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Two new *Diptacus* species (Acari: Trombidiformes: Diptilomiopidae) from Iran

ALI GOL[1], HUSSEIN SADEGHI NAMAGHI[1*]& ENRICO DE LILLO[2]

[1]*Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad, Mashhad, Razavi Khorasan, Iran; sadeghin@um.ac.ir; ali.gol76@yahoo.com*

[2]*Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), Entomology and Zoology Section, University of Bari Aldo Moro, Italy; enrico.delillo@uniba.it*

** Corresponding author. E-mail: sadeghin@um.ac.ir*

Abstract

Two new *Diptacus* species (Diptilomiopidae: Diptilomiopinae) including *D. genusetosus* **sp. nov.** and *D. longiscatuber* **sp. nov.** were collected from *Alnus subcordata* C. A. Meyer (Betulaceae) and *Cornus sanguinea* L. (Cornaceae), respectively, in Aliabad-e-Katul, Iran. They are described and illustrated. The new species appear to be vagrants on the leaf underside, they are white wax producers and no damage was observed on the infested plants. This is the first record of an eriophyoid mite on Cornaceae in Iran.

Key words: Eriophyoidea, Betulaceae, Cornaceae, wax, Golestan

Introduction

To date more than 150 species have been reported from the family Eriophyidae in Iran whereas only 5 species have been recorded from the family Diptilomiopidae. *Diptacus gigantorhynchus* (Nalepa, 1892) is the only eriophyoid species collected up to now within the genus *Diptacus* (Soika *et al*. 2017). In this paper, two new species belonging to *Diptacus* are described and illustrated, namely *D. genusetosus* **sp. nov.** and *D. longiscatuber* **sp. nov.**, from Northern Iran.

Diptacus genusetosus **sp. nov**. was collected from Caucasian alder, *Alnus subcordata* C.A. Meyer (Betulaceae), which is native to temperate regions in the North forests of Iran (Rezaei-Taleshi 2014). Alder trees (genus *Alnus* Mill., Betulaceae) are widely distributed in many temperate regions of the world, including Northern Iran. Colagar *et al*. (2016) reported that *Alnus* species cover about 9% of the Hyrcanian forests. Previously, seven eriophyoid mites have been reported for Iranian fauna on Betulaceae plant species: *Eriophyes laevis* (Nalepa, 1891); *Acalitus alnusae* Hong, Xu and Hajizadeh, 2005; *Acaphyllisa distasa* (Keifer, 1961); *Tegonotus simus* (Keifer, 1940; *Tegnacus unicornutus* Pye, 2012; *Tegonotus depressus* (Nalepa, 1894); *Coptophylla lamimani* (Keifer, 1939) (Gol *et al*. 2016; Hajizadeh & Hosseini 2004; Hong *et al*. 2005; Khanjani & Haddad 2006; Lotfollahi *et al*. 2014; Soika *et al*. 2017).

Diptacus longiscatuber **sp. nov.** was collected from *Cornus sanguinea* L. (Cornaceae). This host plant is present in most of Europe and in the Caucasian region, including the northern part of Iran (Popescu *et al*. 2016). This is the first report of an eriophyoid species on plant species of the family Cornaceae in Iran.

Materials and methods

Eriophyoid mites were collected from leaves of *A. subcordata* and *C. sanguinea* in Rig Cheshmeh and Afra Takhte villages, Aliabad-e-Katul (Iran) during the 2016 and 2017 growing seasons. The specimens were collected from plant materials by direct examination under a dissecting stereomicroscope and preserved in 70% ethanol or Oudemans' fluid in vials. *Diptacus genusetosus* **sp. nov.** specimens were cleared in lactic acid at room temperature and mounted into Hoyer's medium. No fibers were added under the coverslip and this caused increased flattening of the specimens. *Diptacus longiscatuber* **sp. nov.** specimens were cleared and mounted in Keifer's medium (Amrine & Manson 1996), and kapok fibers were added into the mounting medium between slide and coverslip. Bleach was used for clearing the mite's wax. The morphological terminology and setal notation follow mainly Lindquist (1996). The genus was identified according to the generic key by Amrine *et al*. (2003). Measurements were made according to de Lillo *et al*. (2010), given in micrometers (μm), and range values are in parentheses. Measurements are rounded off to the nearest integer, referring to the length of the morphological traits unless otherwise specified. Line drawings of slide-mounted specimens were hand-drawn through a camera lucida according to de Lillo *et al*. (2010). Abbreviations used in the line drawings follow mainly Amrine *et al*. (2003).

Type materials are deposited in the collection of the Acarology Laboratory, Department of Plant Protection, Faculty of Agriculture, Ferdowsi University of Mashhad (Iran). Two paratypes of each species are deposited at the Department of Soil, Plant and Food Sciences (Di.S.S.P.A.), Entomology and Zoology Section, University of Bari Aldo Moro (Italy).

Diptacus genusetosus Gol, Sadeghi Namaghi & de Lillo sp. nov.

(Fig. 1)

Description. FEMALE: (n = 10). Body fusiform, 280 (186–280, including gnathosoma), 72 (65–75) wide, 70 (mean value) thick, dorsally covered with white wax. **Gnathosoma** 44 (42–50) projecting downwards, pedipalp coxal setae *ep* 3 (3–4), dorsal pedipalp genual setae *d* 11(11–14), unbranched, pedipalp tarsal setae *v* 3 (3–4), cheliceral stylets 65 (60–67). **Prodorsal shield** 52 (50–55), including frontal lobe, 65 (60–65) wide; sub-pentagonal with a broad and rigid, frontal lobe 15 (14–17) over gnathosomal base, slightly emarginate anteriorly; a pair of admedian lines slightly diverging on anterior two third of prodorsal shield, and converging towards anterior frontal lobe margin, median and short submedian line joining base of tubercles of scapular setae *sc* to rear margin of prodorsal shield; tubercles of scapular setae *sc* cylindrical, well ahead of rear shield margin, slightly protruded on shield surface, 30 (30–32) apart, scapular setae *sc* 15 (14–16), convergent inner and forward. **Leg I** 49 (47–52), femur 16 (15–17), genu 6 (6–8), tibia 15 (15–17), tarsus 9 (8–10), *ω* 7 (7–8) distally knobbed, empodium divided, 6 (6–7), each branch 6-rayed; femoral setae *bv* absent, genual setae *l″* 50 (47–52), tibial setae *l′* 8 (6–8), tarsal setae *ft′* 26 (25–31), setae *ft″* 30 (29–39). **Leg II** 43 (43–47), femur 15 (15–17), genu 5 (5–6), tibia 12 (11–14), tarsus 9 (8–9), *ω* 8 (no range) distally knobbed, empodium divided, 6 (6–7), each branch 6-rayed; femoral setae *bv* absent, genual setae *l″* 11 (10–12), tarsal setae *ft′* 6 (6–8), setae *ft″* 30 (26–30). **Coxae** with fine granules; setae *1b* 18 (17–21), tubercles *1b* 18 (16–18) apart, setae *1a* 33 (25–33), tubercles *1a* 8 (6–8) apart, setae *2a* 55 (51–63), tubercles *2a* 27 (24–27) apart. **Opisthosoma** with 54 (51–55) smooth dorsal semiannuli, with a slight median ridge; 96 (91–102) ventral semiannuli, with rounded and small microtubercles on rear annulus margin; 26 (25–27) coxigenital semiannuli between coxae and genital coverflap with fine microtubercles; last 14 (13–14) ventral semiannuli with elongated microtubercles. Setae *c2* 40 (37–44), on ventral semiannulus 17 (15–17); setae *d* 63 (63–74), on ventral semiannulus 37 (33–42);

setae *e* 40 (39–45), on ventral semiannulus 58 (54–66); setae *f* 36 (30–39), on ventral semiannulus 87 (82–94), 9 (8–9) annuli posterior setae *f*. Setae *h1* absent, setae *h2* 90 (83–90). **Female genitalia** 17 (17–20), 30 (28–31) wide, coverflap with linear granules in two sub-rounded areas on basal part, setae *3a* 25 (18–25), 20 (18–20) apart.

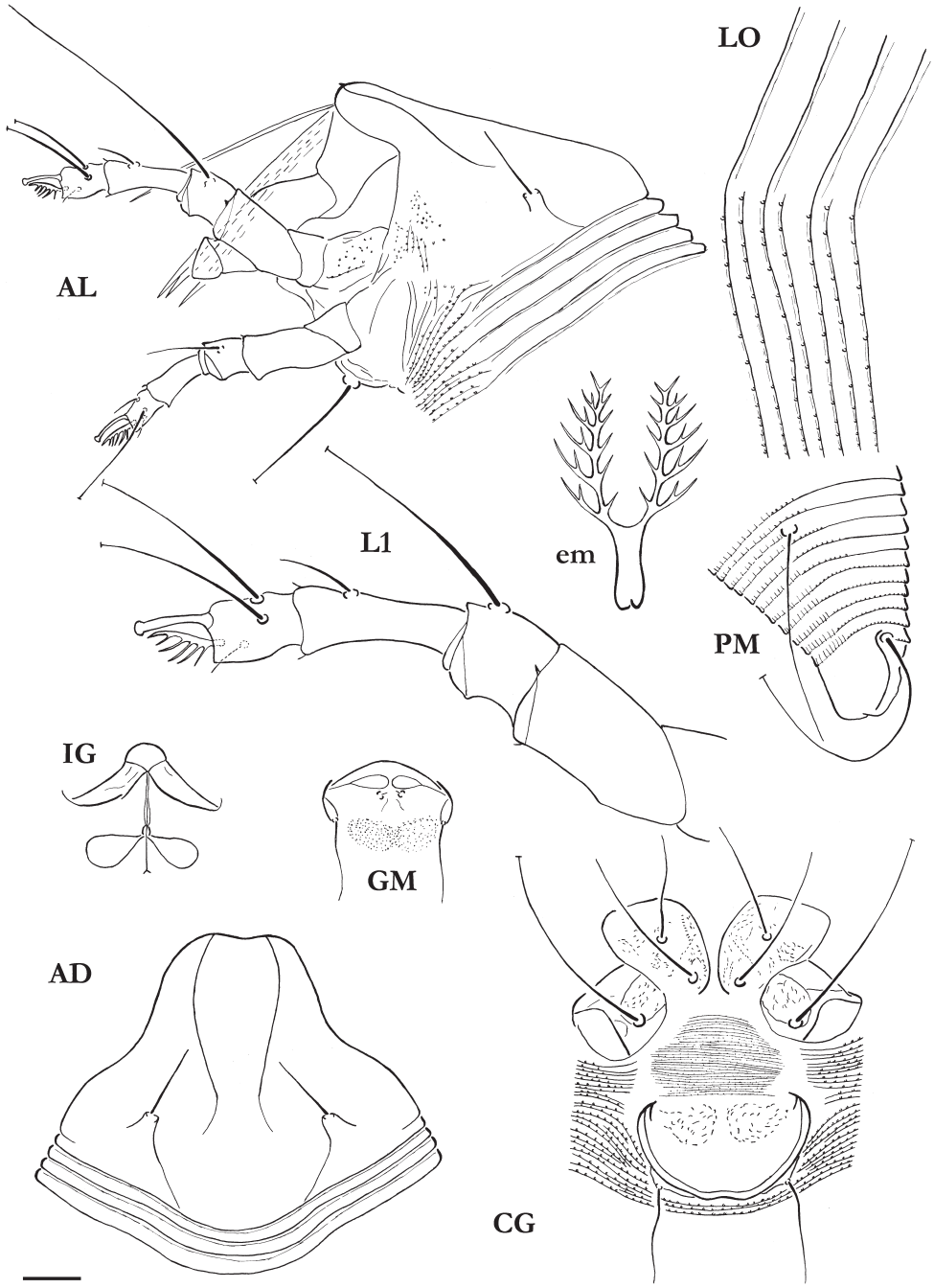

FIGURE 1. Line drawings of *Diptacus genusetosus* **sp. nov.**: **AD**. Prodorsal shield; **AL**. Lateral view of anterior body region; **CG**. Female coxigenital region; **em**. Empodium; **GM**. Male genital region; **IG**. Internal female genitalia; **LO**. Lateral view of annuli; **L1**. Leg I; **PM**. Lateral view of posterior opisthosoma. Scale bar: 10 μm for **AD**, **AL**, **CG**, **GM**, **IG**, **PM**; 5 μm for **LO**, **L1**; 2.5 μm for **em**.

MALE (n = 1). Body fusiform, 142 (including gnathosoma), 50 wide, covered with white wax. **Gnathosoma** 35 projecting downwards, chelicerae 49, palp coxal setae *ep* 3, palp genual setae *d* 9, unbranched. **Prodorsal shield** 46, including frontal lobe, 55 wide, frontal lobe 12. Shield pattern similar to that of female. Tubercles of scapular setae *sc* ahead of rear shield margin, 22 apart, setae *sc* 13, projecting up and ahead. **Leg I** 41, femur 14, genu 5, tibia 12, tarsus 8, *ω* 7 knobbed, empodium divided, 5, each branch 6-rayed; femoral setae *bv* absent, genual setae *l″* 40, tibial setae *l′* 6, tarsal setae *ft′* 21, setae *ft″* 26. **Leg II** 38, femur 14, genu 4, tibia 10, tarsus 8, *ω* 7 knobbed, empodium divided, 5, each branch 6-rayed; femoral setae *bv* absent, genual setae *l″* 9, tarsal setae *ft′* 6, setae *ft″* 24. **Coxae** with fine granules; setae *1b* 15, tubercles *1b* 15 apart, setae *1a* 25, tubercles *1a* 8 apart, setae *2a* 52, tubercles *2a* 22 apart. **Opisthosoma** dorsally with 51 smooth semiannuli, with a central ridge; 88 ventral semiannuli, with round microtubercles on rear annulus margin; 22 semiannuli between coxae and genital region; last 13 ventral semiannuli with elongated and linear microtubercles. Setae *c2* 37 on ventral semiannulus 15, setae *d* 57 on ventral semiannulus 32; setae *e* 38 on ventral semiannulus 53; setae *f* 30 on ventral semiannulus 79, 9 annuli after setae *f*. Setae *h1* absent, setae *h2* 58; setae *3a* 13, 19 apart.

Type host plant. *Alnus subcordata* C.A. Meyer (Betulaceae), Caucasian alder.

Relation to the host plant. Vagrant on the underside of the leaves. No apparent damage was observed.

Type locality. Rig Cheshmeh Village, 36°48'30.1"N 54°49'59.6"E, 830 m above sea level; 27 June 2016, coll. A. Gol.

Type material. Holotype: single female on a microscope slide (ALSU16B-8); paratypes: 13 females and 2 males mounted on separate microscope slides.

Other material. Mites preserved in 70% ethanol extracted from the same sample as the type specimens.

Etymology. The species epithet, *genusetosus*, is a name in apposition and comes from the Latin *genu, -us* (substantive) referring to the genu leg segment, plus the Latin *setosus, -a, -um* (adjective) in the nominative case referring to the long setae *l''* on the foreleg genu.

Differential diagnosis. The new species is morphometrically close to *Diptacus symplocos* Wang, Wei & Yang, 2009, collected on leaves of *Symplocos paniculata* (Thunb.) Miq. (Symplocaceae), in Zhejiang Province, China. The prodorsal shield of both species is provided with a pair of admedian lines which are longer in *D. symplocos* and reach the rear shield margin (they are shorter and on the anterior part of the prodorsal shield for *D. genusetosus* **sp. nov.**). The coverflap of *D. symplocos* has numerous longitudinal striae; on the contrary, *D. genusetosus* **sp. nov.** has two basal groups of fine granules. Further differences are the length of the dorsal pedipalp genual setae d (about 13 in *D. symplocos* and about 3 in *D. genusetosus* **sp. nov.**) and of the opisthosoma setae *e* (about 18 in *D. symplocos* and about 40 in *D. genusetosus* **sp. nov.)**, the number of coxigenital annuli (12 in *D. symplocos* and about 26 in *D. genusetosus* **sp. nov.**) and of empodial rays per each branch (5 in D. symplocos and 6 in D. genusetosus **sp. nov.**).

***Diptacus longiscatuber* Gol, Sadeghi Namaghi & de Lillo sp. nov.**
(Fig. 2)

Description. FEMALE: (n = 10). Body fusiform, 210 (200–240, including gnathosoma), 63 (63–85) wide, 76 (mean value) thick, covered with white wax. **Gnathosoma** 38 (36–41) projecting downwards, pedipalp coxal setae *ep* 3 (3–4), dorsal pedipalp genual setae *d* 11 (10–11), unbranched, pedipalp tarsal setae *v* 2 (2–3), cheliceral stylets 53 (45–55). **Prodorsal shield** 55 (52–60), including frontal lobe, 65 (58–74) wide; triangular, with a broad and rigid, semicircular frontal lobe 18 (16–

19) over gnathosomal base; prodorsal shield pattern composed of a sinuate and complete pair of admedian lines, a pair of complete inner submedian lines, a pair of arched outer submedian lines joined to inner submedian lines, a pair of semicircular cells in frontal lobe; median line absent. Tubercles of scapular setae *sc* ahead of rear shield margin, strongly elongated, 21 (19–24), cylindrical, their bases 26 (25–31) apart, scapular setae *sc* 21 (20–25), projecting divergently up and forward. **Leg I** 50 (49–52), femur 15 (15–17), genu 7 (7–8), tibia 15 (14–16), tarsus 10 (9–10), *ω* 6 (6–7) distally knobbed, empodium divided, 5 (4–5), each branch 5-rayed; femoral setae *bv* absent, genual setae *l″* 40 (37–44), tibial setae *l′* 6 (6–8), tarsal setae *ft′* 22 (20–27), setae *ft″* 25 (25–29). **Leg II** 46 (45–49), femur 14 (14–15), genu 6 (6–7), tibia 14 (12–14), tarsus 9 (9–10), *ω* 6 (6–7) distally knobbed, empodium divided, each branch 5 (no range), 5-rayed; femoral setae *bv* absent, genual setae *l″* 9 (9–10), tarsal setae *ft′* 6 (6–8), setae *ft″* 25 (25–28). **Coxae** with few short lines; setae *1b* 12 (12–15), tubercles *1b* 15 (12–16) apart, setae *1a* 21 (16–22), tubercles *1a* 7 (7–8) apart, setae *2a* 60 (50–68), tubercles *2a* 27 (23–28) apart. **Opisthosoma** with 40 (37–40) dorsal semiannuli, forming a median ridge, with elongated and linear microtubercles; 82 (75–84) ventral semiannuli, with round microtubercles on rear annulus margin; 23 (21–23) coxigenital semiannuli between coxae and genital coverflap, with fine microtubercles; last 12 (10–12) ventral semiannuli with elongated and linear microtubercles. Setae *c2* 24 (18–25), on ventral semiannulus 18 (17–20); setae *d* 70 (mean value) on ventral semiannulus 35 (32–38); setae *e* 18 (13–18), on ventral semiannulus 52 (47–54); setae *f* 34 (32–41), on ventral semiannulus 75 (68–78), 7 (no range) annuli posterior of setae *f*, setae *h1* absent, setae *h2* 103 (76–110). **Female genitalia** 18 (17–20), 33 (31–33) wide, coverflap with short striae in two semicircular areas on basal part, setae *3a* 10 (9–10), 17 (17–19) apart.

MALE (n = 1). Body fusiform, 192 (including gnathosoma), 63 wide, covered with white wax. **Gnathosoma** 35 projecting downwards, cheliceral stylet 43, palp coxal setae *ep* 3, palp genual setae *d* 9, unbranched. **Prodorsal shield** 43, including frontal lobe, 55 wide, frontal lobe 13. Shield pattern similar to that of female. Tubercles of scapular setae *sc* ahead of rear shield margin, strongly elongated, 16, cylindrical, their bases 27 apart, setae *sc* 20, projecting up and forward. **Leg I** 46, femur 13, genu 7, tibia 14, tarsus 9, *ω* 6 distally knobbed, empodium divided, 5, each branch 5-rayed; femoral setae *bv* absent, genual setae *l″* 34, tibial setae *l′* 5, tarsal setae *ft′* 22, setae *ft″* 24. **Leg II** 44, femur 15, genu 6, tibia 12, tarsus 9, *ω* 6 distally knobbed, empodium divided, 5, each branch 5-rayed; femoral setae *bv* absent, genual setae *l″* 10, tarsal setae *ft′* 6, setae *ft″* 24. **Coxae** with few short lines; setae *1b* 12, tubercles *1b* 14 apart, setae *1a* 18, tubercles *1a* 8 apart, setae *2a* 50, tubercles *2a* 25 apart. **Opisthosoma** with 36 dorsal semiannuli, dorsal opisthosoma with a median ridge, with elongated and linear microtubercles; 73 ventral semiannuli, with round microtubercles on rear annulus margin; 20 semiannuli between coxae and genital region; last 11 ventral semiannuli with elongated and linear microtubercles. Setae *c2* 22 on ventral semiannulus 16, setae *d* 63 on ventral semiannulus 31; setae *e* 13 on ventral semiannulus 46; setae *f* 38 on ventral semiannulus 66, 7 annuli posterior of setae *f*. Setae *h1* absent, setae *h2* 115; setae *3a* 10, 20 apart.

Type host plant. *Cornus sanguinea* L. (Cornaceae), common or red dogwood.

Relation to the host plant. Vagrant on the underside of the leaves. No apparent damage was observed.

Type locality. Afra Takhte village, 36°48'18.0"N 54°58'20.5"E, 1318 m above sea level; 25 July 2017, coll. A. Gol.

Type material. Holotype: single female on a microscope slide (COSA1707-2); paratypes: 12 females and 2 males mounted on separate microscope slides.

Other material. Mites preserved in Oudemans' fluid extracted from the same sample as the type specimens.

Etymology. The species epithet, *longiscatuber*, is a name in apposition and comes from the Latin *longus, -a, -um* (adjective), meaning long, plus the Latin *scapulae, -ae* (substantive), meaning

dorsal, and the Latin *tuberculum, -i* (substantive), meaning tubercles, truncated in its final part referring to the long tubercles of the scapular setae *sc*.

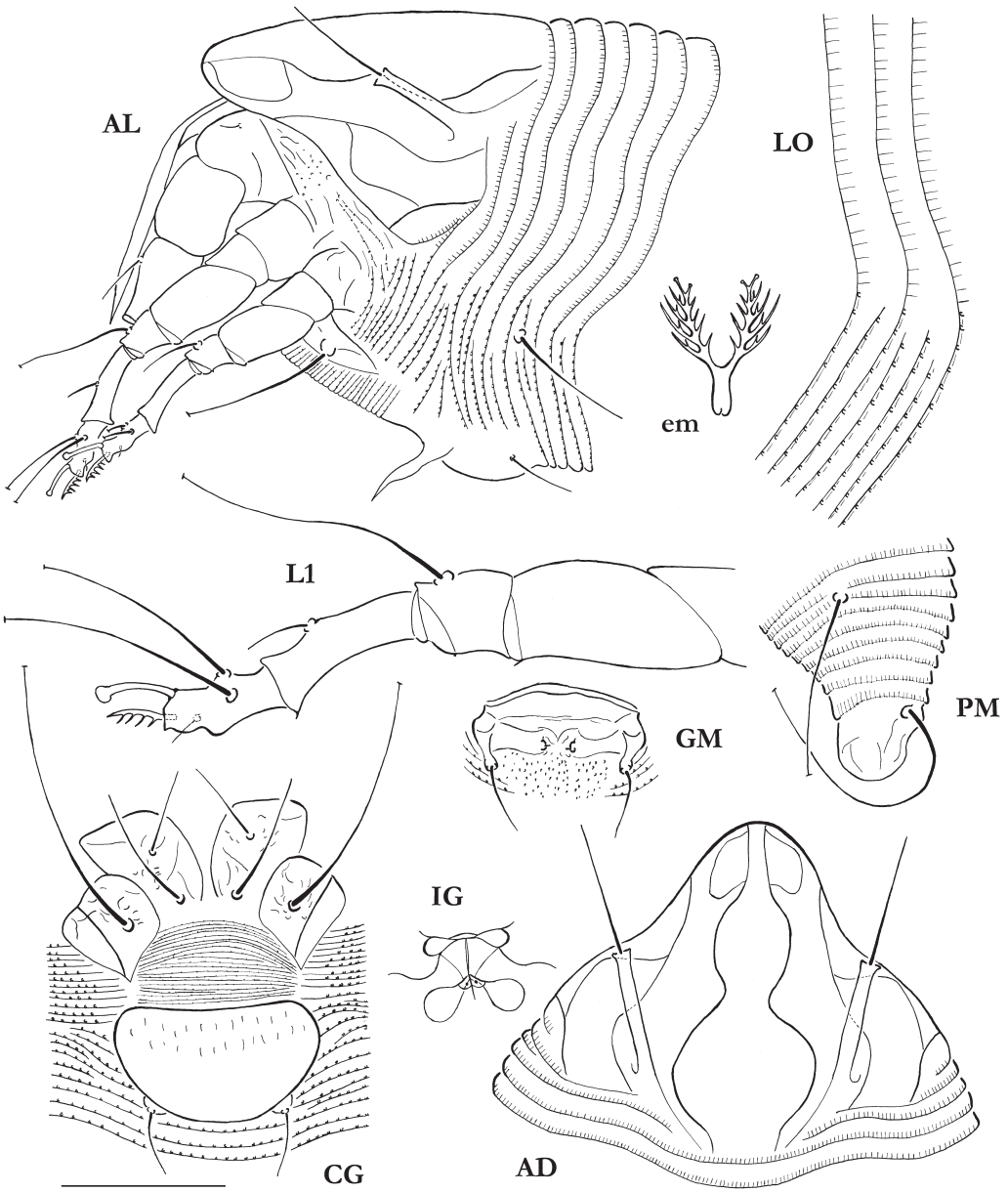

FIGURE 2. Line drawings of *Diptacus longiscatuber* **sp. nov.**: **AD**. Prodorsal shield; **AL**. Lateral view of anterior body region; **CG**. Female coxigenital region; **em**. Empodium; **IG**. Internal female genitalia; **LO**. Lateral view of annuli; **L1**. Leg I; **PM**. Lateral view of posterior opisthosoma. Scale bar: 10 μm for **AD**, **AL**, **CG**, **IG**, **PM**; 5 μm for **LO**, **L1**; 2.5 μm for **em**.

Differential diagnosis. The new species is morphologically similar to *Diptacus calicoryli* (Keifer, 1943), and *Diptacus flocculentus* Keifer, 1959. The prodorsal shield pattern of *D. calicoryli* is composed of a pair of sinuate admedian lines like *D. longiscatuber* **sp. nov.**, but it has also a short median line on the posterior one third of the shield and the submedian lines are quite indistinct.

Similarly, *D. flocculentus* is provided with sinuate and complete admedian lines, but without submedian lines and further cells.

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