

Article

A redescription of *Charletonia damavandica* (Acari: Erythraeidae)

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ABSTRACT

We redescribed and illustrated *Charletonia damavandica* on the basis of examination of its type and new materials which were collected ectoparasitic on *Calliptamus italicus* (Insecta: Orthoptera: Acrididae) as hosts from Shahrood city, Semnan province, Iran as a new host record.

KEY WORDS: Iran; new host; Prostigmata; Orthoptera; Shahrood; synonymy; Trombidiformes.

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INTRODUCTION

The larvae of *Charletonia* Oudemans, 1910 (Acari: Trombidiformes: Prostigmata: Erythraeidae) are ectoparasites of various arthropods. Eighty-six species have been described up to now based on larvae. This genus is divided into three species groups based on the number of setae between coxae II and III (Hakimitabar and Saboori 2022).

Hitherto, 13 species have been described from Iran as follows: *C. damavandica* Karimi Irvanlou, Kamali & Talebi, 2002 (syn.: *C. saboorii* Karimi Irvanlou, Kamali & Talebi, 2002); *C. nazeleae* Karimi Irvanlou, Kamali & Talebi, 2002; *C. behbahanensis* Haitlinger & Saboori, 2008; *C. talebii* Sedghi, Saboori & Hakimitabar, 2009; *C. shahriari* Saboori, Azimi & Shirdel, 2012 (syn.: *C. farajii* Noei, Saboori and Hajizadeh, 2015) and *C. behshahriensis* Hakimitabar & Saboori, 2014 with two intercoxalae II & III, *C. baluchestanica* Tashakor & Hakimitabar, 2015; *C. krendowskyi* (Feider, 1954) (syn.: *C. bahaensis* Kamran & Alatawi, 2014); *C. mehranensis* Haitlinger & Saboori, 2007; *C. bojnordensis* Haitlinger & Saboori, 2008; *C. stekolnikovi* Hakimitabar & Saboori, 2011; *C. terianae* Hakimitabar, Saboori & Seiedy, 2013 with four intercoxalae II & III and *C. ahwazensis* Haitlinger & Saboori, 2007 with more than four intercoxalae II & III.

Originally, *C. damavandica* was described by Karimi Irvanlou *et al.* (2002). The holotype and paratype were collected on *Acrotylus insubricus* Scopoli, 1786 and *Mioscirtus wagneri* (Eversmann 1859) (Orthoptera: Acrididae), respectively, from Varamin city, Tehran province, Iran. The

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description of the species and drawings were incorrect and unclear, especially those concerning the shape of scutum, number and position of setae on leg segments and the shape of hypostomalae and galeala. In the same paper, the species *C. saboorii* was described from holotype collected on *Heteracris littoralis* (Rambur, 1838) (Orthoptera: Acrididae) in Varamin city, Tehran province, Iran. Karimi Irvanlou *et al.* (2002) stated just two ratios, AW/AL and TiIII/AW as differential diagnoses for comparing them. The authors did not consider other characters which are the same in both species. Later, Noei and Honarmand (2020) collected *C. saboorii* on unknown Tettigonidae (Orthoptera) from Khorasan Razavi province but presented only its metric data (see Table 1). Therefore, in this paper, we redescribe *C. damavandica* and correct its morphological and meristic data. We also report a new host record for the species.

MATERIAL AND METHODS

The holotypes of *C. damavandica* and *C. saboorii* deposited in the Acarological Collection, College of Agriculture, Tarbiat Modares University, Tehran, Iran (ACTMU), were examined. Unfortunately the paratype of *C. damavandica* was not available. Specimens belonging to the new material were detached by insect pins, preserved in 75% ethanol, cleared in lactic acid and mounted using Faure medium on microscope slides (Walter and Krantz 2009) and deposited in the Acarological Collection, Jalal Afshar Zoological Museum (JAZM), Faculty of Agriculture, University of Tehran, Karaj, Iran. Figures were drawn and measurements were calculated using a BX-51 Olympus microscope equipped with a drawing tube and magnification changer. The terminology and abbreviations follow Wohltmann *et al.* (2006) and Saboori *et al.* (2009) and measurements are given in micrometers (μm). Figures of dorsal and ventral diosoma were drawn from the holotype of *C. damavandica*, and gnathosoma and legs were drawn from the holotype of *C. saboorii* because gnathosoma and legs in the holotype of *C. saboorii* had a better position than the holotype of *C. damavandica*.

RESULTS AND DISCUSSION

Superfamily Erythraeoidea Family Erythraeidae

Charletonia damavandica Karimi Irvanlou, Kamali & Talebi, 2002 (Figs. 1–15)

Syn.: *Charletonia saboorii* Karimi Irvanlou, Kamali & Talebi, 2002

Diagnosis

Two setae between coxae II and III, solenidion on Ge I placed in distal half after or at the same level as the most distal normal seta, $220 > \text{Ti III} > 150$, galealae normal (setiform) with 5–8 long ciliations and hypostomalae barbed.

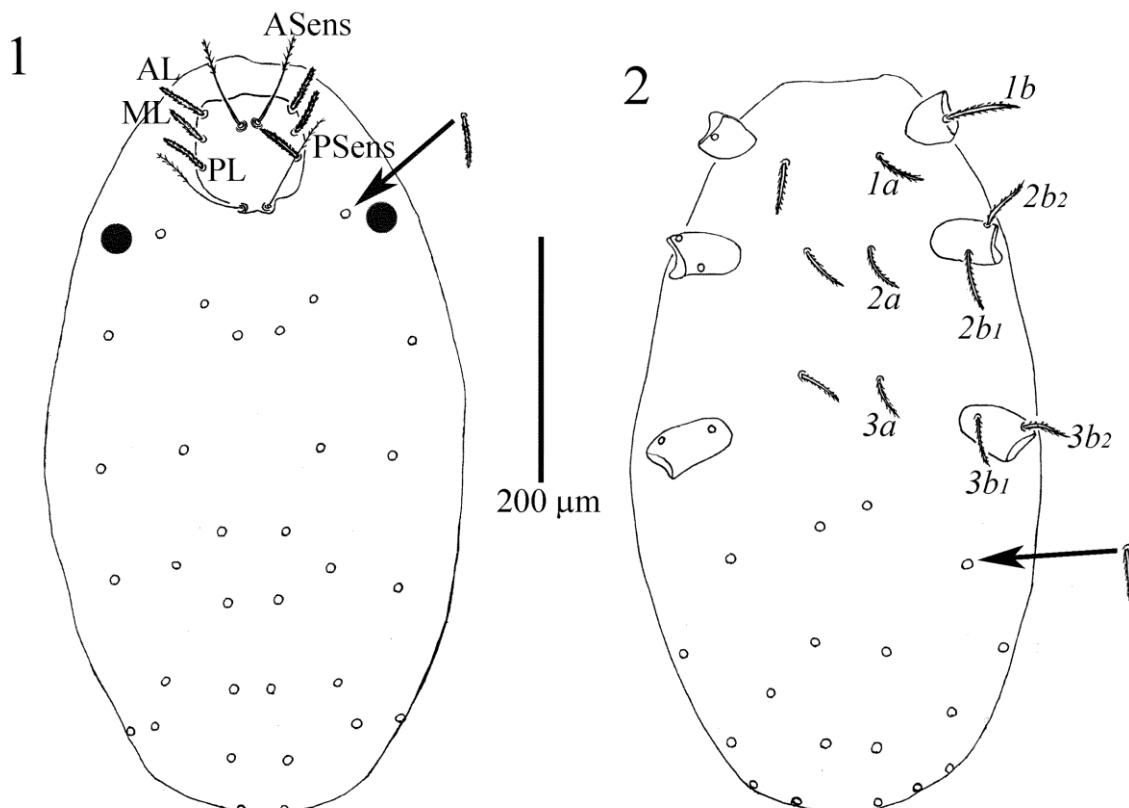
Redescription

Larva (N = 10) – Dorsal surface with 32 barbed and pointed setae; scutum pentagonal, punctate and longer than wide; lateral parts of anterior border slightly concave, median part convex, lateral borders slightly convex; posterior border convex except median part which is concave; scutum with two pairs of sensilla and three pairs of normal setae. AL, ML and PL barbed and pointed. Posterior sensilla (PSens) longer than anterior sensilla (ASens); ASens and PSens with short barbs in distal 1/3 (Fig. 1). One eye on each side of idiosoma, 25 in diameter.

Ventral surface of idiosoma with 18 barbed and pointed setae behind coxae III (fV). Sternalae 1a (between coxae I), 2a (between coxae II) and 3a (between coxae II and III) barbed and pointed. NDV = $32 + 18 = 50$. Coxa I with one seta (1b); coxae II & III, each with two setae. All coxalae

barbed and pointed (Fig. 2).

Subcapitulum with a galeala (*cs*) and two hypostomalae (*as*, *bs*), galealae normal (setiform) with 5–8 long cilia, hypostomalae barbed (Fig. 3). Palpal femur and genu each with one barbed and pointed seta; palpal tibia with three pointed and barbed setae (Fig. 3); palpal tibial claw bifurcate. Palpal tarsus with five barbed setae, one solenidion and one eupathidium (Fig. 3). fPp = 0-B-B-BBB₂-5Bωζ. Cheliceral basis punctate. Supracoxal seta peg-like, 4–5 long.



Figures 1–2. *Charletonia damavandica* (holotype) – 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma (Only one seta is shown in dorsal view and some setae in ventral view and other setae were shown with hollow circles).

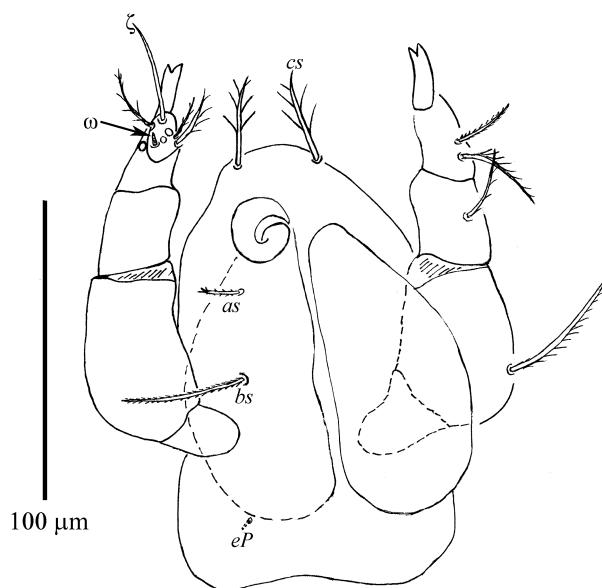
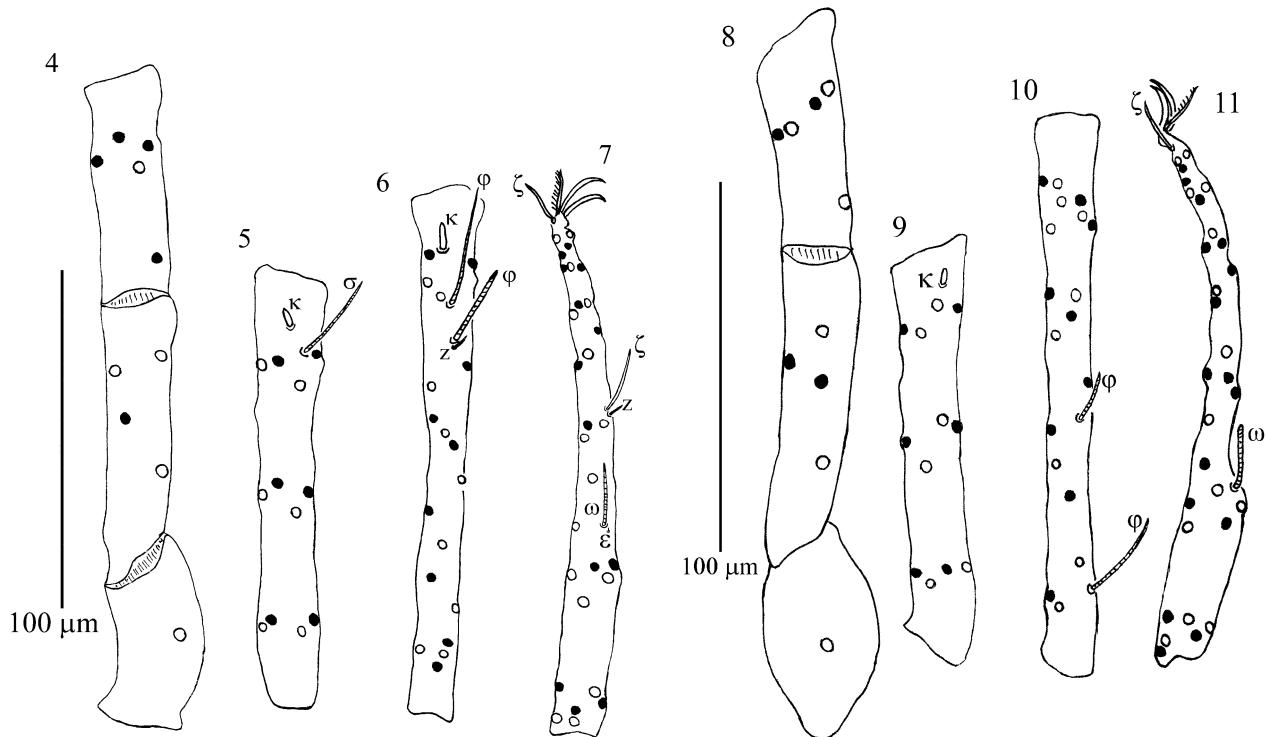
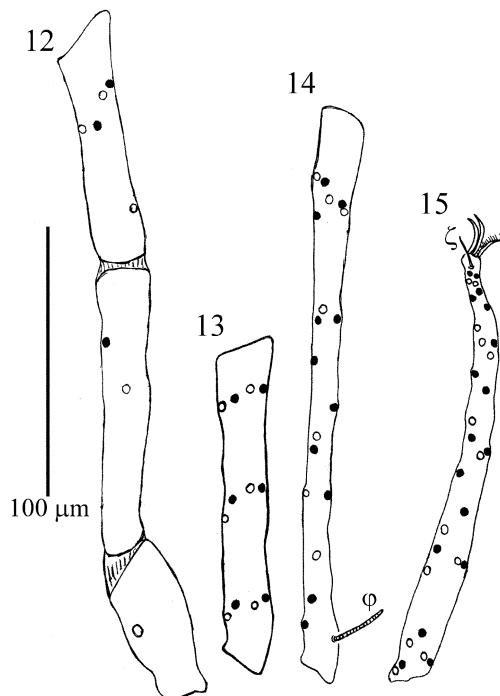


Figure 3. *Charletonia damavandica* (from specimen described as holotype of *C. saboorii*) – Ventral view (left) and dorsal view (right) of gnathosoma.

Leg segmentation formula: 7–7–7. Leg setal formula: Leg I: Ta – 1 ω , 1 ε , 2 ζ , 1Cp, 29n; Ti – 2 φ , 1Cp, 1 κ , 18n; Ge – 1 σ , 1 κ , 12n; TFe – 5n; BFe – 4n; Tr – 1n (Figs. 4–7). Leg II: Ta – 1 ω , 1 ζ , 30n; Ti – 2 φ , 18n; Ge – 1 κ , 12n; TFe – 5n; BFe – 4n; Tr – 1n (Figs. 8–11). Leg III: Ta – 1 ζ , 30n; Ti – 1 φ , 18n; Ge – 12n; TFe – 5n; BFe – 2n; Tr – 1n (Figs. 12–15). Lengths of solenidion on Ta I: 19–23.



Figures 4–11. *Charletonia damavandica* (from specimen described as holotype of *C. saboorii*) – 4. Tr-TFe I; 5. Ge I; 6. Ti I; 7. Ta I; 8. Tr-TFe II; 9. Ge II; 10. Ti II; 11. Ta II (solid circles represent dorsal setae and hollow circles represent ventral setae).



Figures 12–15. *Charletonia damavandica* (from specimen described as holotype of *C. saboorii*) – 12. Tr-TFe III; 13. Ge II; 14. Ti III; 15. Ta III (solid circles represent dorsal setae and hollow circles represent ventral setae).

Measurements and also the corrected metric data of the specimen described as *C. saboorii* are given in Table 1.

Table 1. Metric data for *Charletonia damavandica* new materials (1a–1d); holotype of *C. saboorii* (e); holotype of *C. damavandica* (f); samples from Khorasan Razavi province [after Noei and Honarmand (2020)] (g).

Character	1a	1b	1c	1d	e	f	g (n = 4)	Character	1a	1b	1c	1d	e	f	g (n = 4)
SD	103	103	95	94	97	95	100–105	bs	39	38	39	38	35	36	40
W	86	91	92	88	94	90	97–103	Ta I (L)	168	168	168	158	153	130	167–180
AW	71	69	71	67	64	64	70–77	Ti I	171	166	167	155	156	136	172–200
MW	72	72	74	70	73	71	77–82	Ge I	131	135	136	127	124	111	131–150
PW	79	77	79	75	79	75	82–90	TFe I	79	82	79	74	71	77	82–92
AA	14	13	15	13	13	12	13–20	BFe I	97	93	94	94	99	87	100–105
SB	19	19	20	20	19	17	20–22	Tr I	60	59	58	62	59	45	62
ISD	73	73	71	66	67	66	68–75	Cx I	70	64	74	64	67	54	65–75
AP	38	40	42	37	37	38	40–45	Leg I	776	767	776	734	729	640	779–864
AL	41	44	45	47	44	43	40–46	Ta II (L)	158	161	163	149	144	126	160–165
ML	41	44	40	41	40	41	37–44	Ti II	153	149	153	146	141	129	150–175
PL	41	43	—	43	42	40	40–50	Ge II	126	124	124	121	111	99	122–135
ASens	77	73	70	78	69	68	65–80	TFe II	74	71	77	74	64	69	75–85
PSens	86	92	91	83	85	85	80–107	BFe II	84	88	88	87	87	74	92–102
DS min.	30	25	25	30	25	25	25–30	Tr II	59	60	59	66	59	50	60–62
DS max.	60	59	54	62	35	45	35–62	Cx II	75	66	77	64	57	62	67–82
1a	47	50	47	53	49	41	47	Leg II	729	719	741	707	663	609	731–806
1b	50	67	57	55	67	64	65–72	Ta III	174	174	172	168	153	141	175–182
2a	49	55	45	50	50	46	52	Ti III	214	211	213	210	208	183	212–217
2b ₁	61	56	57	54	57	51	65–67	Ge III	134	131	136	131	124	109	135–142
2b ₂	53	57	54	51	49	47	60–65	TFe III	98	99	106	99	91	82	98–105
3b ₁	48	50	48	50	43	43	47–52	BFe III	103	94	101	101	99	82	105–115
3b ₂	50	51	50	48	41	40	47–50	Tr III	64	62	62	62	64	59	67–70
GL	142	149	149	143	146	136	142–152	Cx III	65	68	82	74	67	62	67–85
cs	32	31	33	32	33	32	32–35	Leg III	852	839	872	845	806	718	867–909
as	19	20	19	20	20	20	20	IP	235	2325	2389	2286	2198	1967	2372–2579

Type material examined

Holotype of *C. damavandica* (ACTMU, no accession number), on *Acrotylus insubricus*, Varamin city ($51^{\circ} 39' N$, $35^{\circ} 19' E$, 900 m a.s.l.), Tehran province, Iran, 16 July 1998, col. J.S. Karimi Irvanlou. Holotype of *C. saboorii* (ACTMU, no accession number), on *Heteracris littoralis*, Varamin city, Tehran province, Iran, 20 August 1998, col. J.S. Karimi Irvanlou.

Additional material examined

Four larvae of *C. damavandica* (JAZM-AC-Er-0566a, b, c, d), on one female of *Calliptamus italicus* L., Shahrood city ($36^{\circ} 22' 27.54'' N$, $54^{\circ} 54' 50.08'' E$, 1317 m a.s.l.), Semnan province, Iran, 6 August 2018, col. Masoud Hakimitabar. Two specimens (JAZM-AC-Er-0566a & b) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran and two specimens (JAZM-AC-Er-0566c & d) are deposited in the Acarological Collection, Acarological Society of Iran, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran.

Remarks

This species belongs to the species group of *Charletonia* with two setae between coxae II–III, one of the solenidia on Ti II placed on the proximal half of the segment, solenidion on Ge I placed

distal or at the same level as the most distal seta, solenidion on Ta I up to 1/5 length of Ta I, fn Ge I–III 12–12–12, 230 > Ti III > 110. There are seven species in this group, as follows: *C. kalithensis* and *C. kosensis* both from Greece, *C. austisensis* from Italy, *C. damavandica*, *C. behbahanensis* and *C. behshahriensis*, all from Iran.

Charletonia damavandica differs from *C. kalithensis* by longer Ti III (183–217 vs. 114–120), Ta I (130–180 vs. 84–90), Ta II (126–165 vs. 74–76), Ta III (141–182 vs. 78–80), and fD (32–36 vs. 84); from *C. kosensis* by shorter solenidion on Ta I (19–23 vs. 45–50), anteromedian border of scutum convex (vs. anterior border almost straight), shape of galealae and hypostomalae (barbed vs. nude); from *C. austisensis* by shape of galealae and hypostomalae (barbed vs. nude), solenidion on Ge I placed at the same level as the most distal normal seta (vs. after the most distal normal seta), from *C. behbahanensis* by shape of galealae and hypostomalae (barbed vs. nude), one seta present between eye and scutum (vs. without setae between eye and scutum), from *C. behshahriensis* by galealae normal with 5–8 long cilia (vs. galealae cone-like with several short cilia), solenidion on Ge I placed at the same level as the most distal normal seta (vs. solenidion on Ge I placed distinctly after the most distal normal setae).

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باز توصیف گونه *Charletonia damavandica* (Acari: Erythraeidae)

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چکیده

گونه *Charletonia damavandica* با بررسی نمونه تایپ و نمونه‌های جمع‌آوری شده از روی *Calliptamus italicus* (Insecta: Orthoptera: Acridida) به عنوان میزبان از شهرستان شاہرود، استان سمنان، ایران، باز توصیف، ترسیم و میزبان‌های جدیدی برای گونه که گزارش شد.

واژگان کلیدی: ایران؛ میزبان جدید؛ پیش‌استیگمايان؛ راست‌بالان؛ شاھرود؛ ترادف؛ Trombidiformes

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