Acarologia

A quarterly journal of acarology, since 1959
Publishing on all aspects of the Acari

All information:
http://www1.montpellier.inra.fr/CBGP/acarologia/
acarologia-contact@supagro.fr

Acarologia is proudly non-profit,
with no page charges and free open access

Please help us maintain this system by
encouraging your institutes to subscribe to the print version of the journal
and by sending us your high quality research on the Acari.

Subscriptions: Year 2020 (Volume 60): 450 €
http://www1.montpellier.inra.fr/CBGP/acarologia/subscribe.php
Previous volumes (2010-2018): 250 € / year (4 issues)
Acarologia, CBGP, CS 30016, 34988 MONTFERRIER-sur-LEZ Cedex, France
ISSN 0044-586X (print), ISSN 2107-7207 (electronic)

The digitalization of Acarologia papers prior to 2000 was supported by Agropolis Fondation under the reference ID 1500-024 through the « Investissements d’avenir » programme
(Labex Agro: ANR-10-LABX-0001-01)

Acarologia is under free license and distributed under the terms of the Creative Commons-BY-NC-ND which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original author and source are credited.
Description of a new species of the genus *Leptus* (Acari: Erythraeidae) from Iran and new data for two *Abrolophus* species

Alireza Saboori\(^a\), Matthias Hartmann\(^b\), Masoud Hakimitabar\(^c\), Narjes Khademi\(^d\), Ahmad-Reza Katouzian\(^e\)

\(^a\) Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran. ORCID ID: 0000-0002-3101-1330.
\(^b\) Naturkundemuseum Erfurt, Große Arche 14, D-99084 Erfurt, Germany.
\(^c\) Department of Plant Protection, Faculty of Agriculture, Shahrood University of Technology, Shahrood, Iran. ORCID ID: 0000-0002-0161-7008.
\(^d\) Department of Entomology, Science and Research Branch, Islamic Azad University, Tehran, Iran.
\(^e\) School of Biology and Centre of Excellence in Phylogeny of Living Organisms, University of Tehran, Tehran, Iran.

**ABSTRACT**

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

**Keywords** *Abrolophus khanjanii*, *A. stanislavae*, larva, *Leptus (L.) tridentatus*, mite, Parasitengona, Prostigmata, Trombidiiformes

**Zoobank** [http://zoobank.org/D995D9E4-D42D-4288-A809-EE96EDE70134](http://zoobank.org/D995D9E4-D42D-4288-A809-EE96EDE70134)

**Introduction**

There are approximately 280 larval species in this important and worldwide genus, in two subgenera *Leptus* and *Amaroptus* (with only one species: *L. (Amaroptus) vuki* Haitlinger, 2000 (Southcott 1992; Haitlinger 2000; Beron 2008; Makol & Wohltmann 2012, 2013). *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 *Leptus* are poorly studied in Iran. So far only six species have been described from Iran as follows: *L. (L.) fathipeuri* Haitlinger & Saboori, 1996; *L. (L.) zhangi* Saboori & Atamehr, 1999; *L. (L.) esmailii* Saboori & Ostovan, 2000; *L. (L.) kamalii* Karimi Irvanlou & Saboori, 2001; *Leptus (Leptus) eslamizadehi* Saboori, 2002; and *L. (L.) delijanensis* Khademi, Saboori & Hakimitabar, 2015 (Makol & Wohltmann, 2012; Khademi et al., 2015). In this paper, we describe the larva of *L. (L.) tridentatus* Saboori, Hakimitabar & Khademi \(^sp\). \(^nov\). 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.

**Materials and methods**

Larvae of *L. (L.) tridentatus* Saboori, Hakimitabar & Khademi \(^n\). \(^sp\). 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 La longer than other sternalae (Fig. 1B).

Coxae 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-4B2Nωζ (Fig. 3). Supracoxal seta of palp (eP) peg-like, 5 long. Chelicerae, subcapitulum and palp with punctuation. 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. 2A, 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. 2B, 3B).

Leg III: Ta–1ζ, 25–26B; Ti–1ω, 15B; Ge–8B; TFe–5B; BFe–2B; Tr–1B; Cx–1B (Figs. 2C, 3C). Coxal 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.
Leptus (Leptus) tridentatus Saboori, Hakimitabar & Khademi n. sp. (larva): A – Ta I; B – Ta II; C – Ta III.

The following combination of characters: palpal femur with one and palpal genu with two setae and basifemoral setae formula 3–3–2. There is one species, L. (L.) maldonadoicus with the basifemoral setae formula 3–3–2. It differs from L. (L.) maldonadoicus in the number of setae on palpal femur (1 vs. 2), number of setae between coxae I–II (6 vs. 0), number of setae between coxae II–III (~30–44 vs. 6), number of setae behind coxae III (~46–56 vs. 22), longer SD (109–126 vs. 64–76), W (109–116 vs. ~84–86), AW (87–94 vs. 74–76), PW (97–109 vs. 76), ISD (47–57 vs. 40–42), Ti I (144–180 vs. 106–112), Ti II (116–124 vs. 82–94), Ti III (188–215 vs. 130–134), leg I (723–769 vs. 484–502), leg II (637–660 vs. 394–406), and leg III (802–848 vs. 502–520). It is closely related to L. (L.) dubius (Paoli, 1937), L. (L.) pyrenaicus André, 1953, L. (L.) josifovi Beron, 1975, L. (L.) guus Haitlinger, 1990, L. (L.) mogadoranus Haitlinger, 1990, L. (L.) ogazulacus Haitlinger, 1990, L. (L.) pasopaicus Haitlinger, 1990, L. (L.) comosus Southcott, 1991, L. (L.) bertoldi Haitlinger, 1993, and L. (L.) batoricus Haitlinger, 1998, according to the setal counts on palpal genu and palpal femur. It differs L. (L.) dubius...
Table 1 Metric data for larvae of *Leptus (Leptus) tridentatus* Saboori, Hakimitabar & Khademi n. sp.

<table>
<thead>
<tr>
<th>Character</th>
<th>1a</th>
<th>1b</th>
<th>1c</th>
<th>1d</th>
<th>Character</th>
<th>1a</th>
<th>1b</th>
<th>1c</th>
<th>1d</th>
</tr>
</thead>
<tbody>
<tr>
<td>SD</td>
<td>126</td>
<td>114</td>
<td>109</td>
<td>–</td>
<td>Ti I</td>
<td>158</td>
<td>151</td>
<td>144</td>
<td>180</td>
</tr>
<tr>
<td>W</td>
<td>116</td>
<td>109</td>
<td>111</td>
<td>109</td>
<td>Ge I</td>
<td>126</td>
<td>116</td>
<td>111</td>
<td>111</td>
</tr>
<tr>
<td>AW</td>
<td>94</td>
<td>89</td>
<td>87</td>
<td>89</td>
<td>TFe I</td>
<td>89</td>
<td>87</td>
<td>77</td>
<td>69</td>
</tr>
<tr>
<td>PW</td>
<td>109</td>
<td>101</td>
<td>97</td>
<td>104</td>
<td>BFe I</td>
<td>89</td>
<td>87</td>
<td>89</td>
<td>64</td>
</tr>
<tr>
<td>AA</td>
<td>17</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>Tr I</td>
<td>62</td>
<td>59</td>
<td>64</td>
<td>50</td>
</tr>
<tr>
<td>SB</td>
<td>17</td>
<td>15</td>
<td>17</td>
<td>15</td>
<td>Cx I</td>
<td>87</td>
<td>79</td>
<td>84</td>
<td>79</td>
</tr>
<tr>
<td>ISD</td>
<td>57</td>
<td>52</td>
<td>52</td>
<td>47</td>
<td>Leg I</td>
<td>769</td>
<td>723</td>
<td>698</td>
<td>628</td>
</tr>
<tr>
<td>AP</td>
<td>17</td>
<td>15</td>
<td>15</td>
<td>15</td>
<td>Ta II (L)</td>
<td>119</td>
<td>119</td>
<td>121</td>
<td>121</td>
</tr>
<tr>
<td>AL</td>
<td>54</td>
<td>50</td>
<td>–</td>
<td>45</td>
<td>Ta II (H)</td>
<td>20</td>
<td>25</td>
<td>25</td>
<td>25</td>
</tr>
<tr>
<td>PL</td>
<td>45</td>
<td>47</td>
<td>47</td>
<td>42</td>
<td>Ti II</td>
<td>131</td>
<td>131</td>
<td>116</td>
<td>124</td>
</tr>
<tr>
<td>AAS</td>
<td>40</td>
<td>40</td>
<td>38</td>
<td>–</td>
<td>Ge II</td>
<td>104</td>
<td>101</td>
<td>99</td>
<td>99</td>
</tr>
<tr>
<td>ASens</td>
<td>50</td>
<td>50</td>
<td>52</td>
<td>47</td>
<td>TFe II</td>
<td>74</td>
<td>74</td>
<td>64</td>
<td>67</td>
</tr>
<tr>
<td>PSens</td>
<td>87</td>
<td>74</td>
<td>89</td>
<td>92</td>
<td>BFe II</td>
<td>74</td>
<td>74</td>
<td>64</td>
<td>69</td>
</tr>
<tr>
<td>DS</td>
<td>27–40</td>
<td>27–40</td>
<td>28–38</td>
<td>28–39</td>
<td>Tr II</td>
<td>52</td>
<td>54</td>
<td>57</td>
<td>54</td>
</tr>
<tr>
<td>1a</td>
<td>40</td>
<td>37</td>
<td>33</td>
<td>30</td>
<td>Cx II</td>
<td>87</td>
<td>84</td>
<td>82</td>
<td>72</td>
</tr>
<tr>
<td>1b</td>
<td>64</td>
<td>64</td>
<td>64</td>
<td>60</td>
<td>Leg II</td>
<td>641</td>
<td>637</td>
<td>603</td>
<td>596</td>
</tr>
<tr>
<td>2b</td>
<td>27</td>
<td>22</td>
<td>25</td>
<td>30</td>
<td>Ta III (L)</td>
<td>149</td>
<td>149</td>
<td>149</td>
<td>129</td>
</tr>
<tr>
<td>3b</td>
<td>27</td>
<td>30</td>
<td>27</td>
<td>35</td>
<td>Ta III (H)</td>
<td>15</td>
<td>17</td>
<td>17</td>
<td>20</td>
</tr>
<tr>
<td>GL</td>
<td>210</td>
<td>205</td>
<td>173</td>
<td>176</td>
<td>Ti III</td>
<td>215</td>
<td>208</td>
<td>188</td>
<td>188</td>
</tr>
<tr>
<td>PaScFed</td>
<td>50</td>
<td>54</td>
<td>57</td>
<td>47</td>
<td>Ge III</td>
<td>124</td>
<td>116</td>
<td>111</td>
<td>111</td>
</tr>
<tr>
<td>PaScGed</td>
<td>54</td>
<td>52</td>
<td>54</td>
<td>50</td>
<td>TFe III</td>
<td>99</td>
<td>94</td>
<td>92</td>
<td>87</td>
</tr>
<tr>
<td>PaScGev</td>
<td>54</td>
<td>50</td>
<td>42</td>
<td>47</td>
<td>BFe III</td>
<td>99</td>
<td>94</td>
<td>89</td>
<td>87</td>
</tr>
<tr>
<td>Ga</td>
<td>24</td>
<td>22</td>
<td>22</td>
<td>20</td>
<td>Tr III</td>
<td>54</td>
<td>62</td>
<td>62</td>
<td>59</td>
</tr>
<tr>
<td>aHy</td>
<td>8</td>
<td>8</td>
<td>7</td>
<td>8</td>
<td>Cx III</td>
<td>89</td>
<td>79</td>
<td>74</td>
<td>59</td>
</tr>
<tr>
<td>pHy</td>
<td>51</td>
<td>52</td>
<td>50</td>
<td>42</td>
<td>Leg III</td>
<td>829</td>
<td>802</td>
<td>765</td>
<td>720</td>
</tr>
<tr>
<td>Ta I (L)</td>
<td>158</td>
<td>144</td>
<td>129</td>
<td>144</td>
<td>IP</td>
<td>2239</td>
<td>2162</td>
<td>2066</td>
<td>1944</td>
</tr>
<tr>
<td>Ta I (H)</td>
<td>25</td>
<td>23</td>
<td>27</td>
<td>24</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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), Ti III (97–109 vs. 122–130), Ti I (144–180 vs. 312), Ti II (116–131 vs. 254), 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 types 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, 1 Cp, 22B; Ti– 2φ, 1κ, 13B; Ge– 1κ, 1σ, 11B; TFe– 8B; BFe– 4B; Tr– 2B; Cx– 1B.

Leg II: Ta– 1ω, 2ζ, 1 Cp, 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, 1 Cp, 2ζ, 25B; Ti– 1 Cp, 2φ, 1κ, 13B; Ge– 1κ, 1σ, 11B; TFe– 7B; BFe– 4B; Tr– 2B; Cx– 1B.

Leg II: Ta– 1ω, 1 Cp, 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.
Acknowledgements

The authors are thankful to Prof. Ryszard Haitlinger for providing type specimens and to Prof. Joanna Mąkol for her kind help during our stay in Poland. The project (Invited Collaborative Research Program) on which this paper was based was supported by a grant (No. 1724) from the “Center for International Scientific Studies and Collaboration”, Ministry of Science, Research and Technology of Iran which is greatly appreciated.

References


