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Description of a new species of the genus \textit{Leptus} (Acari: Erythraeidae) from Iran and new data for two \textit{Abrolophus} species

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\textbf{ABSTRACT}

\textit{Leptus (Leptus) tridentatus} Saboori, Hakimitabar & Khademi \textbf{n. sp.} (Acari: Erythraeidae) is described and illustrated from larvae (off host) from Damavand mountain, Tehran Province, Iran. Some meristic data of \textit{Abrolophus khanjanii} (Haitlinger & Saboori, 1996) and \textit{A. stanislavae} (Haitlinger, 1986) are amended or given.

\textbf{Keywords} \textit{Abrolophus khanjanii}, \textit{A. stanislavae}, larva, \textit{Leptus (L.)} tridentatus, mite, Parasitengona, Prostigmata, Trombidiformes

\textbf{Zoobank} http://zoobank.org/D995D9E4-D42D-4288-A809-EE96EDE70134

\textbf{Introduction}

There are approximately 280 larval species in this important and worldwide genus, in two subgenera \textit{Leptus} and \textit{Amaroptus} (with only one species: \textit{L. (Amaroptus) vuki} Haitlinger, 2000 (Southcott 1992; Haitlinger 2000; Beron 2008; Mąkol & Wohltmann 2012, 2013). \textit{Leptus} larvae are ectoparasites of different arthropods specially insect orders e.g. Orthoptera, Coleoptera, and Lepidoptera (Welbourn, 1983) but their potential in biological control has not been investigated.

Mites of the genus \textit{Leptus} are poorly studied in Iran. So far only six species have been described from Iran as follows: \textit{L. (L.) fathipeuri} Haitlinger & Saboori, 1996; \textit{L. (L.) zhangi} Saboori & Atamehr, 1999; \textit{L. (L.) esmailii} Saboori & Ostovan, 2000; \textit{L. (L.) kamalii} Karimi IrvaniLou & Saboori, 2001; \textit{Leptus (Leptus) eslamizadehi} Saboori, 2002; and \textit{L. (L.) delijanensis} Khademi, Saboori & Hakimitabar, 2015 (Mąkol & Wohltmann, 2012; Khademi \textit{et al.}, 2015). In this paper, we describe the larva of \textit{L. (L.) tridentatus} Saboori, Hakimitabar & Khademi \textbf{sp. nov.} from Damavand mountain, Tehran Province, Iran. Also, the first and second authors re-examined some species in private Haitlinger’s collection and amend some of their meristic data or give new meristic data.

\textbf{Materials and methods}

Larvae of \textit{L. (L.) tridentatus} Saboori, Hakimitabar & Khademi \textbf{n. sp.} were collected from Damavand mountain, Tehran province, Iran, on 3 July 2009, by Masoud Hakimitabar. Specimens were collected from under a stone (off host) by minute brush. They were preserved
in 70% ethanol, cleared in Nesbitt’s fluid and mounted using Faure medium on microscope slides (Walter & Krantz, 2009). Figures were drawn and measurements were made using a BX51 Olympus microscope equipped with a drawing tube. The terminology and abbreviations used in the description are adapted from Haitlinger (2013) and Wohltmann et al. (2007). All measurements are given in micrometers (μm).

**Results**

*Leptus (Leptus) tridentatus* Saboori, Hakimitabar & Khademi n. sp. (Figs. 1-3)

Zoobank: 2871C554-EC3F-478F-AA19-5758851205EC

**Diagnosis** — With three denticles on dorsal part of palpal tibial claw; palpal femur with one and palpal genu with two setae; fn Fe = 3-3-2; ~30–44 setae between coxae II & III; Ti III < 225.

**Description** — **Larva (N = 4)** — Idiosoma oval in shape, and with ~170–204 barbed setae. Scutum longer than or equal with wide, punctate, with two pairs of sensilla and two pairs of scutalae, anterior border deeply concave (Fig. 1), ASens and PSens barbed on distal 1/3; cuticular lines around bases of PSens, and parallel conjunct to posterolateral borders, also narrow cuticular lines beyond bases of ASens (Fig. 1A); AL longer than PL. One eye on each side of scutum, both circular in shape and 24–30 across.

Ventral surface of idiosoma with barbed sternalae; 2 barbed sternalae between coxae I, 6–7 barbed sternalae between coxae II; ~30–44 barbed intercoxalae between coxae II and III and ~46–56 barbed setae behind coxae III. Sternalae 1a longer than other sternalae (Fig. 1B).

Coxa I-III each with one seta, coxa I with a peg-like supracoxal seta; coxalae 1b about twice the length of coxalae 2b; coxalae 3b longer than coxalae 2b; all coxalae barbed (Fig. 2). NDV = ~272–287.

Gnathosoma narrow and cone-shaped, 173–210 long with barbed and thick galealae (Ga) and two pairs of hypostomalae, anterior hypostomalae (aHy) smooth, small and peg-like, posterior hypostomalae (pHy) thicker, stronger and barbed. Palpal femur with one and palpal genu with two barbed setae. Palpal tibia with three barbed setae, palpal tibial claw with 3 small denticles on dorsal side (Fig. 1C). Palpal tarsus with 8 setae including 4 barbed and 2 nude setae, a solenidion, and an eupathidium. Palpal setal formula: fPp= 0-B-BB-BBB-B2N (Fig. 3). Supracoxal seta of palp (eP) peg-like, 5 long. Chelicerae, subcapitulum and palps with punctation. Length of legs I-III 723–769, 637–660 and 802–848, respectively. IP = 1944–2239. Measurements are given in Table 1.

Leg segmentation formula: 7–7–7. Leg setal formula: Leg I: Ta–1ω, 1ε, 2ζ, 27–28B; Ti–2φ, 1κ, 14B; Ge–1σ, 1κ, 8B; TFe–5B; BFe–3B; Tr–1B; Cx–1B (Figs. 2 A, 3A).

Leg II: Ta–1ω, 1ε, 2ζ, 25–26B; Ti–2φ, 1κ, 15B; Ge–1σ, 1κ, 8B; TFe–5B; BFe–3B; Tr–1B, Cx–1B (Figs. 2 B, 3B).

Leg III: Ta–1ζ, 25–26B; Ti–1φ, 15B; Ge–8B; TFe–5B; BFe–2B; Tr–1B; Cx–1B (Figs. 2C, 3C). Coxa III abnormally with two setae on left side. Tarsal claws slender, anterior and middle pointed, posterior with long onychotrichs.

**Etymology** — Name of the new species is derived from three small denticles on palpal tibial claw.

**Type material** — The holotype larva (ARS–20090703–1a) and paratype larvae (ARS–20090703–1b, 1c, 1d) were collected by Masoud Hakimitabar, under the stones (off host) from Damavand Mountain, Tehran Province, Iran, 9 July 2009. The specimens are deposited in Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran.

**Remarks** — *Leptus (L.) tridentatus* Saboori, Hakimitabar & Khademi n. sp. is unique in having 3 denticles on dorsal side of palpal tibial claw. Also, it is unique in having the...
Figure 1 Leptus (Leptus) tridentatus Saboori, Hakimitabar & Khademi n. sp. (larva): A – Dorsal view of idiosoma; B – Ventral view of idiosoma; C – Gnathosoma (Left, dorsal view; Right, ventral view).
Figure 2  *Leptus (Leptus) tridentatus* Saboori, Hakimitabar & Khademi n. sp. (larva): A – Tr I-TI I; B – Tr II-Ti II; C – Tr III-Ti III.
Figure 3 *Leptus (Leptus) tridentatus* Saboori, Hakimitabar & Khademi n. sp. (larva): A – Ta I; B – Ta II; C – Ta III.

Table 1 Metric data for larvae of *Leptus* (*Leptus*) *tridentatus* Saboori, Hakimitabar & Khademi n. sp.

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in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (~30–44 vs. 8–10), shape of scutum, SD (109–126 vs. 90), W (109–116 vs. 90), AW (87–94 vs. 74), PW (97–109 vs. 81), Ti I (144–180 vs. 128), Ti II (116–131 vs. 96), and Ti III (188–215 vs. 154); from *L. (L.) pyrenaicus* in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (~30–44 vs. 14–16), SD (109–126 vs. 57), W (109–116 vs. 83), AW (87–94 vs. 64), PW (97–109 vs. 79), AL (45–54 vs. 25), PL (42–47 vs. 25), 1b (60–64 vs. 110), 2b (22–30 vs. 80), and 3b (27–35 vs. 80); from *L. (L.) josifovi* in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (~30–44 vs. 15), AL (45–54 vs. 63), 3b (27–35 vs. 45), and shape of scutum; from *L. (L.) guus* in the number of setae between coxae II & III (~30–44 vs. 20), SD (109–126 vs. 100–102), W (109–116 vs. 142–154), AW (87–94 vs. 124–132), PW (97–109 vs. 136–146), GL (176–210 vs. 244–288), Ti I (144–180 vs. 210), Ti II (116–131 vs. 186–192), and Ti III (188–215 vs. 324); from *L. (L.) mogadoranus* in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (~30–44 vs. ~20), shape of scutum, SD (109–126 vs. 82–92), W
(109–116 vs. 134–146), AW (87–94 vs. 110–118), PW (97–109 vs. 122–130), Ti I (144–180 vs. 312), Ti II (116–131 vs. 254), and Ti III (188–215 vs. 362); from L. (L.) ogazulacus in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (∼30–44 vs. 22), shape of scutum, SD (109–126 vs. 80–82), W (109–116 vs. 100–102), AL (45–54 vs. 64–72), and PL (42–47 vs. 52–56); from L. (L.) pasopaicus in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (∼30–44 vs. 16), shape of scutum, SD (109–126 vs. 72), W (109–116 vs. 94), GL (176–210 vs. 142), ASens (47–52 vs. 40), and PSens (74–92 vs. 64); from L. (L.) comosus in the number of normal setae on basifemora (3-3-2 vs. 3-2-2), number of solenidia on TFe I (0 vs. 3), on TFe II (0 vs. 4), on Ge II (1 vs. 4–5), on TFe III (0 vs. 6–7), on Ge III (0 vs. 6), longer leg I (723–769 vs. 590), leg II (637–669 vs. 540), and leg III (802–848 vs. 600); from L. (L.) bertoldi in the number of setae between coxae II (6–7 vs. 2), shape of scutum, SD (109–126 vs. 66–68), SD ≥ W in L. (L.) tridentatus Saboori, Hakimitabar & Khademi n. sp. (vs. SD < W in L. (L.) bertoldi), AL (45–54 vs. 70), PL (42–47 vs. 60–62), 1b (60–64 vs. 90), GL (176–210 vs. 244), Ti I (144–180 vs. 332), Ti II (116–131 vs. 258–264), and Ti III (188–215 vs. 384); from L. (L.) batoricus in the number of setae between coxae II (6–7 vs. 2), number of setae between coxae II & III (∼30–44 vs. ∼18), Ti I (144–180 vs. 114), Ti II (116–131 vs. 100), and Ti III (188–215 vs. 150), fD (∼170–204 vs. 86), number of setae behind coxae III (∼46–56 vs. ∼32).

Genus Abrolophus Berlese, 1891

Holotypes of Abrolophus khanjanii (Haitlinger & Saboori, 1996) and A. stanislavae (Haitlinger, 1986) were studied.

Examination of type specimens showed that some meristic data provided in the descriptions of Haitlinger (1986) and Haitlinger & Saboori (1996) should be amended and completed.

Abrolophus khanjanii (Haitlinger & Saboori, 1996)

Abrolophus khanjanii was described by Haitlinger & Saboori (1996) based on a single specimen. We re-examined the holotype and present amended data as follows:

Leg setal formula: Leg I: Ta–1ω, 1ε, 2ζ, 1Cp, 22B; Ti–2φ, 1κ, 13B; Ge–1κ, 1σ, 11B; TFe–8B; BFe–4B; Tr–2B; Cx–1B.
Leg II: Ta–1ω, 2ζ, 1Cp, 19B; Ti–2φ, 13B; Ge–1κ, 1σ, 9B; TFe–5B; BFe–4B; Tr–2B, Cx–1B.
Leg III: Ta–1ζ, 20B; Ti–13B; Ge–1σ, 9B; TFe–5B; BFe–4B; Tr–2B; Cx–1B.

Palpal tarsus with 8 setae and gnathosoma with two pairs of hypostomalae and one pair of galealae. Palpal femur with one projection whereas in figure 18 of original description, the projection was shown on palpal genu.

Abrolophus stanislavae (Haitlinger, 1986)

It was described by Haitlinger in 1986 and redescribed by Haitlinger & Sundic (2015). We checked the holotype and present amended data in the redescription here.

Leg setal formula: Leg I: Ta–1ω, 1ε, 1Cp, 2ζ, 25B; Ti–1Cp, 2φ, 1κ, 13B; Ge–1κ, 1σ, 11B; TFe–7B; BFe–4B; Tr–2B; Cx–1B.
Leg II: Ta–1ω, 1Cp, 2ζ, 20B; Ti–2φ, 12/13B; Ge–1κ, 1σ, 9B; TFe–5B; BFe–4B; Tr–2B; Cx–1B.
Leg III: Ta–1ζ, 20B; Ti–13B; Ge–1σ, 9B; TFe–5B; BFe–4B; Tr–2B; Cx–1B.

Palpal tarsus with 8 setae and gnathosoma with two pairs of hypostomalae and one pair of galealae.

ASens bases in level with AL bases.
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