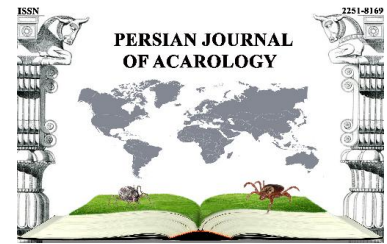




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Correspondence

Second world record of *Olopachys hallidayi* Özbek, 2014 (Mesostigmata: Pachylaelapidae) from Iran

Saeid Valizadeh¹, Ali Ahadiyat^{2*}, Mohammad Bagheri¹ and Omid Joharchi³

1. Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran; E-mails: Saeid_valizade@yahoo.com, mbagheri20022002@yahoo.com
2. Department of Plant Protection, Science and Research Branch, Islamic Azad University, Tehran, Iran; E-mails: a.ahadiyat@srbiau.ac.ir, ali.ahadiyat@hotmail.com
3. Department of Plant Protection, College of Agriculture, Yazd Branch, Islamic Azad University, Yazd, Iran; E-mail: joharchi@iauyazd.ac.ir.

* Corresponding author

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The family Pachylaelapidae comprises four genera in Iran, including *Olopachys* Berlese, 1910, *Onchodellus* Berlese, 1904, *Pachylaelaps* Berlese, 1888 and *Pachyseius* Berlese, 1910, which have been systematically under survey recently (Babaeian and Kazemi 2011; Ahadiyat and Cheraghali 2012; Baroozeh and Ahadiyat 2012; Ahadiyat *et al.* 2014, 2016; Babaeian *et al.* 2016a, b; Abutaleb Kermani *et al.* 2017; Mašán *et al.* 2018; Mojahed *et al.* 2017, 2019). *Olopachys* contains three species in the country, namely *O. caucasicus* Koroleva, 1976 (Ahangaran *et al.* 2010; Saberi *et al.* 2016; Mojahed *et al.* 2017), *O. compositus* Koroleva, 1976 (Kazemi and Ahangaran 2011; Ahadiyat and Cheraghali 2012; Ahangaran *et al.* 2012; Zakeri *et al.* 2012; Rezaie *et al.* 2016; Mojahed *et al.* 2017), and *O. iraniensis* (Mojahed *et al.* 2019), all belonging to the subgenus *Olopachys* (*Olopachys*) distributed in the northern provinces. Currently, *Olopachys* includes 23 species throughout the world (Özbek 2016; Mojahed *et al.* 2019).

The species *Olopachys* (*Olopachys*) *hallidayi* was collected from orchards from Maragheh and adjacent villages, East Azerbaijan Province, using Berlese-Tullgren funnel during the autumn 2016. The specimens were cleared in Nesbitt's fluid, then mounted on microscope slides using Hoyer's medium, and finally dried in an oven at 45–50 °C for 3–4 weeks. All measurements were given in micrometers (µm). Lengths of the shields were measured along their midlines from anterior to posterior margins. Widths of shields were taken approximately at mid-level (at the widest point) for the dorsal shield, between the mid-level of coxae II and at the level of setae *st2* for the sternal shield, almost near the level of the setae *JVI* (at the widest point) for the genitiventrianal shield. Length of the peritreme was taken from the anterior margin of stigmata to the anterior end of peritreme. Lengths of the setae and the distances between them were measured from the bases of their insertions to their tips and from the center of the setal alveolae, respectively. Idiosomal setal notation used in this paper follows that of Lindquist and Evans (1965). Some specimens of both species are deposited in the Acarology Collection of the Department of Plant Protection (ACDPP), College of Agriculture and Natural Resources, Science and Research Branch, Islamic Azad University, Tehran, Iran, and some others in the Acarology Collection of the Department of Plant Protection of Maragheh University, Maragheh, Iran, as well as the senior author's collection (SV).

Olopachys (Olopachys) hallidayi Özbek, 2014

Olopachys (Olopachys) hallidayi Özbek, 2014: 328

Morphological observations of studied material

Female (n = 5) – Dorsal shield ovoid, 740–810 long (in one specimen: 875), 480–550 wide (in one specimen: 580) (length/width ratio: 1.47–1.54), well-reticulated throughout. Shield with two pairs of adjacent gland pores *gdZ1* and *gdS4* on posterolateral margins. Setae *j1* and *z1* and one pair of poroids *idj1* located at the edge of the boundary connection between the dorsal and ventral idiosoma. Seta *J5* minute as microseta. Ventral shields well-reticulated throughout, except the smooth or weakly reticulation in posterior margin of the sternal shield. Sternal shield 228–248 long, 120–128 wide (at the mid-level of coxae II) (length/width ratio: 1.90–1.93), 160–168 wide (at the level of setae *st2*) (length/width ratio: 1.42–1.48), bearing three pairs of poroids (*iv1–3*), and four pairs of smooth setae: *st1* longest (100–120), *st2–4* almost subequal (*st2* 82–86, *st3* 66–78, *st4* 74–85), with an arc-like line at the anterior section (Fig. 1a, b). Genitiventrian shield 335–420 long (in one specimen: 450), 270–360 wide (in one specimen: 375) (length/width ratio: 1.07–1.27), with three pairs of smooth, subequal pre-anal setae *st5* (84–92), *JV1* (82–102) and *JV2* (80–100), three circum-anal setae (para-anal setae = *pa* 46–55, post-anal seta = *po* 36–38), and 4–5 pairs of pore-like structures. A transverse, recurved linea posteriad the level of the setae *JV2*. Peritreme 365–385 long (in one specimen: 450), covered by aciculae, extending anteriorly almost to the level of the seta *z1*, with one gland pore (*gp*) located at the level of coxa II. Peritrematal shield wide, completely fused to the exopodal and metapodal platelets. Lateral and opisthogastric soft integument bearing 12 pairs of smooth setae, including five pairs of lateral and seven pairs of opisthogastric setae. Chelicera with movable digit with one subapical, conspicuous tooth, and fixed digit with one apical, minute tooth, followed by two subapical conspicuous teeth (Fig. 2). Pilus dentilis located close to the upper subapical tooth. Epistome with a long neck, distinctly serrated apically; anterolateral margins finely denticulated. Sperm access system associated with coxae IV, with a relatively elongate and curve tube (105–130 long), slightly expanded distally (Fig. 1a, b). Tarsus II with two spur-like distal setae.

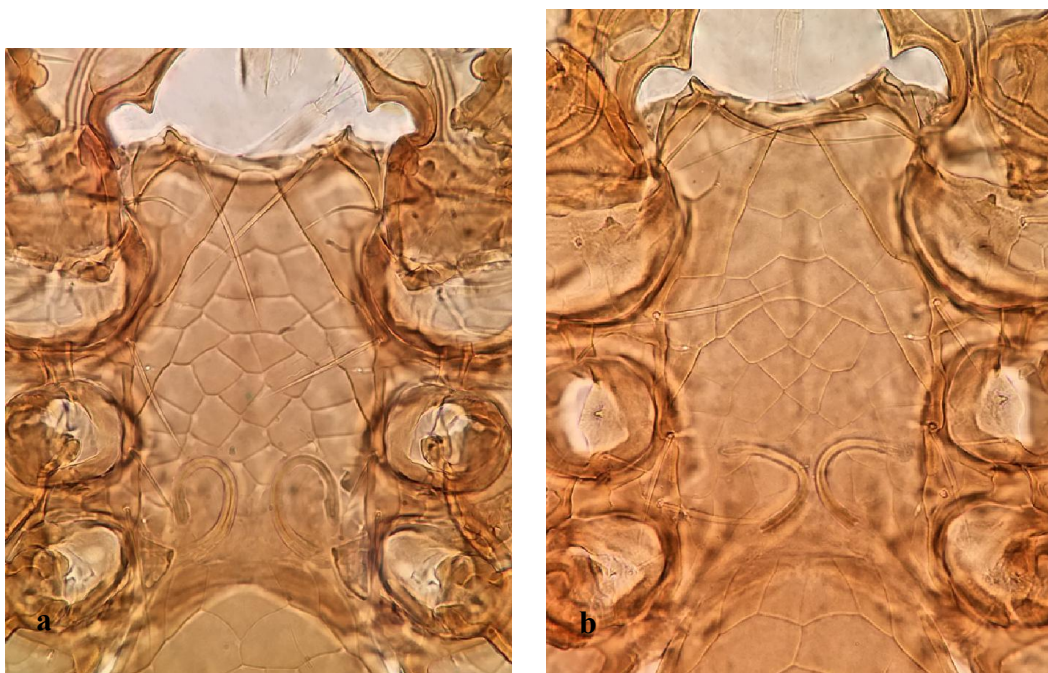


Figure 1. *Olopachys hallidayi* (female) – a, b. Reticulation of the sternal shield and the spermathecal apparatus.

Lengths of dorsal and ventral setae: *j1* 23–42, *j2* 92–112, *j3* 104–115, *j4* 83–97, *j5* 68–85, *j6* 82–95, *J1* 88–105, *J2* 83–110, *J3* 100–113, *J4* 102–125, *J5* 6–10, *z1* unavailable, *z2* 106–125, *z4* 104–115, *z5* 68–80, *z6* 96–117, *Z1* 104–125, *Z2* 102–115, *Z3* 102–114, *s2* 86–113, *s4* 102–126, *s5* 98–120, *s6* 68–85, *S1* 68–92, *S3* 68–83, *S4* 88–115, *S5* 98–125, *r2* 98–123, *r3* 88–108, *r5* 74–90, *r6* 35–47. Distances between some pairs of dorsal and ventral idiosomal setae: *j1–j1* 12–15, *j2–j2* 50–63, *j3–j3* 75–90, *j4–j4* 128–163, *j5–j5* 105–130, *j6–j6* 93–125, *J1–J1* 95–115, *J2–J2* 155–169, *J3–J3* 94–113, *J4–J4* 127–175, *J5–J5* 30–50, *z1–z1* 45–55, *z2–z2* 198–243, *z4–z4* 263–300, *z5–z5* 138–165, *z6–z6* 225–260, *Z1–Z1* 355–440, *Z2–Z2* 357–443, *Z3–Z3* 270–333, *s2–s2* 250–290, *s4–s4* 353–420, *s5–s5* 363–453, *s6–s6* 458–565, *st1–st1* 68–83, *st2–st2* 140–158, *st3–st3* 125–150, *st4–st4* 135–160, *st5–st5* 148–203, *JV1–JV1* 238–277, *JV2–JV2* 127–183.



Figure 2. *Olopachys hallidayi* (female) – Chelicera.

Material examined

2 ♀, East Azerbaijan Province, Maragheh region, Chekan village, 37° 21' 8.2" N, 46° 19' 24.3" E, altitude: 1747 m a.s.l., soil of walnut tree, 7 October 2016; 3 ♀, East Azerbaijan Province, Maragheh region, Chekan village, 37° 21' 15.5" N, 46° 19' 31.4" E, altitude: 1568 m a.s.l., soil of plum tree, 7 October 2016; 4 ♀, East Azerbaijan Province, Maragheh region, Chay Baghi village, 37° 19' 44.5" N, 46° 16' 15.6" E, altitude: 1457 m a.s.l., soil of walnut tree, 14 October 2016; 1 ♀, East Azerbaijan Province, Maragheh region, Agh Kand village, 37° 20' 57.2" N, 46° 15' 21.5" E, altitude: 1425 m a.s.l., leaf-litter, 14 October 2016; 2 ♀, East Azerbaijan Province, Maragheh region, Nova village, 37° 26' 19.3" N, 46° 12' 54.1" E, altitude: 1697 m a.s.l., soil of plum tree, 27 October 2016; 1 ♀, East Azerbaijan Province, Maragheh region, Alavian village, 37° 24' 11.3" N, 46° 13' 26.1" E, altitude: 1480 m a.s.l., soil of plum tree, 27 October 2016; 7 ♀, East Azerbaijan Province, Maragheh region, Tazeh Kand village, 37° 27' 35.3" N, 46° 15' 44.1" E, altitude: 1619 m a.s.l., soil of walnut tree, 6 November 2016; 1 ♀, East Azerbaijan Province, Maragheh region, Tazeh Kand village, 37° 27' 36" N, 46° 15' 44.8" E, altitude: 1622 m a.s.l., manure of almond tree, 6 November 2016; 1 ♀, East Azerbaijan Province, Maragheh region, Ozbak village, 37° 28' 26.5" N, 46° 17' 15.9" E, altitude: 1699 m a.s.l., soil of walnut tree, 6 November 2016; 3 ♀, East Azerbaijan Province, Maragheh region, Ashan village, 37° 30' 48.4" N, 46° 18' 43.9" E, altitude:

1751 m a.s.l., soil of sour cherry tree, 6 November 2016; 2 ♀, East Azerbaijan Province, Maragheh region, Kahaq village, 37° 28' 40.7" N, 46° 13' 29.1" E, altitude: 1767 m a.s.l., soil of walnut tree near river, 18 November 2016; 6 ♀, East Azerbaijan Province, Maragheh region, Kahaq village, 37° 28' 4.1" N, 46° 13' 45.6" E, altitude: 1764 m a.s.l., soil of apple tree, 18 November 2016; 4 ♀, East Azerbaijan Province, Maragheh region, Senowkesh village, 37° 28' 20.9" N, 46° 14' 26.8" E, altitude: 1729 m a.s.l., soil of quince tree, 18 November 2016; 2 ♀, East Azerbaijan Province, Maragheh region, Esfestanaj village, 37° 28' 8.1" N, 46° 14' 16" E, altitude: 1622 m a.s.l., soil of walnut tree, 18 November 2016. All materials were collected by S. Valizadeh.

Notes

This species is reported for the first time from Iran and distributed in the Palaearctic region: Turkey (Özbek 2014; Şahin and Özbek 2018) and Iran (this study). The species was found in moss, soil debris, litter of herbs, ornamental trees and shrubs and nest of an ant species (Özbek 2014; Şahin and Özbek 2018). Özbek (2014) and Şahin and Özbek (2018) collected the species in a wide range of altitudes (1273–1880 and 1596–2455 m a.s.l., respectively). We found it in soil of fruit trees, manure and leaf-litter at the altitudes 1425–1767 m a.s.l. Therefore, it can live in medium- to high-land areas. The Iranian specimens of *Olopachys hallidayi* are very similar to the Turkish ones according to the morphometric characteristics and the original description prepared by Özbek (2014), but they have wide ranges for some characteristics. The Iranian specimens were larger than the Turkish ones in length and width of dorsal shield, although the ratio was smaller in the Iranian specimens [740–875 long, 480–580 wide, the ratio: 1.47–1.54 in the Iranian specimens; 700–780 long, 430–470 wide, the ratio: 1.54–1.69 in the Turkish specimens (Özbek 2014)]. Therefore, the length and width of dorsal shield and their ratio for the species can be expanded as 700–875, 430–580 and 1.47–1.69, respectively. The length and width of genitiventrianal shield and its ratio have wider ranges in the Iranian specimens (the Turkish specimens in the parentheses), which are 335–450 (350–400), 270–375 (300–350) and 1.07–1.27 (1.11–1.19), respectively. The lengths of setae *j4* in the Iranian specimens are slightly shorter than the Turkish ones (83–97 compared with 100–110). During the study, we were confronted with a few specimens collected from another province in Iran, which were very similar to *O. hallidayi* (based on the shape of the spermathecal apparatus) but with 13 pairs of setae on lateral and opisthogastric soft integument, although Özbek (2014) had mentioned that 12 pairs of setae exist on the soft integument. Özbek (personal communications, October 2017) stated that some Turkish specimens bear a range of 12–14 pairs of setae on lateral and opisthogastric soft integument (mostly 12 pairs, rarely 13–14 pairs).

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