are given as dorsal length, following Goldschmidt (2007). Measurements for paratype are given in brackets. All the specimens examined are deposited in GUGC.

**Institutional abbreviations**

GUGC = Institute of Entomology, Guizhou University, Guiyang, China
Results

Class Arachnida Lamarck, 1801
Family Torrenticolidae Piersig, 1902

Genus *Torrenticola* Piersig, 1896

*Torrenticola suptilisrostrum* Gu & Guo sp. nov.
urn:lsid:zoobank.org:act:EEBC35EF-7EFE-4FEA-978D-3D4D2D869986
Figs 1–4

Fig. 1. *Torrenticola suptilisrostrum* Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180801). A. Dorsal view. B. Ventral view. C. Infracapitulum and chelicera. Scale bars = 100 μm.
Diagnosis
Idiosoma elliptical; dorsal plate arrangement: 2+2p+1; dorsal plate with a colour pattern, hour-glass-shaped with pale “shoulder-patches”; infracapitular bay V-shaped; E₄ on the same line with the 4th pair of acetabula; infracapitular rostrum extremely slender and slightly curved towards the dorsum.

Etymology
The specific name is from the Latin words “suptilis” (slender) and “rostrum” (beak), referring to the slender rostrum; used as a noun in apposition.

Fig. 2. Torrenticola suptilisrostrum Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180801). A. Palp, lateral view. B. leg-I. C. leg-II. D. leg-III. E. leg-IV. F. Ejaculatory complex. Scale bar = 100 μm.
Material examined

Holotype
China ♂; Wuyishan; 27°40′54″ N, 117°47′31″ E, 311 m a.s.l.; 4 Aug. 2018; X.Y. Gu leg.; FJ-TO-20180801.

Paratypes
China 1 ♂, 1 ♀; same collection data as for holotype; FJ-TO-20180802 to FJ-TO-20180803.

Fig. 3. *Torrenticola suptilisrostrum* Gu & Guo sp. nov., ♂, paratype (FJ-TO-20180803). A. Dorsal view. B. Ventral view. C. Infracapitulum and chelicera. Scale bars = 100 μm.
Description

Male (n = 2)

Body. Idiosoma elliptical, L/W ratio 1.5 (1.5) (Fig. 1B). Dorsal plate arrangement: 2+2p+1; dorsal plate with colour pattern, hour-glass-shaped with pale “shoulder-patches” (Fig. 1A). Infracapitular bay V-shaped, Cx-II–III mL relatively long; E₄ on same line with 4th pair of acetabula; V₁ anterior to V₂, V₂ almost at same level of Ap (Fig. 1B). Gnathosoma dorsal apodeme short and blunt, ventral apodeme long and wide, rostrum long, extremely slender, curved slightly to dorsum (Fig. 1C). Palp (Fig. 2A): P-1 long, with one dorsal seta; P-2 with three dorsal setae and one ventral seta on ventrodistal prolongation, which is slender and curved towards distal; P-3 with two dorsal setae and one ventral seta on ventrodistal prolongation; P-4 with two developed ventral extensions, bearing one long and three short setae. Legs I–IV as shown in Fig. 2B–E. Ejaculatory complex with well developed anterior keel and proximal arms (Fig. 2F).

Fig. 4. Torrenticola suptilisrostrum Gu & Guo sp. nov., ♀, paratype (FJ-TO-20180803). A. Palp, lateral view. B. leg-I. C. leg-II. D. leg-III. E. leg-IV. Scale bar = 100 μm.
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**MEASUREMENTS.** Idiosoma L 688 (698), W 462 (454); dorsal shield L 563 (563), W 418 (402); dorsal plate L 509 (529), frontal platelets L 122 (115), shoulder platelets L 169 (168). Infracapitular bay depth 160 (170); Cx-I L 207 (204), mL 104 (105), Cx-II–III mL 103 (99); Gf L 138 (137), W 105 (112), distance between Gf and Ap 118 (133). Gnathosoma vL 351 (359), dL 277 (280), chelicera bs L 307 (376), claw L 39 (44). Ejaculatory complex (Fig. 2f), L 177 (166), aL 123 (112), W 85 (78). L of palp segments: P-1, 40 (42); P-2, 114 (121); P-3, 61 (53); P-4, 94 (103); P-5, 16 (13). L of leg segments: I-L-1–6: 39 (35), 82 (78), 85 (83), 99 (102), 106 (112), 92 (94); II-L-1–6: 53 (34), 95 (86), 67 (74), 94 (90), 104 (109), 98 (108); III-L-1–6: 44 (34), 90 (59), 76 (84), 112 (109), 128 (128), 128 (129); IV-L-1–6: 94 (112), 105 (93), 107 (113), 128 (144), 143 (150), 137 (121).

**Female (n = 1)**

**BODY.** Body features same as for the male.

**MEASUREMENTS.** Idiosoma L 687, W 460. Dorsal shield L 558, W 418; dorsal plate L 512, frontal platelets L 175. Infracapitular bay L 159; Cx-I L 194, mL 89, Cx-II–III mL 105. Gf L 135, W 104, distance between Gf and Ap 125. Gnathosoma vL 330, dL 256, chelicera bs L 338, claw L 66. L of palp: P-1, 35; P-2, 127; P-3, 62; P-4, 118; P-5, 19. L of leg segments: I-L-1–6: 34, 83, 81, 95, 107, 95; II-L-1–6: 34, 54, 69, 93, 104, 96; III-L-1–6: 44, 58, 74, 107, 123, 122; IV-L-1–6: 105, 90, 110, 142, 150, 141.

**Distribution**

China (Wuyishan).

**Habitat**

Streamlet.

**Remarks**

The new species, *Torrenticola suptilisrostrum* sp. nov., is similar to *T. fagei* E. Angelier, 1949 (Martin 2009). The new species shares the character of an infracapitular rostrum extremely slender and slightly curved towards the dorsum with *T. fagei*. However, *T. suptilisrostrum* sp. nov. differs from the latter by *E4* on the same line with the 4th pair of acetabula (5th in *T. fagei*); dorsal plate 2+2p+1 (dorsal plate 4+1 in *T. fagei*); P-2 robust and compact (P-2 relatively thin and long in *T. fagei*).

**Torrenticola spinextension** Gu & Guo sp. nov.

*urn:lsid:zoobank.org:act:2CAE5F0A-B477-4CE0-B712-3F609A7B6284*  
Figs 5–8

**Diagnosis**

Idiosoma elliptical; dorsal plate arrangement: 4+1; infracapitular bay narrow U-shaped; *Vj* anterior to *Vj′*, *Vj′* almost at the same level of Ap; P-2 with a laterally compressed, apically serrated and spine-like ventrodistal extension.

**Etymology**

Named after the shape of ventral extension on P-2. The specific name is from Latin words “spina” (thorn), there we used “spin-” and ”extension” (extension or prolongation); used as a noun in apposition.
Material examined

Holotype
China • ♂; Wuyishan; 27°40'54" N, 117°47'31" E, 311 m a.s.l.; 4 Aug. 2018; X.Y. Gu leg.; FJ-TO-20180804.

Paratype
China • 1 ♀; same collection data as for holotype; FJ-TO-20180805.

Fig. 5. Torrenticola spinextension Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180804). A. Dorsal view. B. Ventral view. C. Ejaculatory complex. D. Infracapitulum and chelicera. Scale bars = 100 μm.
Description

Male (n = 1)

BODY. Idiosoma elliptical, L/W ratio 1.5 (Fig. 5B). Dorsal plate arrangement: 4+1 (Fig. 5A). Infracapitular bay U-shaped, Cx-II–III mL relatively long; E4 on same line with 4th pair of acetabula; V1 anterior to V2, V2 slightly rostral to Ap (Fig. 5B). Ejaculatory complex with well-developed anterior keel and proximal arms (Fig. 5C). Gnathosoma dorsal apodeme short and pointed, ventral apodeme long and wide (Fig. 5D). Palp: P-1 long, with one dorsal seta; P-2 short and wide, with three dorsal setae, laterally compressed, apically serrated and spine-like ventrodistant extension, one very short seta laterally at the base of extension; P-3 with two dorsal setae, and one ventral seta on ventral prolongation; P-4 with one tiny dorsal seta and two ventral extensions, bearing one long and three short setae (Fig. 6A). Legs I–IV as shown in Fig. 6B–E: the claw of Leg-I damaged.

MEASUREMENTS. Idiosoma L 635, W 429. Dorsal shield L 520, W 479, dorsal plate L 479, frontal platelets L 104, shoulder platelets L 157. Infracapitular bay depth 136; Cx-I L 228, mL 92, Cx-II–III mL 110; Gf L 140, W 112, distance between Gf and Ap 108. Gnathosoma vL 296, dL 230, chelicera bs L 305, claw L

![Fig. 6. Torrenticola spinextension Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180804). A. Palp, lateral view. B. leg-I. C. leg-II. D. leg-III. E. leg-IV. Scale bar = 100 μm.](image-url)
50. Ejaculatory complex (Fig. 5C), L 206, aL 139, W 92. L of palp segments: P-1, 32; P-2, 102; P-3, 50; P-4, 101; P-5, 22. L of leg segments: I-L-1–6: 41, 86, 72, 84, 90, 91; II-L-1–6: 37, 82, 65, 82, 95, 109; III-L-1–6: 49, 82, 73, 100, 114, 130; IV-L-1–6: 102, 86, 106, 123, 143, 155.

Female (n = 1)

Body. Body features same as male except: dorsal plate with reddish or dark purple pattern at anterior and posterior parts; location of muscle scars posterior to male; $E_4$ on same line with 5th pair of acetabula; line of primary sclerotization farther ahead $D_3$ and $D_4$.

Fig. 7. Torrenticola spinextension Gu & Guo sp. nov., ♂, paratype (FJ-TO-20180805). A. Dorsal view. B. Ventral view. C. Palp, lateral view. D. Infracapitulum and chelicera. Scale bars = 100 μm.
MEASUREMENTS. Idiosoma L 731, W 487. Dorsal shield L 577, W 427; dorsal plate L 538; frontal platelets L 117; shoulder platelets L 175. Infra-capitular bay depth 161; Cx-I L 267, mL 106, Cx-II–III mL 69; Gf L 150, W 122, distance between Gf and Ap 155. Gnathosoma vL 330, dL 256, chelicera bs L 338, claw L 66. L of palp: P-1, 35; P-2, 127; P-3, 62; P-4, 118; P-5, 19. L of leg segments: I-L-1–6: 39, 64, 78, 95, 98, 96; II-L-1–6: 36, 85, 66, 89, 105, 118; III-L-1–6: 45, 71, 79, 108, 123, 135; IV-L-1–6: 123, 98, 114, 148, 157, 158.

Distribution
China (Wuyishan).

Habitat
Streamlet.

Remarks
By having a laterally compressed, apically serrated and spine-like ventrodistal extension on P-2, and one very short seta laterally at the base of extension, this new species is similar to *T. borneoensis* Pešić & Smit, 2014 (Pešić & Smit 2014). But there are obvious differences: dorsal plate arrangement is 4+1 in *T. spinextension* (2+1 in *T. borneoensis*); ventral extension of P-3 is smooth in *T. spinextension* (serrate in *T. borneoensis*); two ventral extensions on P-4 are close to each other in *T. spinextension* (markedly apart from each other in *T. borneoensis*).

Fig. 8. *Torrenticola spinextension* Gu & Guo sp. nov., ♀, paratype (FJ-TO-20180805). A. leg-I. B. leg-II. C. leg-III. D. leg-IV-1–4. E. leg-IV-5–6. Scale bar = 100 μm.
Torrenticola wuyiensis Gu & Guo sp. nov.
urn:lsid:zoobank.org:act:69E7FE0A-89D6-4CF0-8E20-7E007FA65B62
Figs 9–12

Diagnosis
Idiosoma elliptical; dorsal plate arrangement: 2+2p+1, posterior pair of anterior platelets half fused to dorsal plate; infracapitular bay wide U-shaped; E₄ on same line with 5th pair of acetabula.

Fig. 9. Torrenticola wuyiensis Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180807). A. Dorsal view. B. Ventral view. C. Palp, lateral view. D. Infracapitulum and chelicera. E. Ejaculatory complex. Scale bars = 100 μm.
Etymology
This new species is named after Wuyishan (Wuyi Mountain), where the new species was collected.

Material examined

Holotype
China • ♂; Wuyishan; 27°44′24″ N, 117°41′18″ E, 860 m a.s.l.; 2 Aug. 2018; X.Y. Gu leg.; FJ-TO-20180807.

Paratypes
China • 1 ♂, 4 ♀♀; same collection data as for holotype; FJ-TO-20180808 to FJ-TO-20180812.

Description

Male (n = 2)

BODY. Idiosoma elliptical, L/W ratio 1.44 (1.38) (Fig. 9B). Dorsal plate arrangement: 2+2p+1 (Fig. 9A). Infracapitular bay wide U-shaped, Cx-II–III mL relatively short; E4 on same line with 5th pair of acetabula; V1 anterior to V2, V2 almost at same level of Ap (Fig. 9B). Gnathosoma dorsal apodeme short, ventral

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Fig. 10. *Torrenticola wuyiensis* Gu & Guo sp. nov., ♂, holotype (FJ-TO-20180807). A. leg-I-2–6. B. leg-II. C. leg-III. D. leg-IV-1–4. E. leg-IV-5–6. Scale bar = 100 μm.
apodeme long, rostrum curved slightly to ventrum (Fig. 9D). Ejaculatory complex with well developed anterior keel and proximal arms (Fig. 9E). Palp: P-1 short, with one dorsal seta; P-2 with three dorsal setae, one ventral seta at base of sharp ventral prolongation; P-3 with two dorsal setae, one ventral seta on sharp ventral prolongation; P-4 with two ventral extensions, bearing four setae (Fig. 9C). Legs I–IV showed as Fig. 10.

Fig. 11. *Torrenticola wuyiensis* Gu & Guo sp. nov., ♀, paratype (FJ-TO-20180812). A. Dorsal view. B. Ventral view. C. Palp, lateral view. D. Infracapitulum and chelicera. Scale bars = 100 μm.
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MEASUREMENTS. Idiosoma L 745 (746), W 514 (539); dorsal shield L 607 (614), dorsal plate L 568 (578), frontal platelets L 127 (132). Infracapitular bay L 128 (154); Cx-I L 207 (204), mL 132 (113), Cx-II–III mL 73 (87); Gf L 158 (162), W 100 (109), distance between Gf and Ap 158 (144). Gnathosoma vL 331 (341), dL 252 (274), chelicera bs L 352 (320), claw L 49 (67). Ejaculatory complex (Fig. 13E), L 195 (221), aL 146 (160) width 96 (113). L of palp segments: P-1, 44 (40); P-2, 111 (98); P-3, 61 (60); P-4, 91 (83); P-5, 19 (20). L of leg segments: I-L-1–6: - (43); 96 (92), 78 (91), 100 (102), 119 (118), 127 (110); II-L-1–6: 42 (47), 99 (96), 86 (80), 101 (102), 114 (117), 105 (121); III-L-1–6: 16 (53), 91 (108), 77 (85), 100 (124), 117 (149), 118 (143); IV-L-1–6: 14 (12), 108 (115), 124 (127), 171 (164), 176 (174), 177 (178).

Female (n = 4)

Body. Body features same as male except: P-2 with four dorsal setae; P-3 with three dorsal setae (Fig. 11C); gnathosoma ventral apodeme shorter and thicker (Fig. 11D).

MEASUREMENTS. Idiosoma L 826 (705–826), W 573 (495–573). Dorsal shield L 691 (585–691), dorsal plate L 652 (551–652), frontal platelets L 146 (131–146). Infracapitular bay depth 176 (136–176); Cx-I

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**Fig. 12.** *Torrenticola wuyiensis* Gu & Guo sp. nov., ♀, paratype (FJ-TO-20180812). A. leg-I. B. leg-II. C. leg-III. D. leg-IV-1–4. E. leg-IV-5–6. Scale bar = 100 μm.
**Table 1.** Differences in diagnostic characters between *Torrenticola wuyiensis* sp. nov. and *Torrenticola ussuriensis* (Sokolow, 1940).

|                        | *T. wuyiensis* sp. nov. | Russian Far East | Japan | Korea |
|------------------------|-------------------------|-----------------|-------|-------|
| VE\(^1\) of P-4        | two                     | four            | four  | four  |
| P-2/P-4 ratio          | 1.12–1.24               | 1.08–1.16       | 1.50  | 1.05  |
| \(E_4\)                | 5\(^{th}\)              | 4\(^{th}\) \(\vec{5}\) , 6\(^{th}\) \(\vec{7}\) | 5\(^{th}\) | 5\(^{th}\) |
| Ap & \(V_2\) on the same level | yes                    | Ap posterior    | Ap posterior | on the same level |
| P-3 DE\(^3\) with denticles | no                     | yes             | yes   | yes   |

\(^1\) VE = ventral extensions; \(^2\) on the same line with n pair of acetabula; \(^3\) DE = distal margin.

L 171 (132–171), mL 136 (119–136), Cx-II–III mL 54 (54–78). Gf L 169 (154–169), W 139 (110–139), distance between Gf and Ap 186 (144–186). Gnathosoma vL 363 (323–363), dL 269 (249–269), chelicera bs L 325 (325–378), claw L 63 (59–63). L of palp: P-1, 49 (39–49); P-2, 127 (105–127); P-3, 75 (62–75); P-4, 102 (94–102); P-5, 22 (22–23). L of leg segments: I-L-1–6: 45 (42–45), 100 (95–100), 90 (83–90), 110 (101–110), 117 (109–117), 116 (108–116); II-L-1–6: 47 (45–47), 108 (97–108), 81 (75–81), 113 (99–113), 126 (116–126), 130 (127–130); III-L-1–6: 57 (45–57), 121 (69–121), 92 (82–92), 138 (115–138), 154 (144–154), 154 (154–155); IV-L-1–6: 113 (113–116), 122 (111–122), 133 (119–133), 172 (154–172), 185 (177–185), 185 (179–185).

**Distribution**
China (Wuyishan).

**Habitat**
Streamlet.

**Remarks**
This new species is similar to *Torrenticola ussuriensis* (Sokolow, 1940) in the shape of the palp and dorsal plates. *T. ussuriensis* was originally described by Sokolow (1934) from the Primary Territory in the Russian Far East, and later reported from River Inôzava in Japan (Enami 1940), and from Korea (Pešić et al. 2013). Differences between *T. wuyiensis* and *T. ussuriensis* are given in Table 1.

**Torrenticola dentifera** Wiles, 1991

Figs 13–16

**Material examined**
China • 1 ♂, 1 ♀; Wuyishan; 27°45′24″ N, 117°41′20″ E, 710 m a.s.l.; 6 Aug. 2018; X.Y. Gu leg.; FJ-TO-20180806 to FJ-TO-20180807.

**Description**

**Male (n = 1)**

**Body.** Idiosoma elliptical, L/W ratio 1.7 (Fig. 13A). Dorsal plate arrangement: 4+1. Infracapitular bay V-shaped, Cx-II–III mL relatively long; \(L_4\) on same line with 2\(^{nd}\) pair of acetabula; \(E_4\) on same line with 5\(^{th}\) pair of acetabula; \(V_1, V_2\) anterior to Ap (Fig. 13B). Gnathosoma dorsal apodeme short, ventral apodeme long and blunt, ventral edge of infracapitulum flat. Basal part of gnathosoma very long.
(Fig. 13D). Palp: P-1 short, with one dorsal seta; P-2 with four dorsal setae and one ventral seta at base of ventrodistal extension, which is long and finely serrated; P-3 with two dorsal setae and one ventral seta on serrated ventral extension; P-4 with one dorsal seta and two sharp ventral extensions, bearing three setae (Fig. 13C). Legs I–IV as shown in Fig. 14A–D: claw of Leg-I damaged.

**Measurements.** Idiosoma L 584, W 338; dorsal shield L 480, W 300, dorsal plate L 425, frontal platelets L 115, shoulder platelets L 143. Infracapitular bay L 119; Cx-I L 166, mL 74, Cx-II–III mL 92; Gf L 105, W 92, distance between Gf and Ap 144. Gnathosoma vL 240, dL 202, chelicera bs L 222, claw L

![Fig. 13. Torrenticola dentifera Wiles, 1991, ♂ (FJ-TO-20180806). A. Dorsal view. B. Ventral view. C. Palp, lateral view. D. Infracapitulum and chelicera. Scale bars = 100 μm.](image-url)
29. Ejaculatory complex (Fig. 14E), L 140, aL 91. L of palp: P-1, 23; P-2, 63; P-3, 47; P-4, 86; P-5, 13. L of leg segments: I-L-1–6: 23, 46, 51, 67, 75, 86; II-L-1–6: 24, 57, 43, 57, 61, 73; III-L-1–6: 33, 57, 48, 69, 72, 82; IV-L-1–6: 88, 72, 81, 96, 101, 93.

Female (n = 1)

Body. Body features same as male except: L₄ on the same line with 3rd pair of acetabula. Legs I–IV as shown in Fig. 16A–D: claw of Leg-III damaged.

Measurements. Idiosoma L 602, W 371. Dorsal shield L 483, W 320, dorsal plate L 437, frontal platelets L 147, shoulder platelets L 116. Infracapitular bay depth 120; Cx-I L 160, mL 68, Cx-II–III mL 91. Gf L 128, W 111, distance between Gf and Ap 154. Gnathosoma vL 256, dL 214, chelicera bs L 243, claw L 33. L of palp: P-1, 22; P-2, 66; P-3, 48; P-4, 81; P-5, 13. L of leg segments: I-L-1–6: 25, 55, 51, 67, 79, 85; II-L-1–6: 25, 49, 50, 58, 64, 75; III-L-1–6: 27, 58, 51, 72, 80, 77; IV-L-1–6: 91, 74, 85, 102, 101, 99.

Distribution

Malaysia (Wiles 1991, 1997), Korea (Pešić et al. 2013), China (new record).

Fig. 14. Torrenticola dentifera Wiles, 1991, ♂, (FJ-TO-20180806). A. leg-I. B. leg-II. C. leg-III. D. leg-IV. E. Ejaculatory complex. Scale bar = 100 μm.
Habitat
Streamlet.

Remarks
The Chinese specimens well fit with the original description of *Torrenticola dentifera* Wiles, 1991, described from Malaysia (Wiles 1991), and later reported from Korea (Pešić et al. 2013). The only

![Diagram of Torrenticola dentifera](image-url)

**Fig. 15.** *Torrenticola dentifera* Wiles, 1991, ♀, (FJ-TO-20180807). A. Dorsal view. B. Ventral view. C. Palp, lateral view. D. Infracapitulum and chelicera. Scale bars = 100 μm.
difference is the specimens from Malaysia and Korea have one large blunt spine at dorsodistal extremity of P-4, but absent in Chinese specimens.

**Key to the known species of the family Torrenticolidae in China.** (Updated Gu & Guo 2019 and Gu et al. 2019)

3. Infrcapitulum dorsal apodeme short, P-2 and P-3 with obvious ventral protrusions or hyaline expansions (Genus Torrenticola) ........................................................................................................ 4
   - Infrcapitulum dorsal apodeme long, P-2 and P-3 without projections on ventral side (Genus Monatractides) ........................................................................................ 21

4. Dorsal plate arrangements: 4+1 ........................................................................................................ 5
   - Dorsal plate arrangements: 2+1, 2+2p+1 .................................................................................. 18

5. Infrcapitular rostrum short (<½ of gnathosoma dL) ........................................................................... 6
   - Infrcapitular rostrum long (≥½ of gnathosoma dL) .................................................................... 11

6. Palp relatively thin and long ................................................................................................................ 7
   - Palp robust and compact, P-2 shorter than P-4, Cx-IV with a prominent suture line of starting at right angle from genital field, laterally curved anteriorly .......................... T. nanhsiensis Pešić et al.

7. P-3 with a very long tapering ventral projection .................................................................................. 8
   - P-3 with a triangular, relatively short ventral projection ............................................................. 9

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**Fig. 16.** *Torrenticola dentifera* Wiles, 1991, ♂, (FJ-TO-20180807). A. leg-I. B. leg-II. C. leg-III. D. leg-IV. Scale bar = 100 μm.
8. P-2 and P-3 with the smooth and sharp ventral extension ................................... *T. projectura* Pešić et al.
   - P-2 and P-3 with the serrated ventral extension ........................................... *T. dentifera* Wiles, 1991

9. Infracapitular bay deep, ventral apodeme L about two times of dorsal apodeme .................. 10
   - Infracapitular bay shallow, ventral apodeme L three times longer than dorsal apodeme .............. .................................................. *T. curta* Jin, 1997

10. Idiosoma roundish, the lateral view of infracapitulum acute triangle-like ................................
    - Idiosoma elliptical, infracapitulum regular triangle-like in the lateral view ................................. *T. trigona* Gu & Guo, 2019

11. Ventral extensions of P-2, P-3 serrate .............................................................................. 12
    - Ventral extensions of P-2, P-3 smooth .................................................................................. 13

12. Dorsal apodeme of infracapitulum with a fine spine, AP close to the line of primary sclerotization, \( E_4 \) at the same level as the 3rd pair of acetabula ....... *T. yanjinensis* Jin, 1997
    - Dorsal apodeme of infracapitulum with a broad spine, AP on the line of primary sclerotization, \( E_4 \) at the same level as the 4th pair of acetabula ........................................... *T. dentipalpis* Jin, 1997

13. The concavity between the ventral prolongations of P-4 small, idiosoma elliptical ................. 14
    - The concavity between the ventral prolongations of P-4 big and obvious, idiosoma oblate .............. ............................................................................................................. *T. fodingensis* Gu & Guo, 2018

14. Ap anterior to \( V_2 \) .......................................................................................................................... 15
    - Ap on the line with \( V_2 \) or posterior to \( V_2 \) ........................................................................ 16

15. P-2 longer than \( \frac{1}{3} \) total palp L, gnathosoma elongated, vL 308–381, dL 263–30 ........................................ *T. tenuichelicera* Gu & Guo, 2018
    - P-2 shorter than \( \frac{1}{3} \) total palp L, gnathosoma normal, vL 284–302, dL 229–231 .................................................. *T. nipponica* (Enami, 1940)

16. Ap on the line with \( V_3 \), shoulder platelets normal ................................................................. 17
    - Ap posterior to \( V_3 \), shoulder platelets offset to the inside ........................................ *T. hainanensis* Gu & Guo, 2019

17. P-2 with a laterally compressed and apically serrated ventrodiscal extension, spine-like ............ *T. spinextension* Gu & Guo sp. nov.
    - P-2 with a small sharp ventrodiscal extension .................................................. *T. tetrapora* Viets, 1935

18. Dorsal plate arrangements: 2+2p+1 ......................................................................................... 19
    - Dorsal plate arrangements: 2+1, P-3 distal margin with denticles, P-4 stocky .............................. *T. taiwanicus* Pešić et al.

19. Infracapitular rostrum short (<\( \frac{1}{2} \) of gnathosoma dL) .................................................. 20
    - Infracapitular rostrum long (≥\( \frac{1}{2} \) of gnathosoma dL) .............................................. *T. suptilosrostrum* Gu & Guo sp. nov.

20. About \( \frac{3}{4} \) of shoulder platelet fused with the large dorsal plate, posterior suture line of Cx-I retrogressive ........................................................ *T. postfusina* Gu & Guo 2019
    - About \( \frac{1}{2} \) of shoulder platelet fused with the large dorsal plate, posterior suture line of Cx-IV obvious and long ......................................................................................... *T. wuyiensis* Gu & Guo sp. nov.
Remark
Torrenticola semicolor Viets, 1977 and Torrenticola alargada Goldschmidt, 2007, reported to be new records to Chinese fauna, were rechecked to be mis-determined. So they are not included in the key.

Discussion
As a result of human production and living behaviors, the environment has been severely deteriorated, especially water pollution has caused damage to various water ecosystems and greatly reduced species diversity. Torrenticoloid water mites live in different running waters, and are possible monitoring organisms of water quality (Goldschmidt 2009, 2016). Therefore, it is critical to investigate the diversity of Torrenticolidae.

At present, there are more than 600 torrenticoloid species described all over the world, but only 28 species in China. And even in China, more than 50% of these species are found in Southwest China (Gu & Guo 2019). So in the near future, species identification of torrenticoloid water mites is still one of the biggest problems to be resolve in China. Further survey of water mites should be carried out to the other regions in China.

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