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Eight new species of eriophyoid mites (Acari: Eriophyoidea) from Sichuan Province, China

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ABSTRACT

Eriophyoid mites (Eriophyoidea) represent the largest superfamily in the Acari. However, their cryptic diversity in the temperate regions remains unclear. In this study, we described and illustrated eight new eriophyoid mite species from Sichuan Province, China. They are *Shevtchenkella ludingica* **sp. nov.** on *Platycladus orientalis* (L.) Franco (Cupressaceae), *Epitrimerus fortuner* **sp. nov.** on *Euonymus fortunei* (Turcz.) Hand.-Mazz. (Celastraceae), *Epitrimerus emeiensis* **sp. nov.** on *Rosa* sp. (Rosaceae), *Phyllocoptes neoshirakis* **sp. nov.** on *Neoshirakia japonica* (Siebold & Zucc.) Esser (Euphorbiaceae), *Aculops kakies* **sp. nov.** on *Diospyros kaki* Thunb. (Ebenaceae), *Aculops tetrandrus* **sp. nov.** on *Celtis tetrandra* Roxb. (Cannabaceae), *Tegolophus danbaensis* **sp. nov.** on *Rhamnus parvifolia* Bunge (Rhamnaceae), and *Rhyncaphytoptus davidex* **sp. nov.** on *Acer davidii* subsp. *grosseri* (Pax) P.C.de Jong (Sapindaceae). All eight species described herein are vagrants on their host plants. A list of eriophyoid mites from Sichuan Province was provided.

Keywords: *Aculops*; Checklist; *Epitrimerus*; Taxonomy; *Phyllocoptes*; *Rhyncaphytoptus*; *Shevtchenkella*; *Tegolophus*

INTRODUCTION

Eriophyoid mites (Acari: Eriophyoidea) comprise more than 5 000 named species, leading to the most species-rich superfamily in the Acari (Zhang, 2017). This superfamily includes three families: Phytoptidae (ca. 160 species), Eriophyidae (ca. 3 790 species), and Diptilomiopidae (ca. 450 species) (Amrine et al., 2003). Eriophyoid mites are among the smallest terrestrial arthropods (~0.2 mm in length) and possess fewer morphological characters than other mites (e.g., only two pairs of legs, fewer setae, ringed opisthosoma; Amrine et al., 2003). They are strictly herbivorous and highly host-specific, with 89% attacking only one or two congeneric host species (Yin et al., 2022). Host plants have been suggested to play crucial roles in their diversification (Xue et al., 2023). Furthermore, eriophyoid mites exhibit a worldwide distribution, centered in the temperate regions (Li et al., 2023).

Sichuan Province is located in southwestern China, spanning the eastern part of the Qinghai-Xizang Plateau and the Sichuan Basin, a transitional zone characterized by dramatic elevational gradients and heterogeneous habitats (Huang et al., 2019). This region experiences a complex climatic pattern dominated by a subtropical monsoon regime, with a mean annual temperature of 15.2℃ and mean annual precipitation of 959.5 mm (Deng et al., 2023). This topographical and climatic diversity has given rise to exceptionally rich ecosystems that support 9 254 species of vascular plants (Li et al., 2022), which likely underpin the high species diversity of eriophyoid mites in this region.

To date, more than 1 340 named eriophyoid mites have been recorded in China (Xue & Hong, 2023); however, only 23 have been recorded from Sichuan Province (Hao & Xue, 2024; Huang et al., 2024; Xie, 2019; Xue & Hong, 2023; Yao et al., 2024; Yin & Xue, 2025). They belong to two families, three subfamilies, five tribes, and 12 genera (Table 1). During a field survey in 2022, Xiao-Feng Xue and colleagues discovered eight new eriophyoid mite species in Sichuan. In this study, we aimed to (1) compile a checklist of eriophyoid mites from Sichuan Province and (2) describe eight new species.

MATERIALS AND METHODS

Eriophyoid mites were collected from different host plants under a hand lens (30×) from Sichuan Province, China (Figure 1). They were slide-mounted in modified Berlese medium (Amrine & Manson, 1996) without additional fibers, as suggested by de Lillo et al. (2010). Morphological terminology follows Lindquist (1996), internal female genitalia nomenclature follows Chetverikov (2014), and the generic classification is made according to Amrine et al. (2003), with consultation of all genera published subsequently. Specimens were measured following de Lillo et al. (2010). They were

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Table 1 List of eriophyoid mites from Sichuan Province

Family	Subfamily	Tribe	Species	Host
Eriophyidae	Cecidophyinae	Colomerini	*Paracolomerus davidiae* Kuang & Hong, 1995 (Kuang, 1995)	*Davidia involucrata* Baill. (Nyssaceae)
	Eriophyinae	Aceriini	*Aceria granati* (Canestrini & Masssalongo, 1894)	*Punica granatum* L. (Lythraceae)
			Aceria sheldoni chinensis Kuang & Hong, 1991	*Citrus reticulata* Blanco (Rutaceae)
	Phyllocoptinae	Tegonotini	*Shevtchenkella humulus* Wei & Qin, 2002	*Humulus lupulus* L. (Cannabaceae)
			Shevtchenkella Ludingica **sp. nov.**	*Platycladus orientalis* (L.) Franco (Cupressaceae)
		Phyllocoptini	*Cereusacarus juniperensis* (Xue & Li, 2020) (Yin et al., 2020)	*Juniperus chinensis* L. (Cupressaceae)
			Epitrimerus fortuner **sp. nov.**	*Euonymus fortunei* (Turcz.) Hand.-Mazz. (Celastraceae)
			Epitrimerus emeiensis **sp. nov.**	*Rosa* sp. (Rosaceae)
			Glossilus funebrus Yao et al., 2024	*Cupressus funebris* Endl. (Cupressaceae)
			Glossilus lanceolatus Yao et al., 2024	*Cunninghamia lanceolata* (Lamb.) Hook. (Cupressaceae)
			Phyllocoptes neoshirakis **sp. nov.**	*Neoshirakia japonica* (Siebold & Zucc.) Esser (Euphorbiaceae)
			Phyllocoptruta oleivora (Ashmead, 1879)	*Citrus* sp., *Citrus* × *limon* (L.) Osbeck, *Citrus maxima* (Burm.) Merr., *Clausena lansium* (Lour.) Skeels (Rutaceae)
		Anthocoptini	*Aculops loniceris* Xie, 2018	*Lonicera* sp. (Caprifoliaceae)
			Aculops schinifolius Huang et al., 2024	*Zanthoxylum schinifolium* Siebold & Zucc. (Rutaceae)
			Aculops kakies **sp. nov.**	*Diospyros kaki* Thunb. (Ebenaceae)
			Aculops tetrandrus **sp. nov.**	*Celtis tetrandra* Roxb. (Cannabaceae)
			Aculus fockeui (Nalepa & Trouessart, 1891)	*Prunus persica* (L.) Batsch., *Pyrus communis* L. (Rosaceae); *Staphylea japonica* (Thunb.) Mabb. (Staphyleaceae)
			Aculus hypoleus Xie, 2018	*Prunus hypoleuca* (Koehne) J.Wen (Rosaceae)
			Aculus ligustri (Keifer, 1938)	*Ligustrum* sp., *Ligustrum lucidum* W.T.Aiton, *Ligustrum ovalifolium* Hassk. (Oleaceae)
			Aculus schlechtendali (Nalepa, 1890)	*Malus domestica* (Suckow) Borkh. (Rosaceae)
			Anthocoptes lindleyanius Xie, 2018	*Buddleja lindleyana* Fortune (Scrophulariaceae)
			Neocymoptus bambusae Lin et al., 1997	*Bambusa* sp. (Poaceae)
			Tegolophus danbaensis **sp. nov.**	*Rhamnus parvifolia* Bunge (Rhamnaceae)
Diptilomiopidae	Diptilomiopinae		*Apodiptacus hongkouianus* Xue & Lu, 2022	*Bambusa* sp. (Poaceae)
	Rhyncaphytoptinae		*Rhyncaphytoptus dipeltus* Xie, 2019	*Dipelta floribunda* Maxim. (Caprifoliaceae)
			Rhyncaphytoptus mandshuricae Xue & Li, 2020	*Fraxinus mandshurica* Rupr. (Oleaceae)
			Rhyncaphytoptus davidex **sp. nov.**	*Acer davidii* subsp. grosseri (Pax) P.C.de Jong (Sapindaceae)
			Rhyncaphytoptus emeishanicus Hao & Xue, 2024	*Acer tataricum* subsp. *ginnala* (Maxim.) Wesm. (Sapindaceae)
			Rhyncaphytoptus emeishanianus Yin & Xue, 2025	*Combretum indicum* (L.) DeFilipps (Combretaceae)
			Rhyncaphytoptus schifilus Xie, 2019	*Sorbus setschwanensis* (C.K. Schneider) Koehne (Rosaceae)

examined using a Zeiss A2 (Germany) phase-contrast research microscope, and semi-schematic hand line drawings were prepared. Microphotographs were taken with a Zeiss A2 microscope (equipped with AxioCam MRc camera) using phase contrast or differential interference contrast, with 10× eyepieces and 100× oil immersion objectives. Images were processed using Axiovision image analysis software. For each species, the holotype female measurement precedes the corresponding range for paratypes (in parentheses). For males, only ranges are given. No variation among measurements is indicated with an asterisk "*". All measurements are in micrometres (μm) and represent lengths, when not otherwise specified. Holotypes and paratypes were deposited as slide-mounted specimens in the Arthropod/Mite Collection, Department of Entomology, Nanjing Agricultural University (NJAU), Jiangsu Province, China. Institutional acronyms follow Zhang (2018). The species name of host plants follows the Plants of the World Online (POWO, https://powo.science.kew.org/).

TAXONOMY

Family Eriophyidae Nalepa, 1898
Subfamily Phyllocoptinae Nalepa, 1892
Tribe Tegonotini Bagdasarian, 1978
Genus *Shevtchenkella* Bagdasarian, 1978

***Shevtchenkella ludingica* sp. nov. (Figures 2–3)**

Description: Female (n=9). Body fusiform, 230 (226–237), 68 (68–74) wide, 63 (61–65) thick; light yellow. Gnathosoma 20 (20–23), projecting downwards, cheliceral stylets 16 (16–18),

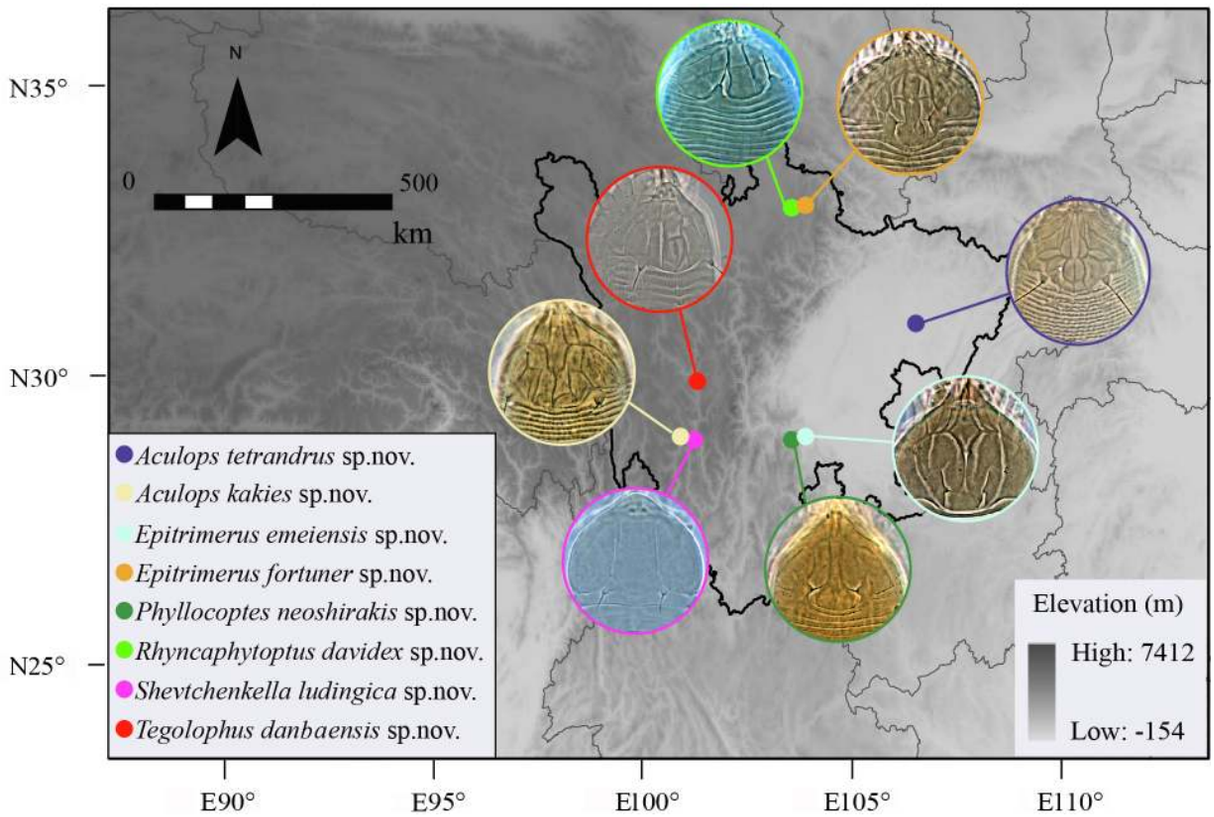

Figure 1 Sample collection localities of specimens used in the present study

pedipalp coxal setae (*ep*) 2 (1–2), dorsal pedipalp genual setae (*d*) 7 (6–7), palp tarsal ventral setae (*v*) absent. Prodorsal shield 54 (54–56), including the frontal lobe, 71 (68–73) wide, frontal lobe broad basally and round apically; median line absent, admedian lines incomplete and connected at posterior, forming a U-shaped line near the rear shield margin. Scapular tubercles on the rear shield margin, setae *sc* 9 (9–11), 31 (30–33) apart, projecting posterior. Coxigenital region with 14* microtuberculated semiannuli between coxae and genitalia; coxal plates with short longitudinal lines, anterolateral setae on coxisternum I (*1b*) 9 (8–9), 13 (12–13) apart; proximal setae on coxisternum I (*1a*) 18 (18–21), 10 (9–10) apart; proximal setae on coxisternum II (*2a*) 30 (30–32), 27 (25–27) apart. Prosternal apodeme 4 (4–5). Leg I 29 (29–31), femur 10 (10–11), basiventral femoral setae (*bv*) 11 (11–12); genu 5 (5–6), antaxial genual setae (*l″*) 15 (15–17); tibia 7 (6–7), paraxial tibial setae (*l′*) 4 (4–5), at 1/3 from the base of tibia; tarsus 6*, paraxial fastigial tarsal setae *ft′* 17 (16–17), antaxial fastigial tarsal setae *ft″* 21 (21–23), setae *u′* 5*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Leg II 26 (26–27), femur 9 (9–10), basiventral femoral setae (*bv*) 9 (8–10); genu 5*, antaxial genual setae (*l″*) 6 (6–7); tibia 6*; tarsus 6*, paraxial fastigial tarsal setae *ft′* 7 (7–9), antaxial fastigial tarsal setae *ft″* 20 (20–23), setae *u′* 5*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Opisthosoma dorsally with 19 (19–20) semiannuli, with lateral lobes and a middorsal ridge, with filament microtubercles on the lateral lobes; ventrally with 87 (86–88) semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 11 (11–13), on ventral semiannulus 20th (20th–22th), 62 (60–63) apart; setae *d* 46 (44–47), on ventral semiannulus 36th (35th–36th), 37 (35–37) apart; setae *e* 10 (10–12), on ventral semiannulus 57th (56th–57th), 22 (22–23) apart; setae *f* 20 (20–22), 23 (22–24) apart, on the 5th ventral semiannulus from rear; setae *h1* 5 (4–5), setae *h2* 50 (50–52). External genitalia 14 (14–16), 25 (25–26) wide, coverflap with 12 longitudinal striae, setae *3a* 13 (13–14), 16 (16–18) apart. Internal genitalia: spermathecae ovoid, directed posterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male (n=2, dorsal view): Body fusiform, 195–206, 53–58 wide; light yellow in color. Gnathosoma 18–19, projecting downwards, cheliceral stylets 16–17, pedipalp coxal setae (*ep*) 2*, dorsal pedipalp genual setae (*d*) 6*, palp tarsal ventral setae (*v*) absent. Prodorsal shield 46–48, 63–65 wide. Scapular tubercles on the rear shield margin, setae *sc* 9–10, 26–27 apart, projecting posterior. Coxal plates with short lines, anterolateral setae on coxisternum I (*1b*) 6–7, 12–13 apart; proximal setae on coxisternum I (*1a*) 18–20, 11* apart; proximal setae on coxisternum II (*2a*) 24–26, 25* apart. Prosternal apodeme present. Leg I 26–27, femur 10*, basiventral femoral setae (*bv*) 7–8; genu 5–6, antaxial genual setae (*l″*) 14–15; tibia 6*, paraxial tibial setae (*l′*) 3–4, inserted at 1/3 from the base of tibia; tarsus 5*, paraxial fastigial tarsal setae *ft′* 16–17, antaxial fastigial tarsal setae *ft″* 19–20, setae *u′* 4*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Leg II 24–25, femur 9*, basiventral femoral setae (*bv*) 7–8; genu 4–5, antaxial genual setae (*l″*) 6–7; tibia 5–6; tarsus 5*, paraxial fastigial tarsal setae *ft′* 4–5, antaxial fastigial tarsal setae *ft″* 18–19, setae *u′* 4*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Opisthosoma dorsally with 18–19 semiannuli, with lateral lobes and a middorsal ridge, with filament microtubercles on the lateral lobes; ventrally with 78–80 semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 11–13, on ventral semiannulus 20th–21th, 56–58 apart; setae *d* 49–51, on

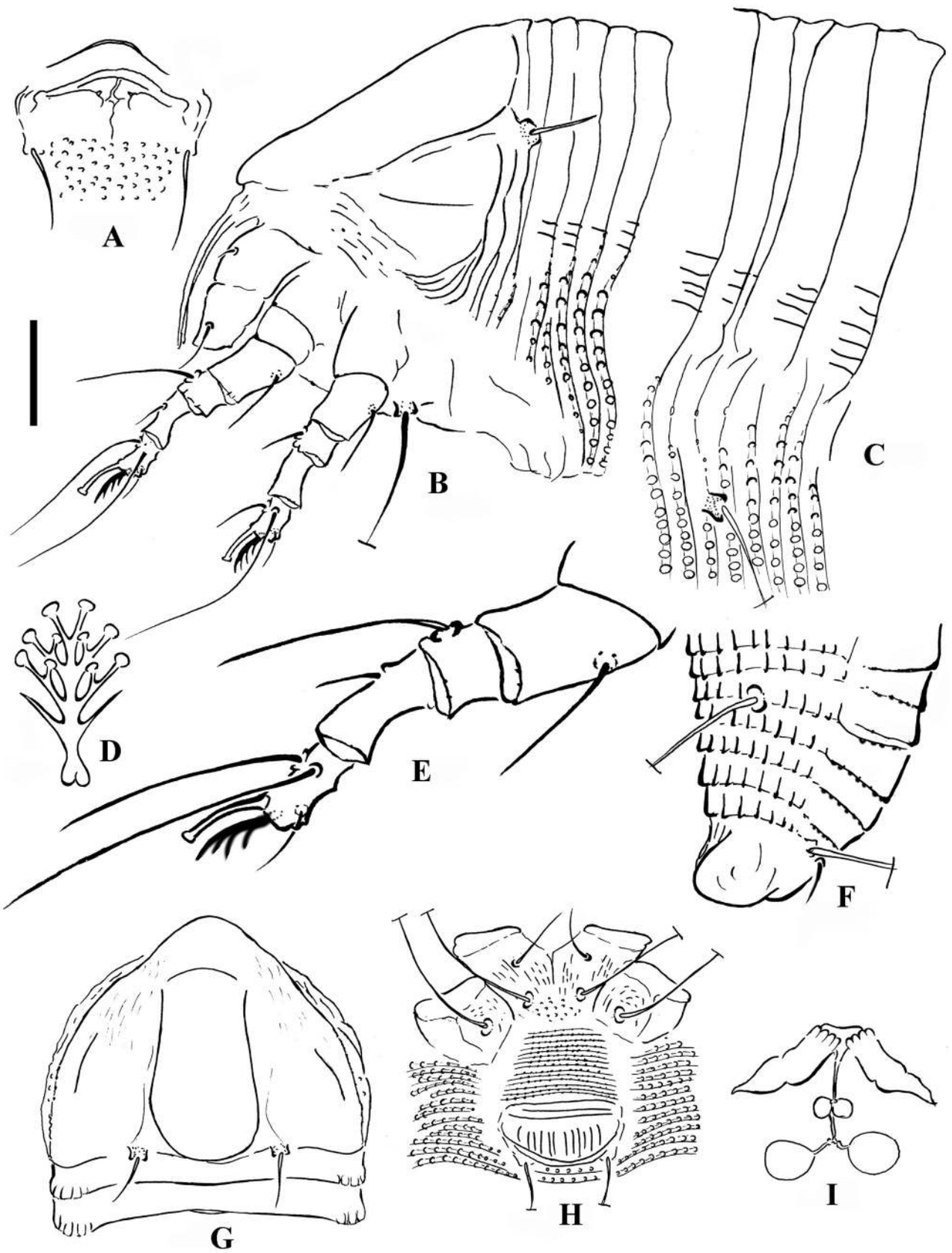

Figure 2 ***Shevtchenkella ludingica*** **sp. nov.**

A: Male genital region, ventral view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: empodium, dorsal view. E: Leg I, lateral view. F: Lateral view of posterior opisthosoma. G: Prodorsal shield, dorsal view. H: Female coxigenital area, ventral view. I: Female internal genitalia, ventral view. Scale bar: 23 μm (G, H), 15 μm (B, F), 10 μm (A, I), 7 μm (C, E), 3 μm (D).

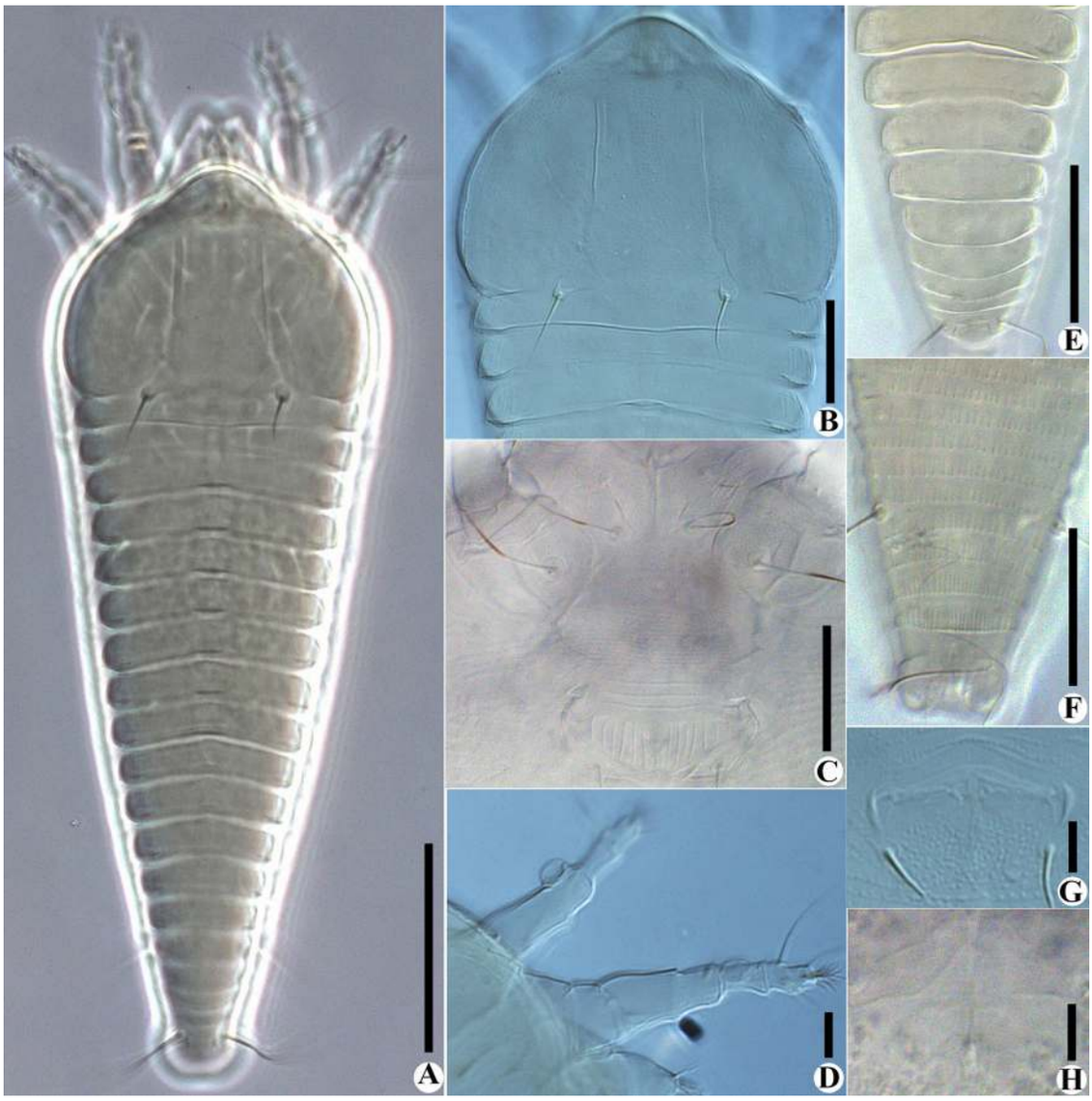

Figure 3 ***Shevtchenkella ludingica*** **sp. nov. A–F, H: Female holotype; G: Male paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: leg I and leg II, dorsal view. E: Dorsal view of posterior opisthosoma. F: Ventral view of posterior opisthosoma. G: Male external genitalia, ventral view. H: female internal genitalia, ventral view. Scale bar: 50 μm (A), 20 μm (B, C, E, F), 5 μm (D, G, H).

ventral semiannulus 33th–35th, 34* apart; setae *e* 10–11, on ventral semiannulus 51th–53th, 20–21 apart; setae *f* 22*, 21–22 apart, on the 5th ventral semiannulus from rear; setae *h1* 2*, setae *h2* 40–44. Male genitalia 10–11, 19–20 wide, setae *3a* 11–13, 15–16 apart.

Type material: Holotype, female (slide no. NJAUSC67.1; marked Holotype), collected from *Platycladus orientalis* (L.) Franco (Cupressaceae), Luding County, Ganzi Tibetan Autonomous Prefecture, Sichuan Province, China, N29°57′02″, E101°59′44″, elevation 3 025 m above sea level (asl), 8 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 8 females (8 slides) and 2 males (2 slides) (slide nos. NJAUSC67.2–11; marked Paratypes), from *P. orientalis*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation *ludingica* is derived from the name of location, Luding, where the type species were collected; feminine in gender.

Differential diagnosis: The new species is morphologically similar to *Shevtchenkella camelliae* Song et al., 2008, described from *Camellia sinensis* (L.) O.Ktze. (Theaceae), but it can be differentiated by admedian lines present (prodorsal shield smooth in *S. camelliae*), empodium 4-rayed (empodium 7-rayed in *S. camelliae*), with filament microtubercles on the lateral ridges (dorsal opisthosoma smooth in *S. camelliae*), and ventral annuli with round microtubercles (ventral annuli with tapered microtubercles in *S. camelliae*). The new species is also morphologically similar to *Shevtchenkella ulmi* (Farkas, 1960), described from *Ulmus campestris* L. (Ulmaceae), but it can be differentiated by admedian lines connected at posterior, forming a U-shaped line near the rear shield margin (admedian lines parallel in *S. ulmi*), with filament microtubercles on the lateral ridges (dorsal opisthosoma smooth in *S. ulmi*), and coxal plates with short lines (coxal plates smooth in *S. ulmi*).

Tribe Phyllocoptini Nalepa, 1892

Genus *Epitrimerus* Nalepa, 1898

Type species: *Tegonotus piri* Nalepa, 1891: 162.

Diagnosis: See Xue et al. (2007a), Xue & Zhang (2009).

***Epitrimerus fortuner* sp. nov. (Figures 4–5)**

Description: Female (n=10). Body fusiform, 247 (244–250), 76 (74–77) wide, 44 (42–47) thick; light yellow. Gnathosoma 27 (25–27), projecting downwards, cheliceral stylets 23 (22–23), pedipalp coxal setae (*ep*) 3 (2–3), dorsal pedipalp genual setae (*d*) 8 (7–8), palp tarsal ventral setae (*v*) absent. Prodorsal shield 55 (55–58), 74 (72–76) wide, frontal lobe broad; median line present but incomplete, V-shaped, only present the rear 1/2, admedian and submedian lines connected by longitudinal and transverse lines forming 11 complete cells on the outermost perimeter, admedian lines join submedian lines with two transverse lines at anterior 1/4 and 1/2. Scapular tubercles ahead of rear shield margin, setae *sc* 6 (6–7), 18 (17–18) apart, projecting centrad. Coxigenital region with 12* microtuberculated semiannuli between coxae and genitalia; coxal plates with granules, anterolateral setae on coxisternum I (*1b*) 7 (7–8), 14 (14–15) apart; proximal setae on coxisternum I (*1a*) 22 (21–22), 12 (11–12) apart; proximal setae on coxisternum II (*2a*) 38 (38–42), 32 (30–34) apart. Prosternal apodeme 6 (6–7). Leg I 31 (30–32), femur 10 (10–11), basiventral femoral setae (*bv*) 10 (9–10); genu 5*, antaxial genual setae (*l″*) 24 (23–25); tibia 7 (7–9), paraxial tibial setae (*l′*) 5 (5–6), inserted at the middle of tibia; tarsus 7*, paraxial fastigial tarsal setae *ft′* 19 (18–19), antaxial fastigial tarsal setae *ft″* 22 (22–23), setae *u′* 4*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Leg II 31 (31–33), femur 11 (11–12), basiventral femoral setae (*bv*) 8 (8–9); genu 5*, antaxial genual setae (*l″*) 28 (26–28); tibia 8 (8–9); tarsus 7*, paraxial fastigial tarsal setae *ft′* 5 (5–6), antaxial fastigial tarsal setae *ft″* 21 (21–22), setae *u′* 4*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Opisthosoma dorsally with 43 (43–44) semiannuli, with three ridges, lateral ridges shorter than middorsal ridge, with elliptical microtubercles on ridges and semiannuli; ventrally with 97 (95–97) semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 30 (28–30), on ventral semiannulus 21th (20th–21th), 65 (63–65) apart; setae *d* 56 (54–57), on ventral semiannulus 42th (41th–42th), 32 (31–33) apart; setae *e* 22 (20–23), on ventral semiannulus 70th (69th–71th), 18 (18–20) apart; setae *f* 26 (23–26), 27 (25–28) apart, on the 6th ventral semiannulus from rear; setae *h1* 3*, setae *h2* 60 (58–61). External genitalia 19 (18–20), 25 (24–25) wide, coverflap with 11–12 longitudinal striae, with 3 granules formed transverse lines at base, setae *3a* 30 (28–30), 19 (18–19) apart. Internal genitalia: spermathecae ovoid, directed anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC55.1; marked Holotype), collected from *Euonymus fortunei* (Turcz.) Hand.-Mazz. (Celastraceae), Jiuzhai Valley, Sichuan Province, China, N33°06′59″, E103°52′20″, elevation 3 004 m asl, 5 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 9 females (9 slides) (slide nos. NJAUSC55.2–10; marked Paratypes), from *E. fortunei*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation is *fortuner* derived from the species name of host plant, *fortunei*; masculine in gender.

Differential diagnosis: The new species is similar to *Epitrimerus verrucoser* Xue & Hong, 2011, described from *Euonymus verrucosus* Scop. (Celastraceae), but can be differentiated by median, admedian and submedian lines present (prodorsal shield with incomplete admedian lines in *E. verrucoser*) and coxal plates with granules (coxal plates with short lines in *E. verrucoser*). The new species is also similar to *Epitrimerus virginiana* Keifer, 1959, described from *Prunus virginiana* L. (Rosaceae), but can be differentiated by frontal lobe broad (frontal lobe more acuminate in *E. virginiana*), opisthosoma dorsally with elliptical microtubercles on annuli (with round microtubercles on annuli in *E. virginiana*), and coverflap with 11–12 longitudinal striae (coverflap with 14 longitudinal striae in *E. virginiana*).

***Epitrimerus emeiensis* sp. nov. (Figures 6–7)**

Description: Female (n=9, dorsal view). Body fusiform, 183 (180–187), 70 (68–73) wide; light yellow. Gnathosoma 26 (25–27), projecting downwards, cheliceral stylets 22 (21–22), pedipalp coxal setae (*ep*) 3 (2–3), dorsal pedipalp genual setae (*d*) 8 (7–8), palp tarsal ventral setae (*v*) absent. Prodorsal shield 59 (59–61), 70 (68–72) wide, frontal lobe present, broad basally; median line absent, admedian lines complete and connected with submedian lines by a transverse line at basal 3/5, and forming 5 cells on each side, many short lines distributed at anterior 1/2 of prodorsal shield. Scapular tubercles ahead of rear shield margin, setae *sc* 8 (7–8), 17 (17–18) apart, projecting centrad. Coxigenital region with 6* smooth semiannuli between coxae and genitalia; coxal plates with granules, anterolateral setae on coxisternum I (*1b*) 7 (7–8), 13 (13–14) apart; proximal setae on coxisternum I (*1a*) 12 (11–12), 9 (8–9) apart; proximal setae on coxisternum II (*2a*) 40 (39–42), 30 (29–31) apart. Prosternal apodeme 4*. Leg I 25 (25–26), femur 11 (11–12), basiventral femoral setae (*bv*) 11 (10–11); genu 5 (5–6), antaxial genual setae (*l″*) 31 (29–31); tibia 6 (6–7), paraxial tibial setae (*l′*) 6 (5–6), inserted at 1/3 from the base of tibia; tarsus 6*, paraxial fastigial tarsal setae *ft′* 17 (17–18), antaxial fastigial tarsal setae *ft″* 20 (20–22), setae *u′* 3*; tarsal empodium (*em*) 6*, simple, 5-rayed, tarsal solenidion (*ω*) 7*, knobbed apically. Leg II 24 (24–25), femur 10 (10–11), basiventral femoral setae (*bv*) 12 (11–12); genu 5*, antaxial genual setae (*l″*) 10 (9–11); tibia 6 (6–7); tarsus 6*, paraxial fastigial tarsal setae *ft′* 7 (6–8), antaxial fastigial tarsal setae *ft″* 20 (19–22), setae *u′* 3*; tarsal empodium (*em*) 6*, simple, 5-rayed, tarsal solenidion (*ω*) 7*, knobbed apically. Opisthosoma dorsally with 36 (36–37) semiannuli, with three ridges, lateral ridges shorter than middorsal ridge, smooth; ventrally with 71 (70–72) semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 21 (19–22), on ventral semiannulus 14th (14th–15th), 56 (53–56) apart; setae *d* 40 (40–42), on ventral semiannulus 27th (26th–28th), 30 (30–32) apart; setae *e* 45 (44–46), on ventral semiannulus 45th (44th–46th), 12 (12–13) apart; setae *f* 22 (20–22), 25 (25–27) apart, on the 6th ventral semiannulus from rear; setae *h1* 3*, setae *h2* 27 (26–29). External genitalia 15 (15–17), 22 (21–23) wide, coverflap with granules at base and 2–3 transversal lines, setae *3a* 40 (38–41), 14 (13–15) apart. Internal genitalia: spermathecae ovoid, directed anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC86.1; marked Holotype), collected from *Rosa* sp. (Rosaceae), Emeishan City, Sichuan Province, China, N29°53′26″,

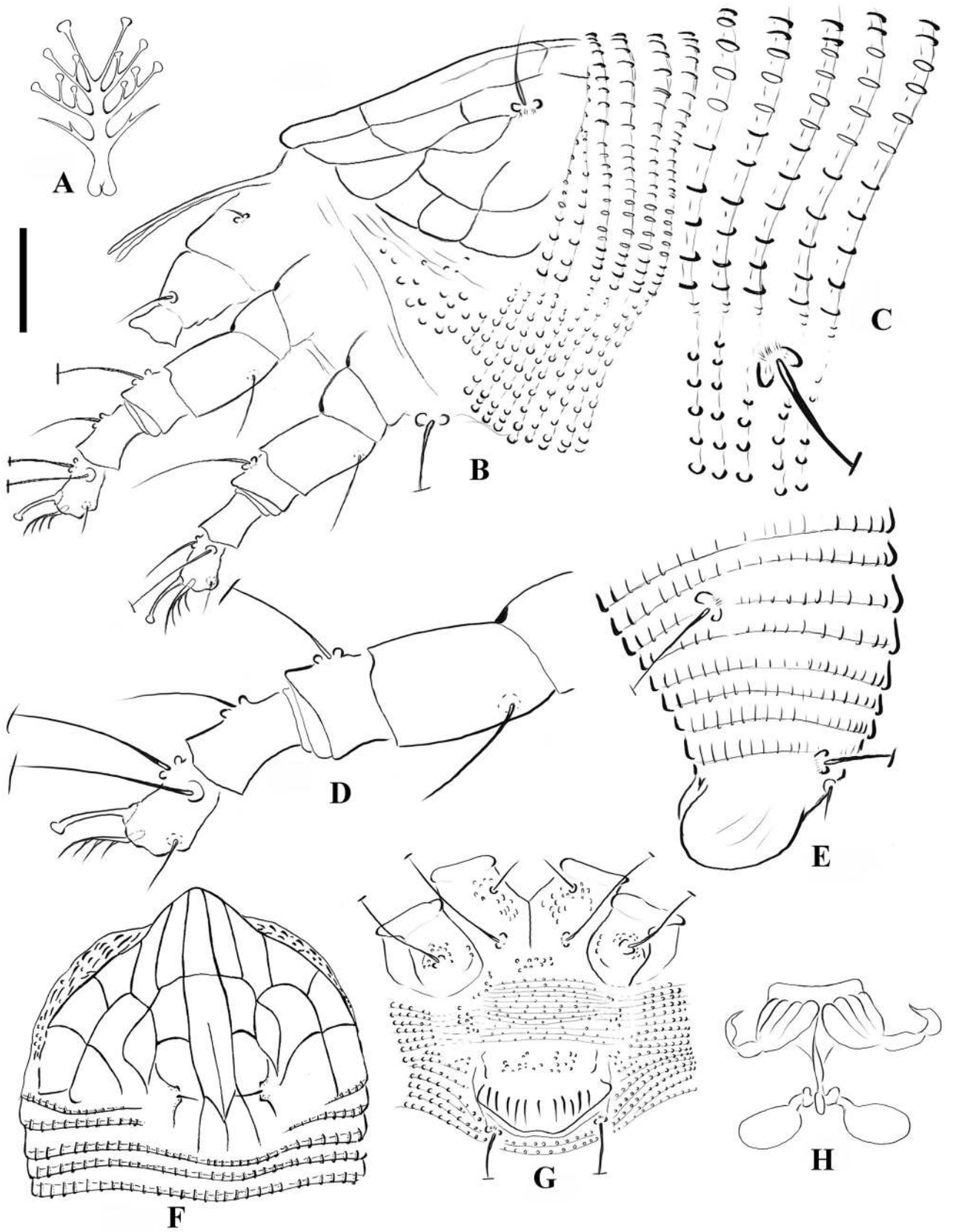

Figure 4 ***Epitrimerus fortuner*** **sp. nov.**

A: Empodium, dorsal view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma, lateral view. C: Lateral view of the annuli at the level of seta *c2*; D: leg I. E: Lateral view of posterior opisthosoma. F: Prodorsal shield, dorsal view. G: Female coxigenital area, ventral view. H: Female internal genitalia, ventral view. Scale bar: 22 μm (F), 16 μm (G), 11 μm (for B, H, E), 6 μm (C, D), 3 μm (A).

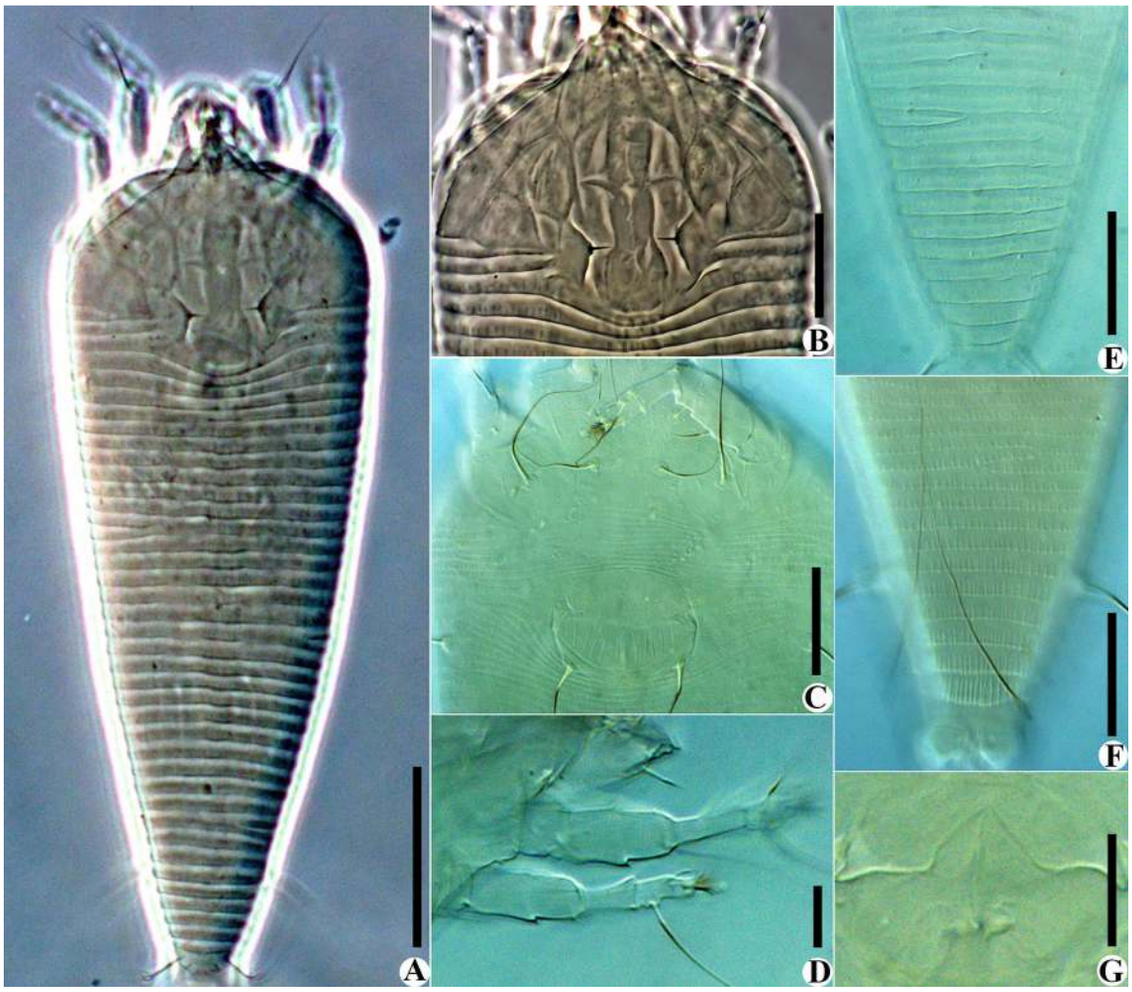

Figure 5 ***Epitrimerus fortuner*** **sp. nov. A–C, E–G: Female holotype; D: Female paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Leg I and leg II, dorsal view. E: Dorsal view of posterior opisthosoma. F: Ventral view of posterior opisthosoma. G: Female internal genitalia, ventral view. Scale bar: 50 μm (A), 20 μm (B, C, E, F), 10 μm (D, G).

E103°33′59″, elevation 2 517 m asl, 10 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 9 females (9 slides) (slide nos. NJAUSC86.2–10; marked Paratypes), from *Rosa* sp., same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation *emeiensis* is derived from the name of location, *Emei*, where the type species were collected; masculine in gender.

Differential diagnosis: The new species is similar to *Epitrimerus cotoneasteri* Xue et al., 2007a, described from *Cotoneaster* sp. B. Ehrhart (Rosaceae), in median line absent, admedian and submedian lines present, and dorsal opisthosoma smooth, but can be differentiated by coxal plates with granules (coxal plates with short lines in *E. cotoneasteri*), and coverflap with granules at base (coverflap with 10 longitudinal ridges in *E. cotoneasteri*). The new species is also similar to *Epitrimerus dimocarpi* Kuang & Hong, 1989, described from *Dimocarpus longan* Lour. (Sapindaceae), they are similar in median line absent, admedian present at shield, empodium 5-rayed and coxal plates with granules, but can be differentiated by many short lines distributed at anterior 1/2 of prodorsal shield (without short lines at shield in *E. dimocarpi*), female genital coverflap with granules at base (coverflap smooth in *E. dimocarpi*), and dorsal annuli smooth (dorsal annuli with microtubercles in *E. dimocarpi*).

Genus *Phyllocoptes* Nalepa, 1887

Type species: *Phyllocoptes carpini* Nalepa, 1887: 127.

Diagnosis: See Xue & Hong (2005), Xue & Zhang (2009), Zhang et al. (2019).

Phyllocoptes neoshirakis **sp. nov. (Figures 8–9)**

Description: Female (n=11). Body fusiform, 195 (192–201), 68 (66–70) wide, 64 (62–67) thick; light yellow. Gnathosoma 24 (23–25), projecting downwards, cheliceral stylets 20 (20–21), pedipalp coxal setae (*ep*) 3*, dorsal pedipalp genual setae (*d*) 9 (9–10), palp tarsal ventral setae (*v*) absent. Prodorsal shield 47 (46–49), 60 (58–61) wide, frontal lobe broad and subtriangular; median line present at basal 1/4, admedian lines complete, curved outwards at basal 1/2, median line connected with admedian lines by a diagonal line at basal 1/4 of shield from posterior with a Y-shaped line, submedian lines joined with marginal lines from admedian line at 1/4 anterior, all lines granulated, shield with many granules. Scapular tubercles ahead of rear shield margin, setae *sc* 7 (7–8), 21 (20–23) apart, projecting centrad. Coxigenital region with 15 (15–17) microtuberculated semiannuli between coxae and genitalia; coxal plates with granules, anterolateral setae on coxisternum I (*1b*) 6 (6–7), 14 (13–14) apart; proximal setae on coxisternum I (*1a*) 27 (25–27), 9* apart; proximal

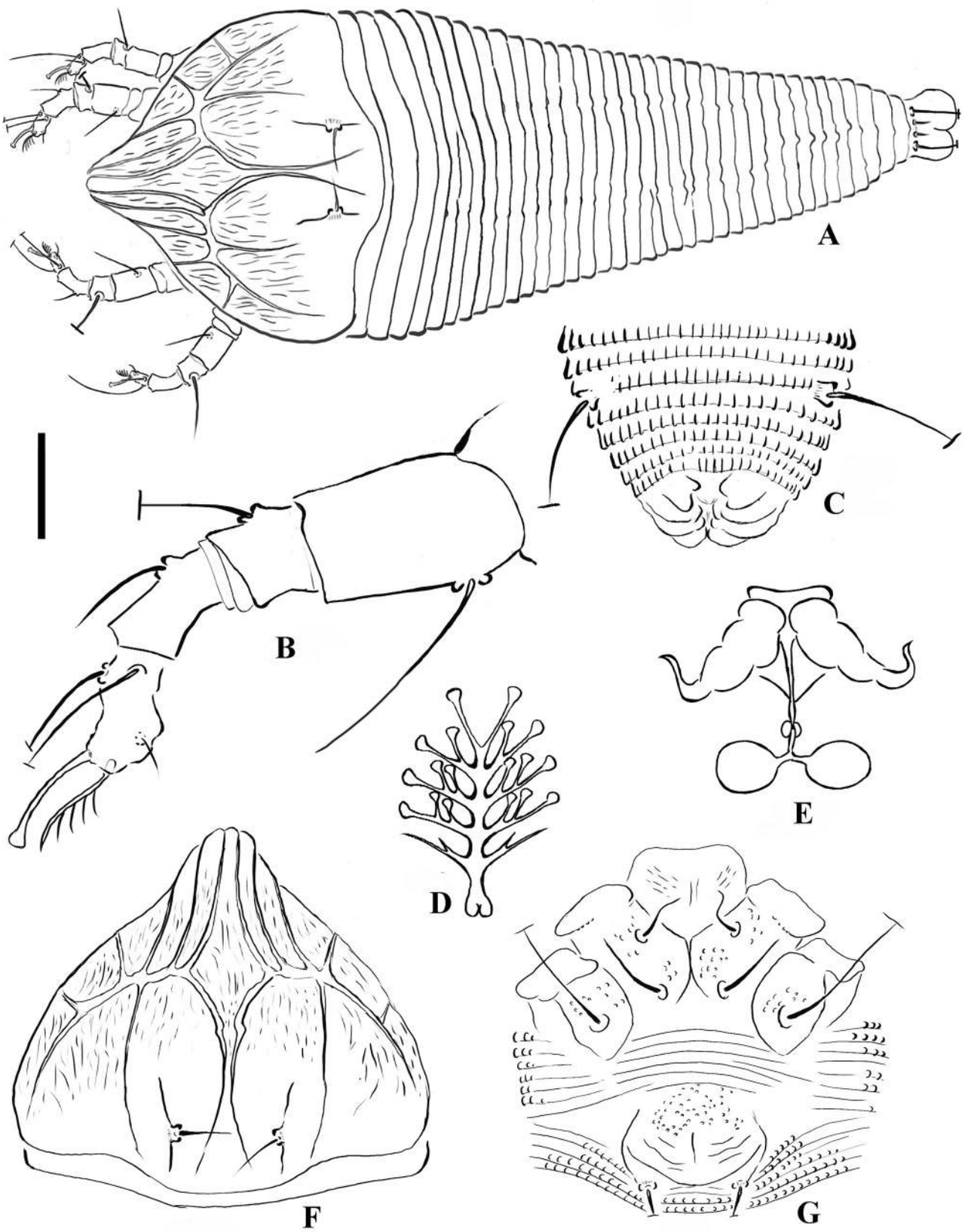

Figure 6 ***Epitrimerus emeiensis*** **sp. nov.**

A: Dorsal view of female; B: Leg I, lateral view. C: Ventral view of posterior opisthosoma. D: Empodium, dorsal view. E: Female internal genitalia, ventral view. F: Prodorsal shield, dorsal view. G: Female coxigenital area, ventral view. Scale bar: 22 μm (A), 17 μm (for C, F, G), 10 μm (E), 5 μm (B), 3 μm (D).

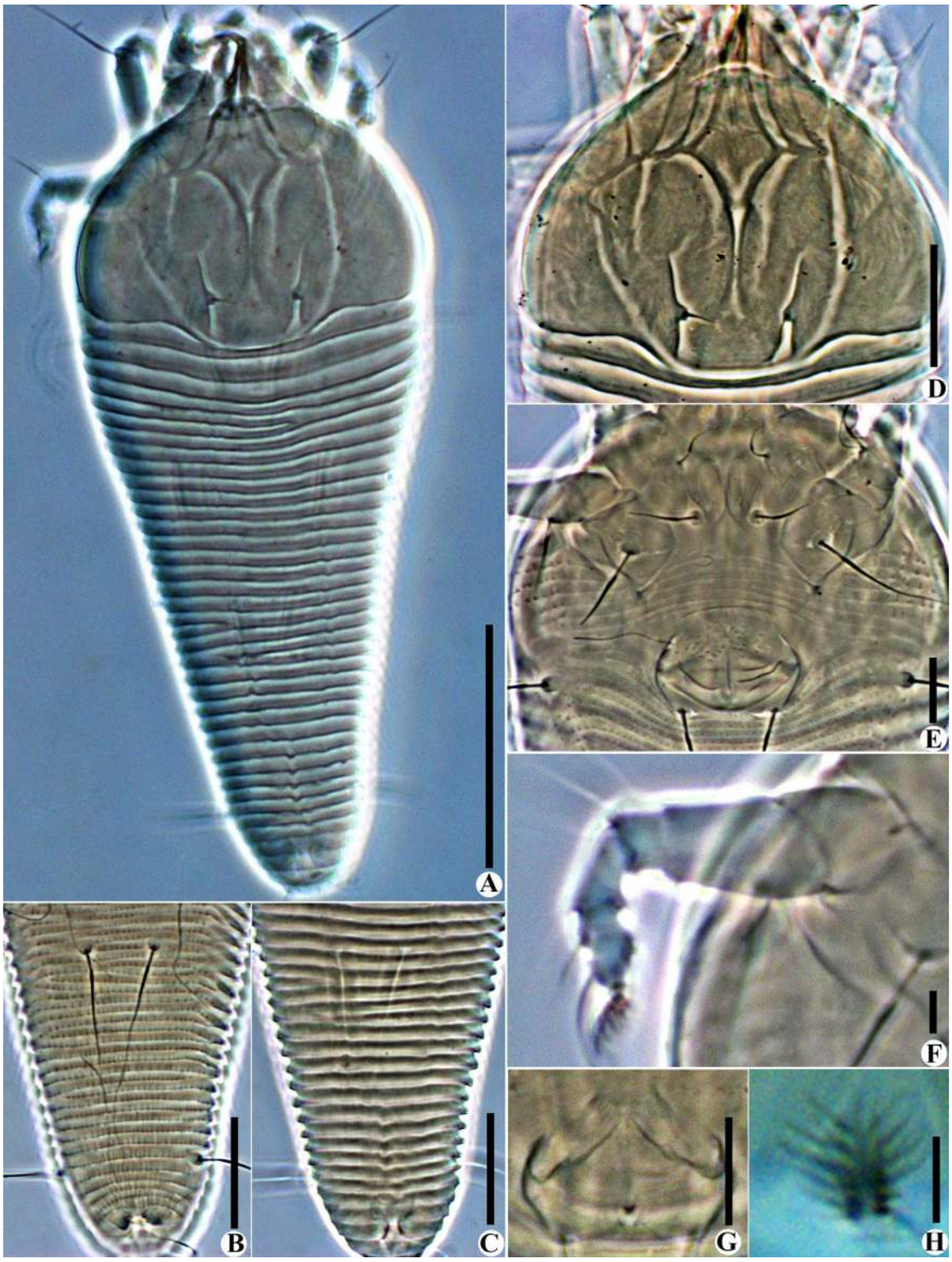

Figure 7 ***Epitrimerus emeiensis*** **sp. nov. A–G: Female holotype; H: Female paratype**

A: Dorsal view of the body. B: Dorsal view of posterior opisthosoma. C: Ventral view of posterior opisthosoma. D: Prodorsal shield, dorsal view. E: Female coxigenital area, ventral view. F: Leg II, dorsal view. G: Female internal genitalia, ventral view. H: Empodium, dorsal view. Scale bar: 50 μm (A), 20 μm (B, C, D, E), 10 μm (G), 3 μm (F, H).

setae on coxisternum II (*2a*) 44 (42–44), 27 (26–28) apart. Prosternal apodeme 8*. Leg I 28 (28–29), femur 10 (10–11), basiventral femoral setae (*bv*) 12 (12–13); genu 5*, antaxial genual setae (*l″*) 27 (26–29); tibia 7*, paraxial tibial setae (*l′*) 7 (6–7), inserted at 1/3 from the base of tibia; tarsus 6*, paraxial fastigial tarsal setae *ft′* 22 (20–23), antaxial fastigial tarsal setae *ft″* 24 (23–25), setae *u′* 5*; tarsal empodium (*em*) 8*, simple, 7-rayed, tarsal solenidion (*ω*) 9 (8–9), rod-like apically. Leg II 28 (28–29), femur 10 (10–11), basiventral femoral setae (*bv*) 19 (18–20); genu 5*, antaxial genual setae (*l″*) 13 (12–13); tibia 7*; tarsus 6*, paraxial fastigial tarsal setae *ft′* 7 (7–8), antaxial fastigial tarsal setae *ft″* 24 (23–25), setae *u′* 4*; tarsal empodium (*em*) 8*, simple, 7-rayed, tarsal solenidion (*ω*) 9 (8–9), rod-like apically. Opisthosoma dorsally with 54 (53–55) semiannuli, with oval microtubercles; ventrally with 81 (79–82) semiannuli, with rounded microtubercles anteriorly,

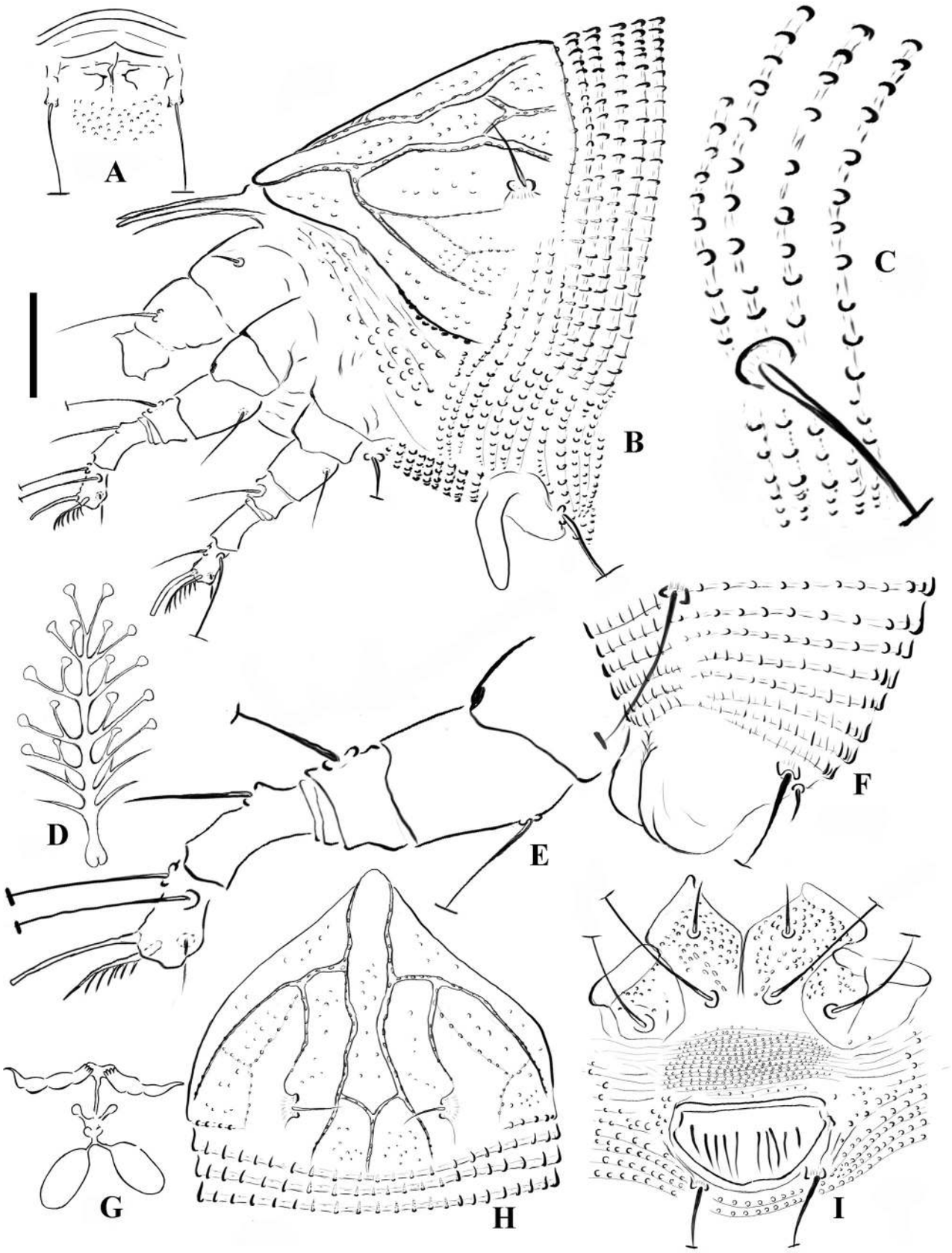

Figure 8 ***Phyllocoptes neoshirakis*** **sp. nov.**

A: Male external genitalia, ventral view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: Empodium, dorsal view. E: Leg I, lateral view. F: Lateral view of posterior opisthosoma. G: Female internal genitalia, ventral view. H: Prodorsal shield, dorsal view. I: Female coxigenital area, ventral view. Scale bar: 15 μm (H, I), 13 μm (A, B, F, G), 6 μm (C, E), 3 μm (D).

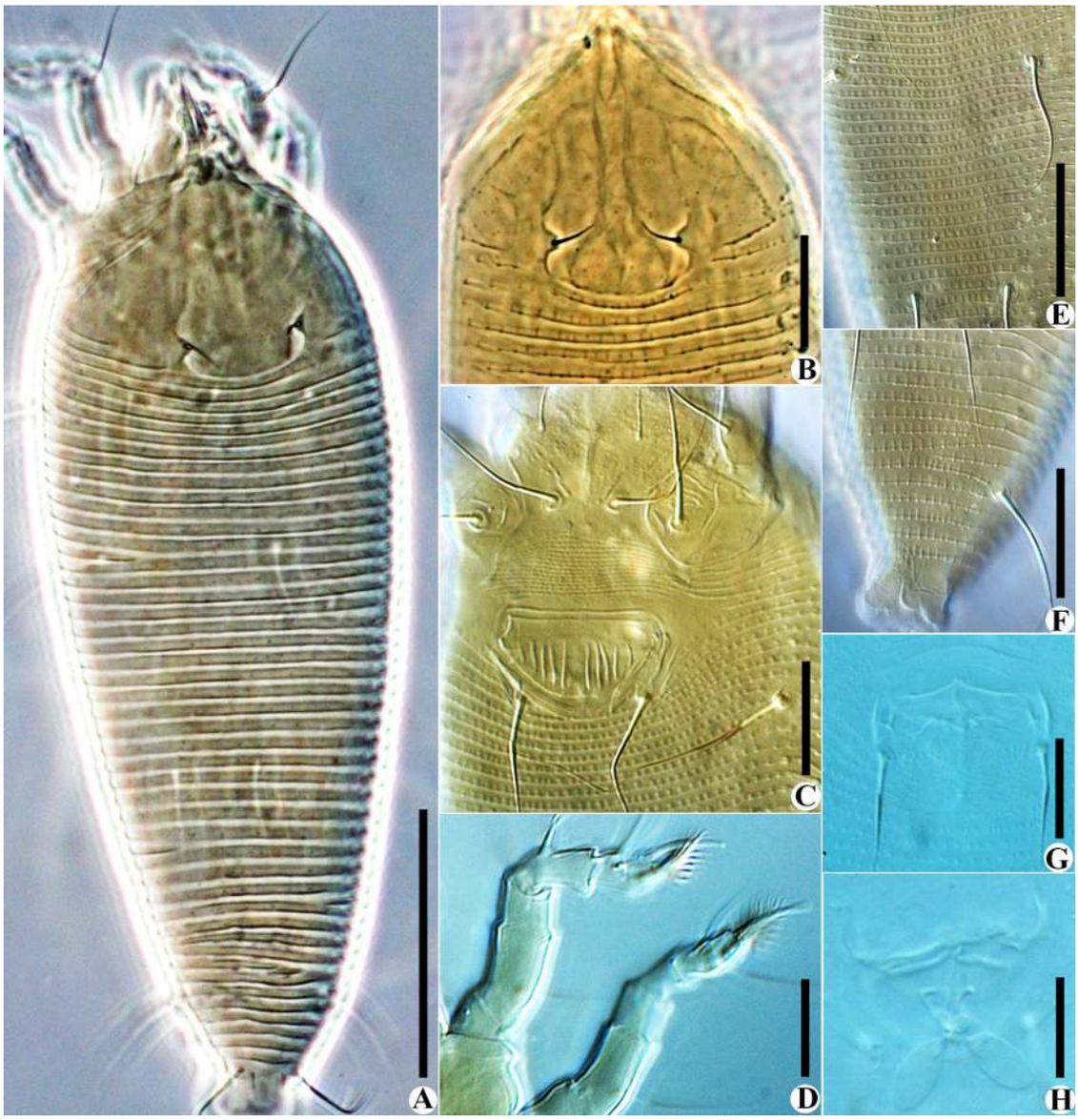

Figure 9 ***Phyllocoptes neoshirakis*** **sp. nov. A, C: Female holotype; B, D–F, H: Female paratype; G: Male paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Leg I and leg II, dorsal-lateral view. E: Ventral view of annuli between the 42th and 63th. F: Ventral view of posterior opisthosoma. G: Male external genitalia, ventral view. H: Female internal genitalia, ventral view. Scale bar: 50 μm (A), 20 μm (B, C, E, F), 10 μm (D, G, H).

becoming linear posteriorly. Setae *c2* 50 (50–52), on ventral semiannulus 25th*, 45 (43–45) apart; setae *d* 62 (59–64), on ventral semiannulus 42th (41th–42th), 26 (25–26) apart; setae *e* 46 (44–47), on ventral semiannulus 59th (58th–60th), 14 (13–15) apart; setae *f* 32th (30th–33th), 21 (20–22) apart, on the 6th ventral semiannulus from rear; setae *h1* 4*, setae *h2* 72 (70–74). External genitalia 14 (14–16), 21 (21–22) wide, coverflap with 10–12 longitudinal striae, setae *3a* 29 (29–30), 15 (15–16) apart. Internal genitalia: spermathecae ovoid, directed anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male (n=3, dorsal view): Body fusiform, 179–183, 57–60 wide; light yellow in color. Gnathosoma 22–24, projecting downwards, cheliceral stylets 19–20, pedipalp coxal setae (*ep*) 2*, dorsal pedipalp genual setae (*d*) 8*, palp tarsal ventral setae (*v*) absent. Prodorsal shield 41–43, 51–54 wide, anterior shield lobe broad. Scapular tubercles ahead of rear shield margin, setae *sc* 6–7, 18–19 apart, projecting centrad. Coxal plates with granules, anterolateral setae on coxisternum I (*1b*) 6–7, 14–15 apart; proximal setae on coxisternum I (*1a*) 27–29, 9* apart; proximal setae on coxisternum II (*2a*) 39–42, 25–26 apart. Prosternal apodeme present. Leg I 28*, femur 10*, basiventral femoral setae (*bv*) 12*; genu 5*, antaxial genual setae (*l″*) 26–36; tibia 7*, paraxial tibial setae (*l′*) 6–7, inserted at 1/3 from base of tibia; tarsus 6*, paraxial fastigial tarsal setae *ft′* 21–22, antaxial fastigial tarsal setae *ft″* 24–25, setae *u′* 5*; tarsal empodium (*em*) 8*, simple, 7-rayed, tarsal solenidion (*ω*) 9*, rod-like apically. Leg II 28*, femur 10*, basiventral femoral setae (*bv*) 17–18; genu 5*, antaxial genual setae (*l″*) 11–13; tibia 7*; tarsus 6*, paraxial fastigial tarsal setae *ft′* 7–8, antaxial fastigial tarsal setae *ft″* 23–24, setae *u′* 5*; tarsal empodium (*em*) 8*, simple, 7-rayed, tarsal solenidion (*ω*) 9*, rod-like apically. Opisthosoma dorsally with 51–52 semiannuli, with round microtubercles, ventrally with 79–80 semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 49–51, on ventral semiannulus 22th*, 45–47 apart; setae *d* 57–59, on ventral semiannulus 39th–40th, 31–32 apart; setae *e* 45–47, on ventral

semiannulus 57th–58th, 15–16 apart; setae *f* 33–34, 23–24 apart, on the 6th ventral semiannulus from rear; setae *h1* 4*, setae *h2* 68–70. Male genitalia 12*, 18–19 wide, setae *3a* 26–27, 16* apart.

Type material: Holotype, female (slide no. NJAUSC85.1; marked Holotype), collected from *Neoshirakia japonica* (Siebold & Zucc.) Esser (Euphorbiaceae), Emeishan City, Sichuan Province, China, N29°53′26″, E103°33′59″, elevation 2 517 m asl, 10 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 10 females (10 slides) and 3 males (3 slides) (slide nos. NJAUSC85.2–14; marked Paratypes), from *N. japonica*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation is *neoshirakis* derived from the generic name of host plant, *Neoshirakia*; masculine in gender.

Differential diagnosis: The new species is morphologically close to *Phyllocoptes webbianae* Song et al., 2009, described from *Lonicera webbiana* Wall. Ex DC. (Caprifoliaceae), but can be differentiated by prosternal apodeme present (prosternal apodeme absent in *P. webbianae*) and prodorsal shield with granules (granules absent from prodorsal shield in *P. webbianae*). The new species is also morphologically close to *Phyllocoptes exochordae* Keifer, 1972, described from *Exochorda racemosa* (Lindl.) (Rosaceae), but can be differentiated by coxal plates with granules (coxal plates I with short curved lines and coxal plates II smooth in *P. exochordae*), empodium 7-rayed (empodium 6-rayed in *P. exochordae*), and dorsal annuli with oval microtubercles (annuli with round microtubercles in *P. exochordae*).

Tribe Anthocoptini Amrine & Stasny, 1994

***Genus Aculops* Keifer, 1966**

Type species: *Vasates populivagrans* Keifer, 1953: 68, 76.

Diagnosis: See Keifer (1966), Xue et al. (2007b), Xue & Zhang (2009).

***Aculops kakies* sp. nov. (Figures 10–11)**

Description: Female (n=6). Body fusiform, 216 (202–221), 65 (63–65) wide, 56 (53–58) thick; light yellow. Gnathosoma 21 (21–22), projecting downwards, cheliceral stylets 19 (17–19), pedipalp coxal setae (*ep*) 3 (2–3), dorsal pedipalp genual setae (*d*) 5 (5–6), palp tarsal ventral setae (*v*) absent. Prodorsal shield 37 (35–37), including the frontal lobe, 46 (43–49) wide, frontal lobe more acuminate; median line incomplete and connected with transverse lines from admedian lines at basal 1/10 and 1/3, admedian and submedian lines connected with a marginal line and a transverse line, forming 6 cells at each shield side, all lines granulated, with several granules distributed on shield. Scapular tubercles on the rear shield margin, setae *sc* 6 (6–7), 30 (29–31) apart, projecting posterior. Coxigenital region with 5* microtuberculated semiannuli between coxae and genitalia; coxal plates with many granules, anterolateral setae on coxisternum I (*1b*) 6 (6–7), 10 (10–11) apart; proximal setae on coxisternum I (*1a*) 18 (18–20), 7 (7–8) apart; proximal setae on coxisternum II (*2a*) 30 (30–32), 24 (24–26) apart. Prosternal apodeme 6 (6–7). Leg I 28 (28–30), femur 10 (10–12), basiventral femoral setae (*bv*) 9 (9–10), with robust vertical lines; genu 5 (5–6), antaxial genual setae (*l″*) 18 (17–21); tibia 8 (8–9), paraxial tibial setae (*l′*) 9 (9–10), inserted at 1/4 from the base of tibia; tarsus 6 (6–7), paraxial fastigial tarsal setae *ft′* 15 (15–16), antaxial fastigial tarsal setae *ft″* 17 (17–19), setae *u′* 6*; tarsal empodium (*em*) 6*, simple, 5-rayed, tarsal solenidion (*ω*) 7 (7–8), knobbed apically. Leg II 26 (26–28), femur 9 (9–10), basiventral femoral setae (*bv*) 9 (8–10), with robust vertical lines; genu 5*, antaxial genual setae (*l″*) 10 (8–10); tibia 7 (7–8); tarsus 6*, paraxial fastigial tarsal setae *ft′* 5 (5–6), antaxial fastigial tarsal setae *ft″* 19 (19–20), setae *u′* 6*; tarsal empodium (*em*) 6*, simple, 5-rayed, tarsal solenidion (*ω*) 7*, knobbed apically. Opisthosoma dorsally with 49 (47–50) semiannuli, ornamented with oval microtubercles, ventrally with 71 (71–73) semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 18 (16–20), on ventral semiannulus 16th*, 48 (48–49) apart; setae *d* 39 (39–40), on ventral semiannulus 30th (30th–32th), 31 (30–32) apart; setae *e* 26 (24–26), on ventral semiannulus 49th (49th–50th), 15 (14–16) apart; setae *f* 30th (29th–31th), 24 (22–24) apart, on the 5th ventral semiannulus from rear; setae *h1* 3*, setae *h2* 111 (107–114). External genitalia 15 (14–15), 19 (18–19) wide, coverflap with 8 longitudinal striae, setae *3a* 22 (20–23), 15 (14–16) apart. Internal genitalia: spermathecae ovoid, directed anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC66.1; marked Holotype), collected from *Diospyros kaki* Thunb. (Ebenaceae), Luding County, Ganzi Tibetan Autonomous Prefecture, Sichuan Province, China, N29°57′02″, E101°59′44″, elevation 3 025 m asl, 8 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 5 females (5 slides) (slide nos. NJAUSC66.2–6; marked Paratypes), from *D. kaki*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation *kakies* is derived from the species name of the host plant, *kaki*; adding a suffix *-es*, feminine in gender.

Differential diagnosis: The new species is morphologically similar to *Aculops sienses* Xue et al., 2007b, described from *Ligustrum sinense* Lour. (Oleaceae), but can be differentiated by prodorsal shield all lines granulated (granules absent from *A. sienses*), coxal plates with granules (coxal plates with short lines in *A. sienses*), and femur with robust vertical lines (femur smooth in *A. sienses*). The new species is also morphologically similar to *Aculops knowltoni* Keifer, 1964, described from *Populus* sp. (Salicaceae), but can be differentiated by prodorsal shield all lines granulated (granules absent from *A. knowltoni*), coxal plates with granules (coxal plates with heavy granular lines in *A. knowltoni*), and coverflap with 8 longitudinal striae (coverflap with 10 longitudinal striae in *A. knowltoni*).

***Aculops tetrandrus* sp. nov. (Figures 12–13)**

Description: Female (n=8). Body fusiform,184 (180–195), 64 (60–65) wide, 47 (47–51) thick; light yellow. Gnathosoma 23 (21–23), projecting downwards, cheliceral stylets 19 (17–19), pedipalp coxal setae (*ep*) 3 (2–3), dorsal pedipalp genual setae (*d*) 7 (7–8), palp tarsal ventral setae (*v*) absent. Prodorsal shield 42 (42–43), including the frontal lobe, 46 (46–51) wide, frontal lobe more acuminate; median line present at the basal 3/8, two transverse lines join admedian lines to median line at posterior 1/8 and 3/8, pairs of submedian lines posteriorly connected to admedian lines with two transverse lines at anterior 3/8 and 5/8. Scapular

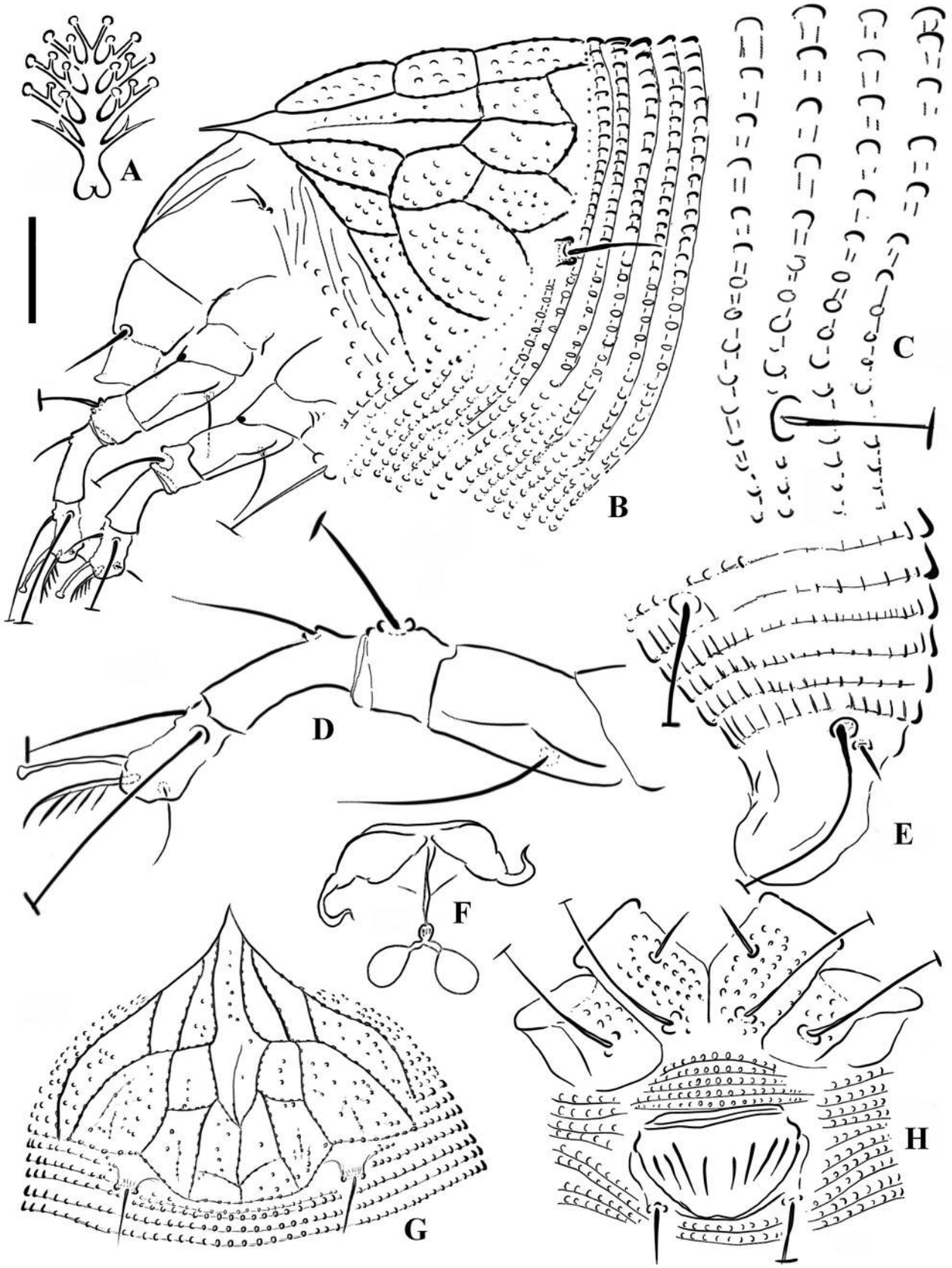

Figure 10 ***Aculops kakies*** **sp. nov.**

A: Empodium, dorsal view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: Leg I, lateral view. E: Lateral view of posterior opisthosoma. F: Female internal genitalia, ventral view. G: Prodorsal shield, dorsal view. H: Female coxigenital area, ventral view. Scale bar: 13 μm (G, H), 12 μm (B, E, F), 6 μm (C, D), 3 μm (A).

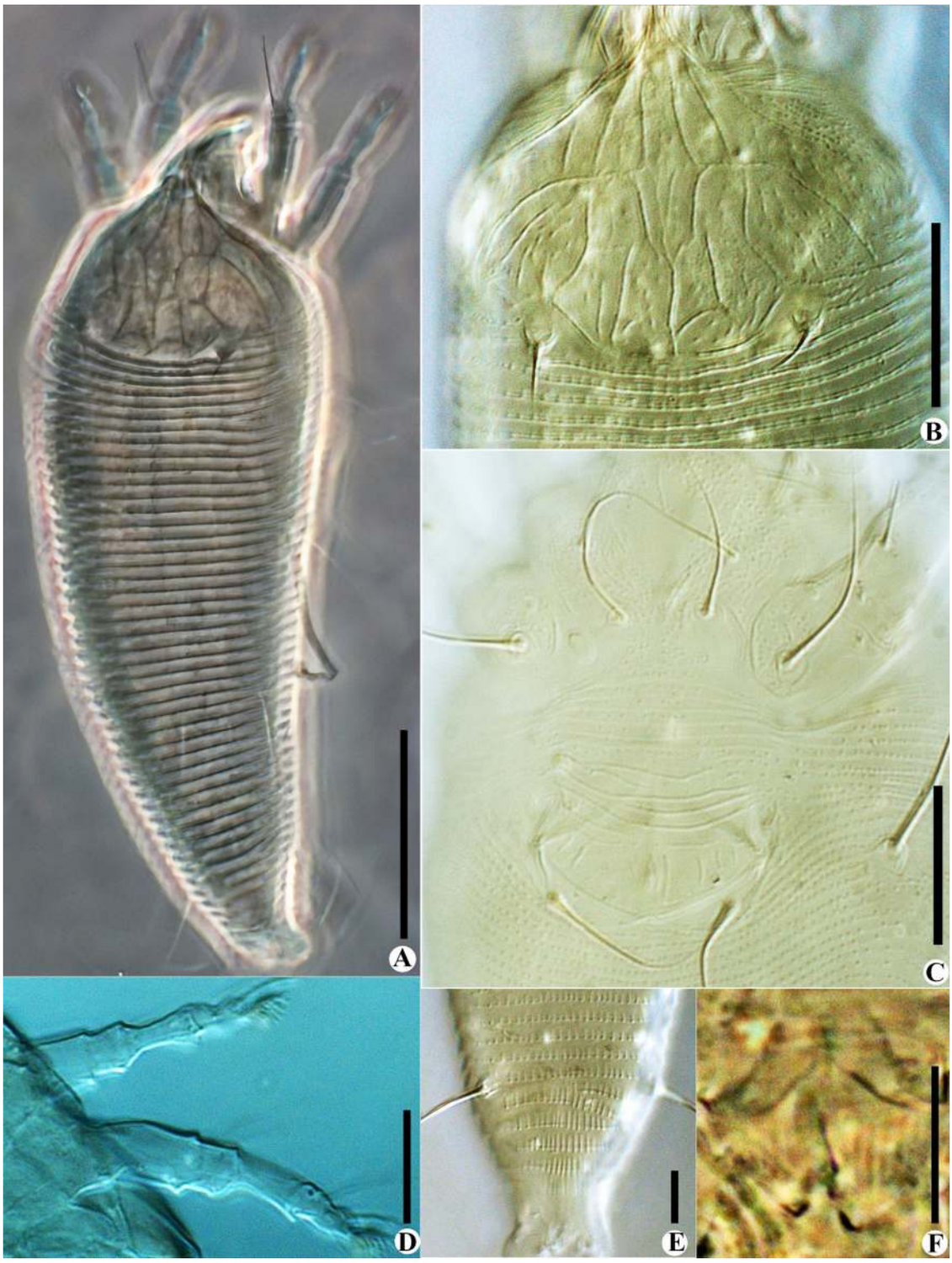

Figure 11 ***Aculops kakies*** **sp. nov. A: Female holotype; B–F: Female paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Leg I and leg II, dorsal view. E: Ventral view of posterior opisthosoma. F: Female internal genitalia, ventral view. Scale bar: 50 μm (A), 20 μm (B, C, F), 10 μm (D, E).

tubercles on rear shield margin, setae *sc* 54 (51–56), 29 (29–31) apart, projecting posterior. Coxigenital region with 11* microtuberculated semiannuli between coxae and genitalia; coxal plates with granules and short lines, anterolateral setae on coxisternum I (*1b*) 9 (9–10), 13 (12–13) apart; proximal setae on coxisternum I (*1a*) 25 (24–26), 9 (8–9) apart; proximal setae on coxisternum II (*2a*) 46 (42–46), 26 (25–27) apart. Prosternal apodeme 8*. Leg I 28 (28–29), femur 9 (9–10), basiventral femoral setae (*bv*) 8 (8–10); genu 5 (5–6), antaxial genual setae (*l″*) 28 (27–29); tibia 7*, paraxial tibial setae (*l′*) 12 (12–13), inserted at 1/3 from the base of tibia; tarsus 7*, paraxial fastigial tarsal setae *ft′* 21 (21–22), antaxial fastigial tarsal setae *ft″* 25 (24–26), setae *u′* 3*; tarsal empodium (*em*) 7*, simple, 5-rayed, tarsal solenidion (*ω*) 7 (7–8), knobbed apically. Leg II 28 (27–28), femur 9 (8–9), basiventral femoral setae (*bv*) 9 (9–12); genu 5*, antaxial genual setae (*l″*) 9 (8–9); tibia 7*; tarsus 7*, paraxial fastigial tarsal setae *ft′* 8 (8–9), antaxial fastigial tarsal setae *ft″* 23

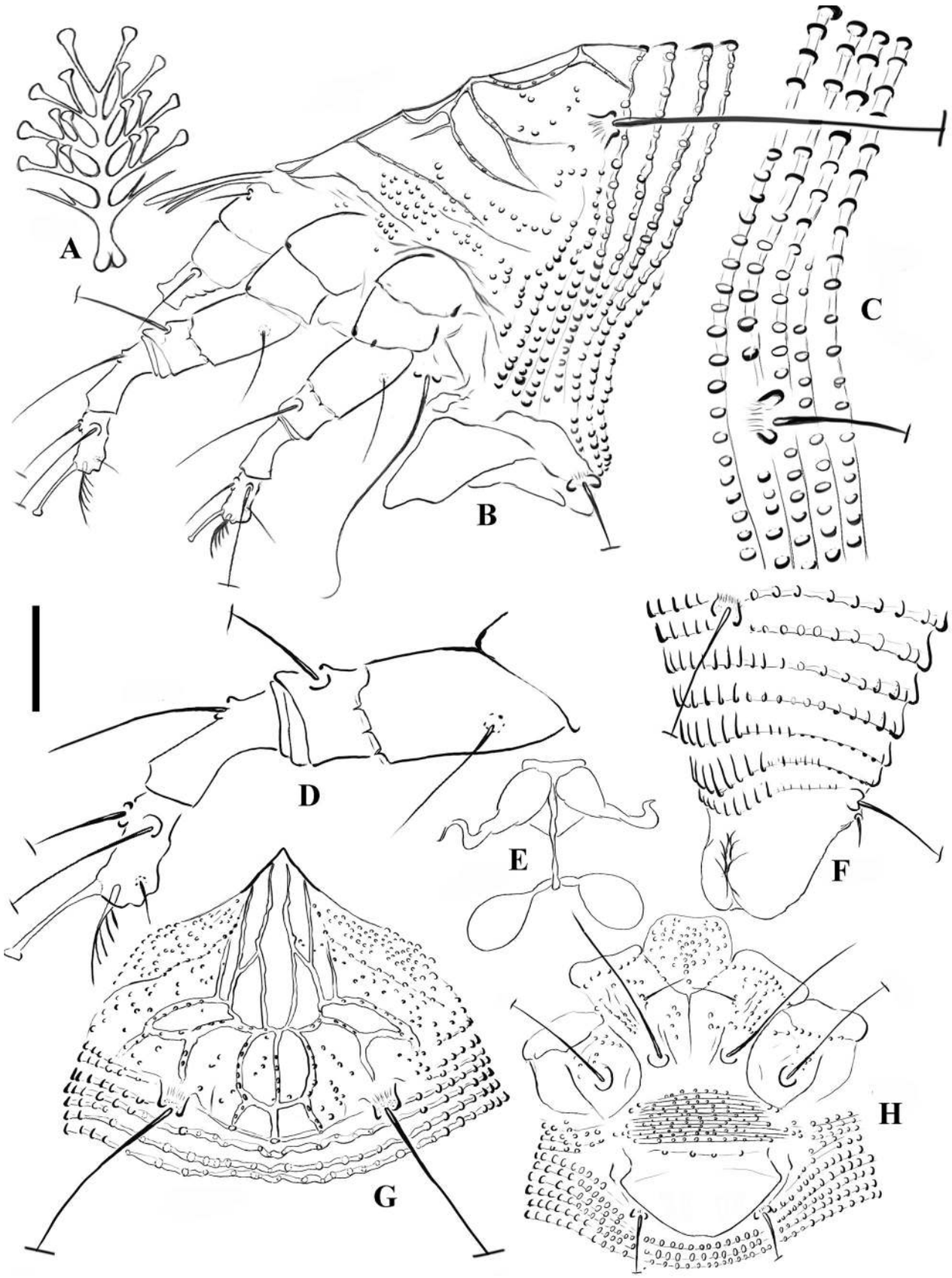

Figure 12 ***Aculops tetrandrus*** **sp. nov.**

A: Empodium, dorsal view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: Leg I, lateral view. E: Female internal genitalia, ventral view. F: Lateral view of posterior opisthosoma. G: Prodorsal shield, dorsal view. H: Female coxigenital area, ventral view. Scale bar: 15 μm (G, H), 10 μm (B, E, F), 6 μm (C, D), 3 μm (A).

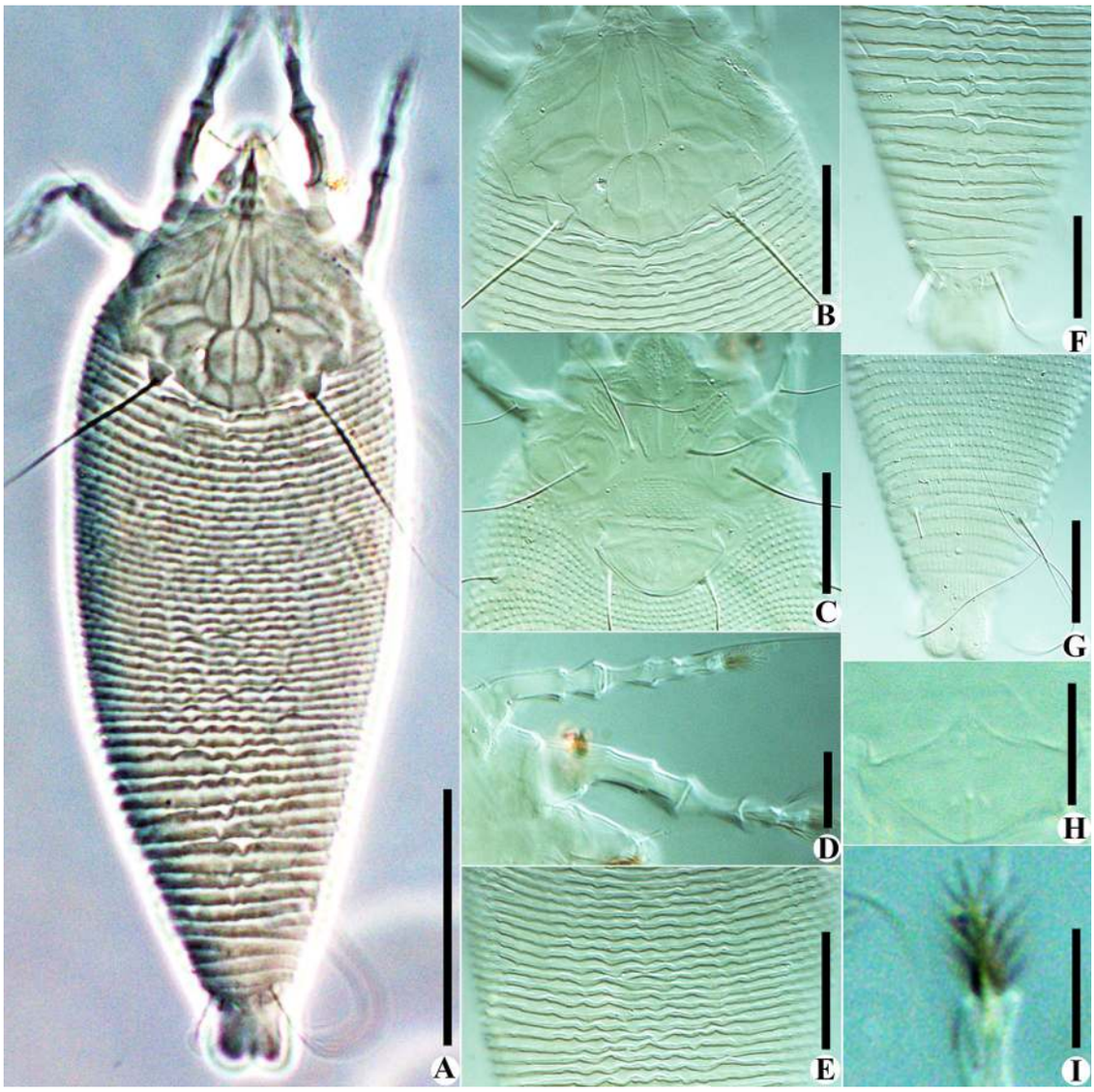

Figure 13 ***Aculops tetrandrus*** **sp. nov. A–C: Female holotype; D–I: Female paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Leg I and leg II, dorsal view. E: Dorsal view of semiannuli between the 14th and 33th. F: Dorsal view of posterior opisthosoma. G: Ventral view of posterior opisthosoma. H: Female internal genitalia, ventral view. I: Empodium, dorsal view. Scale bar: 50 μm (A), 20 μm (B, C, E, F, G), 10 μm (H), 5 μm (I).

(23–24), setae *u′* 3*; tarsal empodium (*em*) 7*, simple, 5-rayed, tarsal solenidion (*ω*) 7*, knobbed apically. Opisthosoma dorsally with 52 (52–54) semiannuli, sinuate and ornamented with elliptical microtubercles, ventrally with 77 (75–78) semiannuli, with oval microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 35 (33–36), on ventral semiannulus 18th*, 55 (53–55) apart; setae *d* 48 (47–50), on ventral semiannulus 34th (34th–35th), 38 (38–40) apart; setae *e* 21 (21–23), on ventral semiannulus 52th (51th–53th), 19 (18–20) apart; setae *f* 31th (29th–31th), 21 (20–22) apart, on the 6th ventral semiannulus from rear; setae *h1* 3*, setae *h2* 82 (80–84). External genitalia 14 (14–15), 22 (21–22) wide, coverflap smooth, setae *3a* 48 (47–50), 16 (16–18) apart. Internal genitalia: spermathecae ovoid, directed laterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC20.1; marked Holotype), collected from *Celtis tetrandra* Roxb. (Cannabaceae), Wangyu Mountain, Bazhong City, Sichuan Province, China, N31°52′42″, E106°45′51″, elevation 535 m asl, 3 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 7 females (7 slides) (slide nos. NJAUSC20.2–8; marked Paratypes), from *C. tetrandra*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation *tetrandrus* is derived from the species name of the host plant, *tetrandra*; deleting *-a* and adding a suffix *-us*, masculine in gender.

Differential diagnosis: The new species is morphologically similar to *Aculops celtidis* Keifer, 1957, described from *Celtis occidentalis* L. (Cannabaceae), but can be differentiated by median line incomplete, submedian and admedian lines complete (prodorsal shield smooth in *A. celtidis*) and dorsal annuli sinuate (dorsal annuli smooth in *A. celtidis*).

Genus *Tegolophus* Keifer, 1961

Type species: *Epitrimerus califraxini* Keifer, 1938: 308–309, 320.

Diagnosis: See Keifer (1961), Xue et al. (2011), Xue & Zhang

(2009).

***Tegolophus danbaensis* sp. nov. (Figures 14–15)**

Description: Female (n=7). Body fusiform, 176 (172–182), 54 (53–57) wide, 38 (36–41) thick; light yellow. Gnathosoma 18 (18–21), projecting downwards, cheliceral stylets 14 (14–16), pedipalp coxal setae (*ep*) 2 (2–3), dorsal pedipalp genual setae (*d*) 5 (5–6), palp tarsal ventral setae (*v*) absent. Prodorsal shield 39 (39–42), 53 (53–54) wide, frontal lobe broad and subtriangular; median line present at basal 3/8, admedian lines complete, curved a little outwards at basal 1/2, connected with median line by two diagonal lines at basal 1/8 and 3/8, submedian lines joined with marginal lines running from admedian lines at 1/2 anterior. Scapular tubercles on rear shield margin, setae *sc* 9 (9–11), 28 (28–31) apart, projecting posterior. Coxigenital region with 7* microtuberculated semiannuli between coxae and genitalia; coxal plates with granules, anterolateral setae on coxisternum I (*1b*) 5 (5–6), 8 (8–9) apart; proximal setae on coxisternum I (*1a*) 18 (16–19), 7* apart; proximal setae on coxisternum II (*2a*) 27 (26–29), 20 (20–22) apart. Prosternal apodeme 5*. Leg I 21 (21–23), femur 7 (7–8), basiventral femoral setae (*bv*) 8 (7–8); genu 4*, antaxial genual setae (*l″*) 15 (15–17); tibia 5 (5–6), paraxial tibial setae (*l′*) 5 (5–6), inserted at 1/3 from base of tibia; tarsus 5*, paraxial fastigial tarsal setae *ft′* 15 (15–16), antaxial fastigial tarsal setae *ft″* 17 (17–18), setae *u′* 3*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Leg II 21 (21–22), femur 7*, basiventral femoral setae (*bv*) 9 (9–10); genu 4*, antaxial genual setae (*l″*) 5 (5–6); tibia 5 (5–6); tarsus 5*, paraxial fastigial tarsal setae *ft′* 4 (4–5), antaxial fastigial tarsal setae *ft″* 15 (15–16), setae *u′* 3*; tarsal empodium (*em*) 5*, simple, 4-rayed, tarsal solenidion (*ω*) 6*, knobbed apically. Opisthosoma dorsally with 32 (32–35) semiannuli, with a middorsal ridge and two lateral ridges ornamented elongated microtubercles; ventrally with 65 (65–66) semiannuli, with elliptical microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 14 (14–16), on ventral semiannulus 14th (13th–14th), 39 (37–40) apart; setae *d* 42 (40–44), on ventral semiannulus 27th (27th–28th), 25 (24–27) apart; setae *e* 12 (12–14), on ventral semiannulus 45th (45th–48th), 10 (10–12) apart; setae *f* 17th (17th–18th), 15 (15–16) apart, on the 6th ventral semiannulus from rear; setae *h1* 3 (3–4), setae *h2* 60 (56–62). External genitalia 11 (10–12), 17 (17–19) wide, coverflap with 10 longitudinal striae and 3 transverse lines at base, setae *3a* 10 (9–11), 12 (11–12) apart. Internal genitalia: spermathecae ovoid, directed anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC56.1; marked Holotype), collected from *Rhamnus parvifolia* Bunge (Rhamnaceae), Danba County, Ganzi Tibetan Autonomous Prefecture, Sichuan Province, China, N30°55′55″, E101°52′01″, elevation 2 376 m asl, 7 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 6 females (6 slides) (slide nos. NJAUSC56.2–7; marked Paratypes), from *R. parvifolia*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation is *danbaensis* derived from the name of location, Danba County, where the type species were collected; adding a suffix *-ensis*, masculine in gender.

Differential diagnosis: The new species is morphologically similar to *Tegolophus paliurus* Kuang & Lin, 2001, described from *Paliurus ramosissinus* (Lour.) Poir. (Rhamnaceae), but it can be differentiated by dorsally with elongated microtubercles on ridges (dorsal opisthosoma smooth in *T. paliurus*), coxal plates with granules (coxal plates with short lines in *T. paliurus*), and female genital coverflap with 3 transverse lines at base (transverse lines absent from coverflap in *T. paliurus*). The new species is also morphologically similar to *Tegolophus phyllathus* Xie et al., 2007, described from *phyllathus* sp. (Euphorbiaceae), but it can be differentiated by dorsally with elongated microtubercles on ridges (dorsal opisthosoma smooth in *T. phyllathus*), coxal plates with granules (coxal plates with short lines in *T. phyllathus*), and empodium 4-rayed (empodium 6-rayed in *T. phyllathus*).

Family Diptilomiopidae Keifer, 1944

Subfamily Rhyncaphytoptinae Roivainen, 1953

***Genus Rhyncaphytoptus* Keifer, 1939**

Type species: *Rhyncaphytoptus ficifoliae* Keifer, 1939: 150.

Diagnosis: See Keifer (1939), Xue et al. (2006), Xue & Zhang (2009), Varandi et al. (2022).

***Rhyncaphytoptus davidex* sp. nov. (Figures 16–17)**

Description: Female (n=5). Body fusiform, 245 (239–257), 86 (82–90) wide, 74 (70–77) thick; light yellow. Gnathosoma 53 (48–55), projecting abruptly downwards; cheliceral stylets 47 (44–49); pedipalp coxal setae (*ep*) 2*; dorsal pedipalp genual setae (*d*) 6 (6–8); palp tarsal ventral setae (*v*) 3*. Prodorsal shield 28 (26–31), 63 (59–63) wide; frontal lobe absent; median line absent, admedian lines join submedian lines with a transverse line, forming two rows of cells: 7 cells in anterior row, 5 cells at center row. Scapular tubercles ahead of rear shield margin, setae *sc* 10 (9–11), 22 (22–24) apart, projecting up. Coxigenital region with 10* microtuberculated semiannuli between coxae and genitalia; coxal plates with few short lines; anterolateral setae on coxisternum I (*1b*) 8 (8–9), 12 (12–14) apart; proximal setae on coxisternum I (*1a*) 15 (14–16), 9 (9–11) apart; proximal setae on coxisternum II (*2a*) 37 (36–38), 28 (26–31) apart. Prosternal apodeme 6 (6–7). Leg I 35 (33–35); femur 12 (11–13), basiventral femoral setae (*bv*) 10 (10–12); genu 6*, antaxial genual setae (*l″*) 25 (23–26); tibia 9 (8–9), paraxial tibial setae (*l′*) 7 (7–9), inserted at 1/3 from the base of tibia; tarsus 8*, paraxial fastigial tarsal setae *ft′* 20 (19–21), antaxial fastigial tarsal setae *ft″* 25 (24–26), setae *u′* 5*; tarsal empodium (*em*) 6*, simple, 5-rayed; tarsal solenidion (*ω*) 6 (6–7), knobbed apically. Leg II 31 (31–33); femur 11 (10–11), basiventral femoral setae (*bv*) 9*; genu 5*, antaxial genual setae (*l″*) 6 (5–7); tibia 7 (7–8); tarsus 7*, paraxial fastigial tarsal setae *ft′* 6 (6–8), antaxial fastigial tarsal setae *ft″* 24 (23–25), setae *u′* 5*; tarsal empodium (*em*) 6*, simple, 5-rayed; tarsal solenidion (*ω*) 6 (6–7), knobbed apically. Opisthosoma dorsally with 56 (55–58) semiannuli, with small round microtubercles; ventrally with 88 (85–88) semiannuli, with rounded microtubercles anteriorly, becoming linear posteriorly. Setae *c2* 7 (7–9), on ventral semiannulus 21th (20th–22th), 64 (62–65) apart; setae *d* 48 (46–49), on ventral semiannulus 35th (33th–36th), 44 (42–45) apart; setae *e* 8 (7–9), on ventral semiannulus 50th (49th–52th), 23 (23–25) apart; setae *f* 27th (26th–29th), 26 (24–26) apart, on the 8th ventral semiannulus from rear; setae *h1* 1*, setae *h2* 71 (71–76). External genitalia 19 (18–19), 24 (23–26) wide; coverflap smooth; setae *3a* 8 (8–10), 19 (18–20) apart. Internal genitalia: spermathecae ovoid, directed

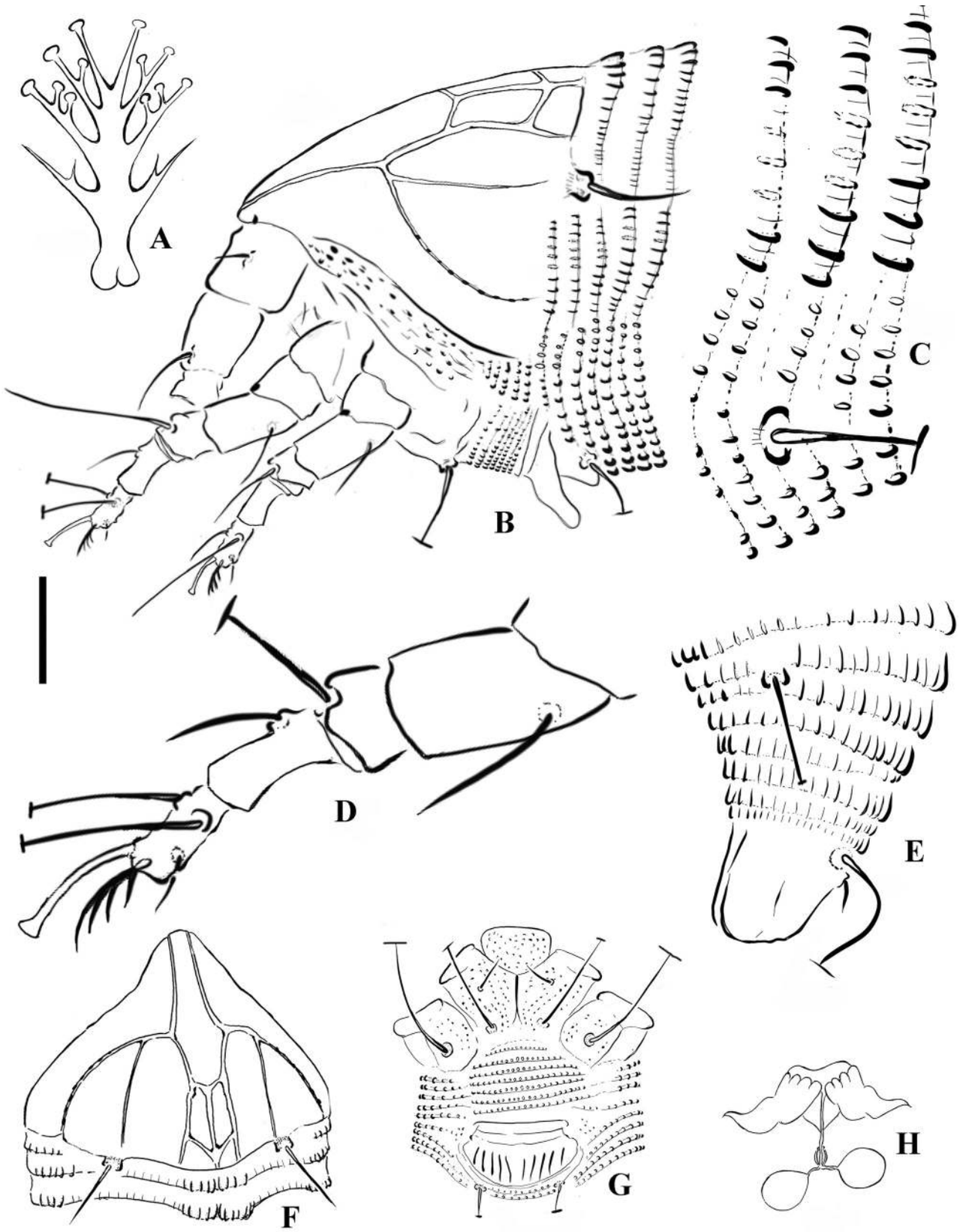

Figure 14 ***Tegolophus danbaensis*** **sp. nov.**

A: Empodium, dorsal view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: Leg I, lateral view. E: Lateral view of posterior opisthosoma. F: Prodorsal shield, dorsal view. G: Female coxigenital area, ventral view. H: Female internal genitalia, ventral view. Scale bar: 17 μm (F, G), 9 μm (B, E, H); 4 μm (C, D), 2 μm (A).

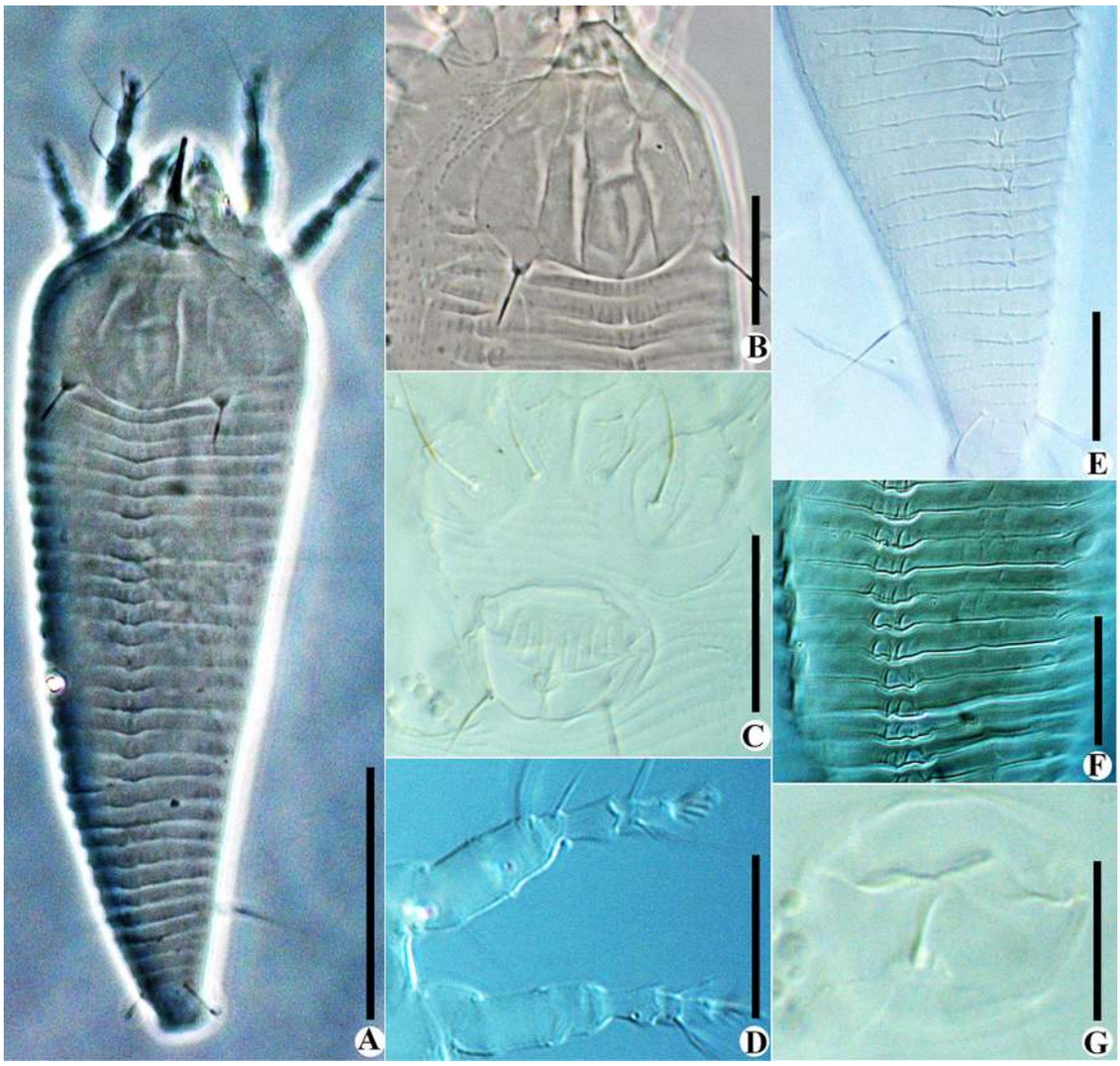

Figure 15 ***Tegolophus danbaensis*** **sp. nov. A: Female holotype; B–G: Female paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Leg I and leg II, dorsal view. E: Dorsal view of posterior opisthosoma. F: Dorsal view of semiannuli between the 5th and 15th. G: Female internal genitalia, ventral view. Scale bar: 50 μm (A), 20 μm (B, C, E, F), 10 μm (D, G).

anterolaterally; spermathecal tubes relatively short; transverse genital apodeme trapezoidal, distally folded.

Male: Not found.

Type material: Holotype, female (slide no. NJAUSC51.1; marked Holotype), collected from *Acer davidii* subsp. *grosseri* (Pax) P.C.de Jong (Sapindaceae), Jiuzhai Valley, Sichuan Province, China, N33°06′59″, E103°52′20″, elevation 3 004 m asl, 5 August 2022, coll. Liang-Fei Yao, Ni Li, Yue Hu & Xiao-Feng Xue. Paratypes, 4 females (4 slides) (slide nos. NJAUSC51.2–5; marked Paratypes), from *A. davidii*, same details as holotype.

Relation to host: Vagrant on the lower leaf surface. No apparent symptoms were observed on the host plant.

Etymology: The specific designation *davidex* is derived from the species name of the host plant, *davidii*; deleting *-ii* and adding a suffix *-ex,* masculine in gender.

Differential diagnosis: The new species is morphologically similar to *Rhyncaphytoptus fengi* Wang et al., 2007, described from *Acer davidii* subsp. *grosseri* (Pax) P.C.de Jong (Sapindaceae), but it can be differentiated by median line absent from prodorsal shield (median line present in *R. fengi*), dorsal and ventral annuli with round microtubercles (dorsal and ventral annuli smooth in *R. fengi*), and empodium 5-rayed (empodium 6-rayed in *R. fengi*).

Type species

Oxypleurites juglandis Keifer, 1951: 97, 104.

Diagnosis

See Bagdasarian (1978), Xue & Zhang (2009).

NONMENCLATURAL ACTS REGISTRATION

This published work and the nomenclatural acts it contains have been registered in ZooBank, the online registration system for the ICZN. The ZooBank LSIDs (Life Science Identifiers) can be resolved, and the associated information can be viewed through any standard web browser by appending the LSID to the prefix http://zoobank.org/.

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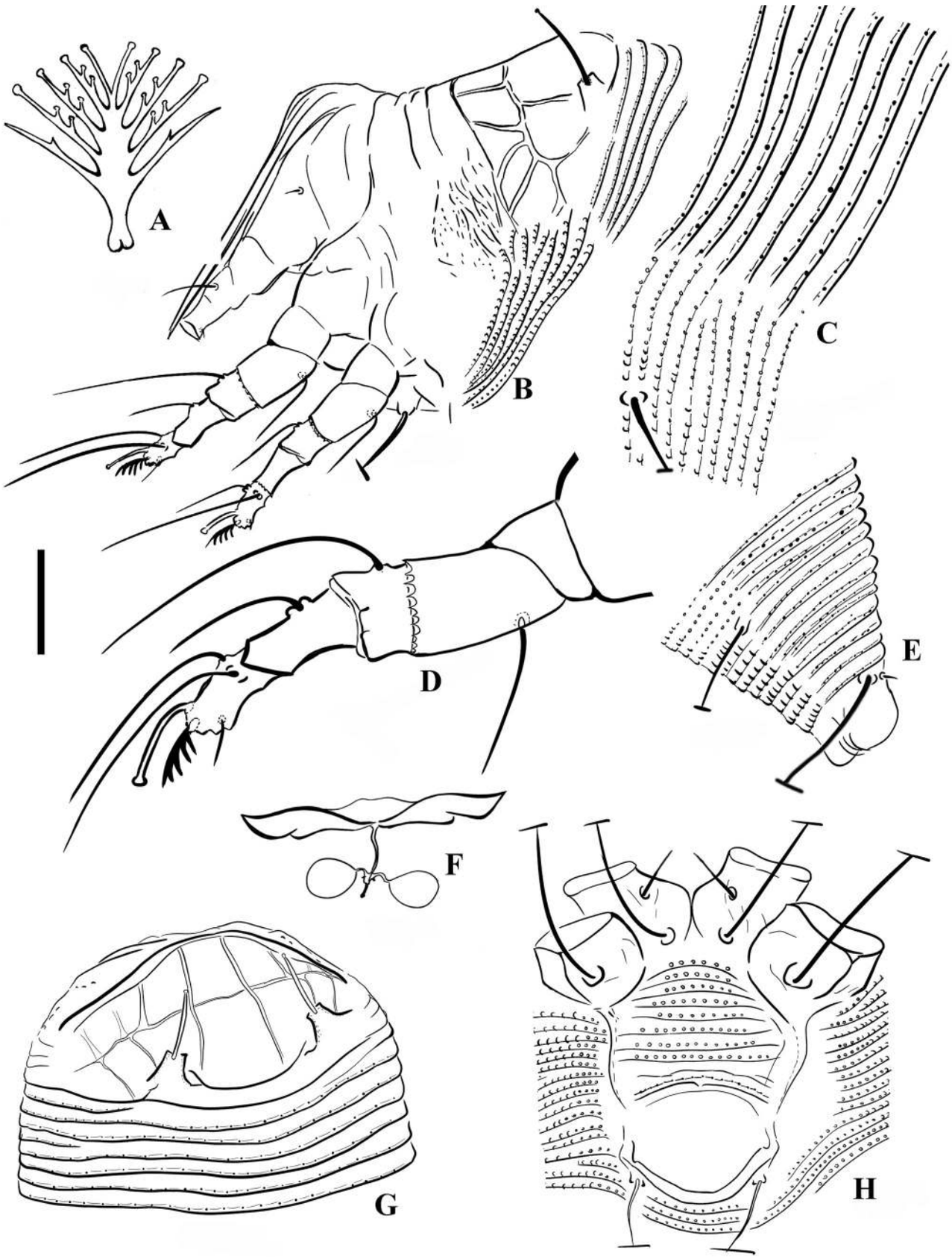

Figure 16 ***Rhyncaphytoptus davidex*** **sp. nov.**

A: Empodium, dorsal view. B: Sublateral view of gnathosoma, prosoma and anterior opisthosoma. C: Lateral view of the annuli at the level of seta *c2*. D: Leg I, lateral view. E: Lateral view of posterior opisthosoma. F: Female internal genitalia, ventral view. G: Prodorsal shield, dorsal view. H: Female coxigenital area, ventral view. Scale bar: 18 μm (B, E), 15 μm (G, H), 9 μm (C, D, F), 3 μm (A).

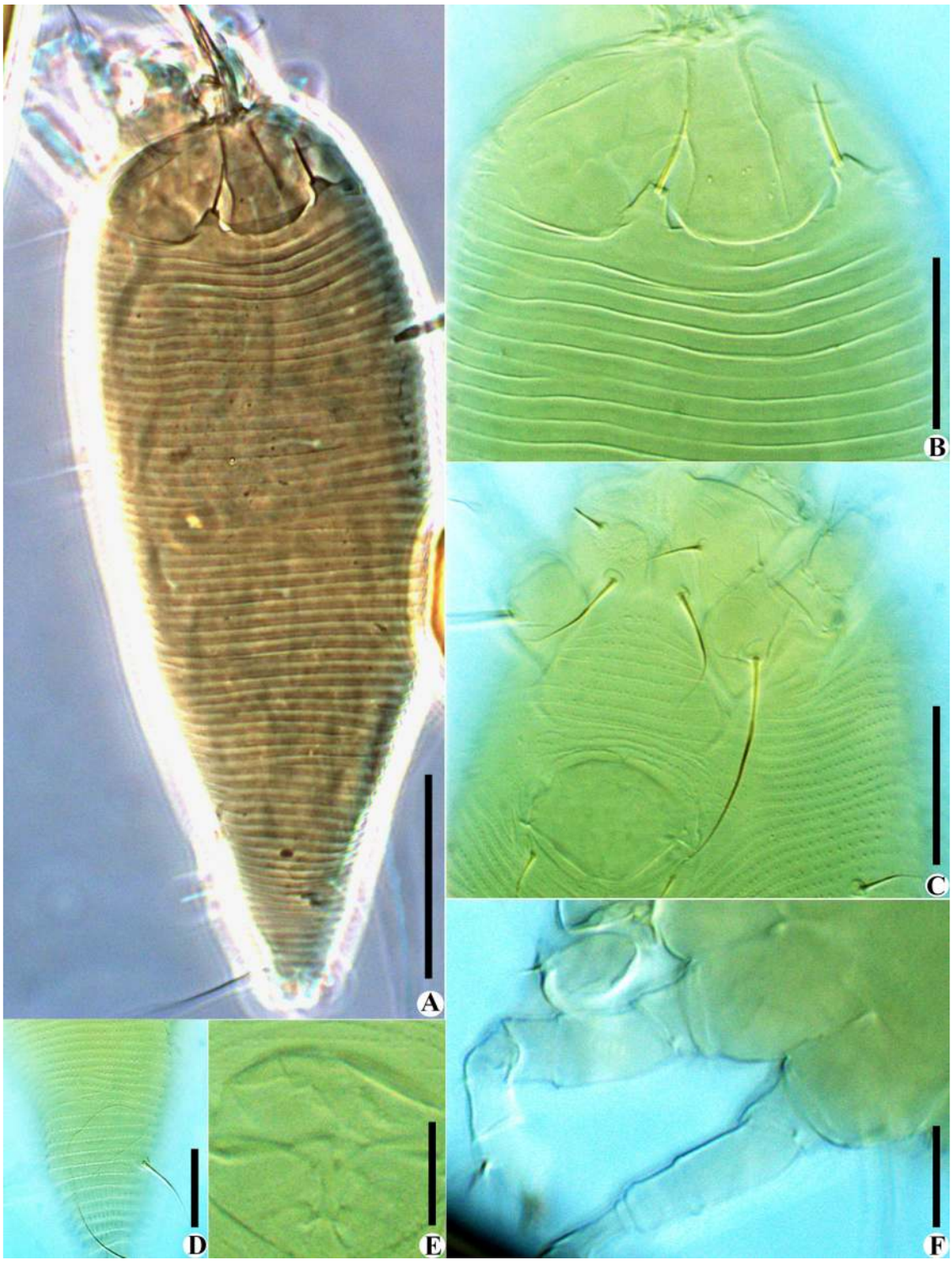

Figure 17 ***Rhyncaphytoptus davidex*** **sp. nov. A–B: Female holotype; C–F: Female paratype**

A: Dorsal view of the body. B: Prodorsal shield, dorsal view. C: Female coxigenital area, ventral view. D: Ventral view of posterior opisthosoma. E: Female internal genitalia, ventral view. F: Leg I and leg II, dorsal-lateral view. Scale bar: 50 μm (A), 20 μm (B, C, D), 10 μm (E, F).

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SCIENTIFIC FIELD SURVEY PERMISSION INFORMATION

Eriophyoid mites are among the smallest arthropods and exhibit high species diversity. Field survey does not involve any nationally protected species, and the survey locations are outside the core areas of nature

reserves. Field survey permission is not applicable for eriophyoid mites. Additionally, this research received approval from the National Natural Science Foundation of China (32570526).

COMPETING INTERESTS

The authors declare that they have no competing interests.

AUTHORS' CONTRIBUTIONS

Y.H.H. and X.F.X. designed the study, performed morphological species identification. Y.H.H. drafted the manuscript and prepared the morphological figures and the distribution maps. All authors read and approved the final version of the manuscript.

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