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Article

A contribution to the knowledge of *Charletonia nazeleae* (Acari: Erythraeidae)

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ABSTRACT
Larvae of *Charletonia nazeleae* Karimi Iravanlou, Kamali & Talebi were previously collected from Karaj, Alborz province, Iran, parasitizing two different acridid grasshopper species. Here, we present new morphological and meristic data based on collecting new mite specimens during surveys to Zagros Mountains, Fars province, Iran and a correction of the previous description by reconsidering the type specimen and augmenting the original data. Also, two new hosts for this species are identified.

KEY WORDS: Acrididae; biometry; Iran; Parasitengona; Trombidiformes.

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INTRODUCTION

Charletonia Oudemans, 1910 is a cosmopolitan mite genus with the highest number of species in the subfamily Callidosomatinae. The larvae of this genus are ectoparasites of various arthropods (Southcott 1991). In Asia, the highest species diversity is found in Iran with 13 species (Hakimitabar and Saboori 2022). Among them, *C. damavandica* Karimi Irvanlou, Kamali & Talebi, 2002; *C. nazeleae* Karimi Irvanlou, Kamali & Talebi, 2002; *C. behbahanensis* Haitlinger & Saboori, 2008; *C. talebii* Sedghi, Saboori & Hakimitabar, 2010; *C. shahriari* Saboori, Azimi & Shirdel, 2012 and *C. behshahriensis* Hakimitabar & Saboori, 2014 form a group of species characterized by two setae between coxae II & III (Karimi Irvanlou *et al.* 2002; Haitlinger and Saboori 2008; Sedghi *et al.* 2010; Saboori *et al.* 2012; Hakimitabar and Saboori, 2014, 2022).

Karimi Irvanlou *et al.* (2002) described *C. nazeleae*. This species was collected from Karaj, Alborz province, Iran. The holotype and paratypes were collected ectoparasitic on *Heliopteryx humeralis* (Kuty, 1907) and *Ramburiella turcomana* (Fischer von Waldheim, 1833) (Orthoptera: Acrididae), respectively. However, the original description of the species and drawings were incorrect and unclear; especially those of the shape of the scutum, the number and position of setae on leg segments and the shape of the hypostomalae and galeala. Haitlinger (2003) recorded this species from an undetermined orthopteran. Later, Ahmadi *et al.* (2012) collected *C. nazeleae* (Syn.: *C. dalegori*

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Haitlinger, 2003) on *Dociostaurus* (*Stauronotulus*) *crassiusculus nigrogeniculatus* Tarbinsky, 1928 and *Pyrgodera armata* (Fischer von Waldheim, 1820) from Khorasan Razavi province. Therefore, in this paper, we redescribe *C. nazeleae* and provide correct and more complete morphological and meristic data. Sixteen specimens of this species were collected ectoparasitic on Acrididae (Insesta: Orthoptera) in the Zagros Mountains, Fars province, Iran. Based on these collections, we report two new hosts for the species.

MATERIAL AND METHODS

The holotype of *C. nazaleae*, deposited in the Acarological Collection, College of Agriculture, Tarbiat Modares University, Tehran, Iran (ACTMU), was examined; unfortunately, the paratypes were not available. Three additional specimens were also examined from this university's collection. In addition, new larvae were obtained from Acrididae grasshoppers, collected using insect nets during surveys in the Zagros Mountains, Fars province by Najmeh Kiany and Mohsen Kiany. Sampling was pperformed four times at each of three locations (Shiraz–Bushehr Road; Darengoon; Tange Ghanimi) from March to October in two consecutive years, 2020 and 2021. During survey to Zagros Mountains, 16 mite larvae were detached by an insect pin from the hind wings, forewings and mesothorax of grasshopper hosts (see Table 2). Specimens were preserved in 96% alcohol. They were cleared in Nesbitt's fluid and finally mounted on microscope slides using Faure's medium (Walter and Krantz 2009). Specimens were measured (in micrometers) and drawn using a Reichert Biovar microscope equipped with a Camera Lucida. Terminology and abbreviations are adapted from Wohltmann *et al*. (2007) and Saboori *et al*. (2009).

RESULTS

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

Diagnosis

Two setae between coxae II and III, solenidion on Ge I placed in distal half of Ge I slightly distal or at the same level as the most distal normal seta (see Table 2), Ti III > 270, galealae (*cs*) parsnip-shaped, *as* smooth, *bs* barbed.

Material examined

Holotype of *C. nazeleae* (ACTMU, no accession number), on *Heliopteryx humeralis*, Iran, Tehran province, Karaj city (35° 49' 57.58" N, 50° 59' 29.58" E, 1342m), 16 July 1998, col. J.S. Karimi Irvanlou.

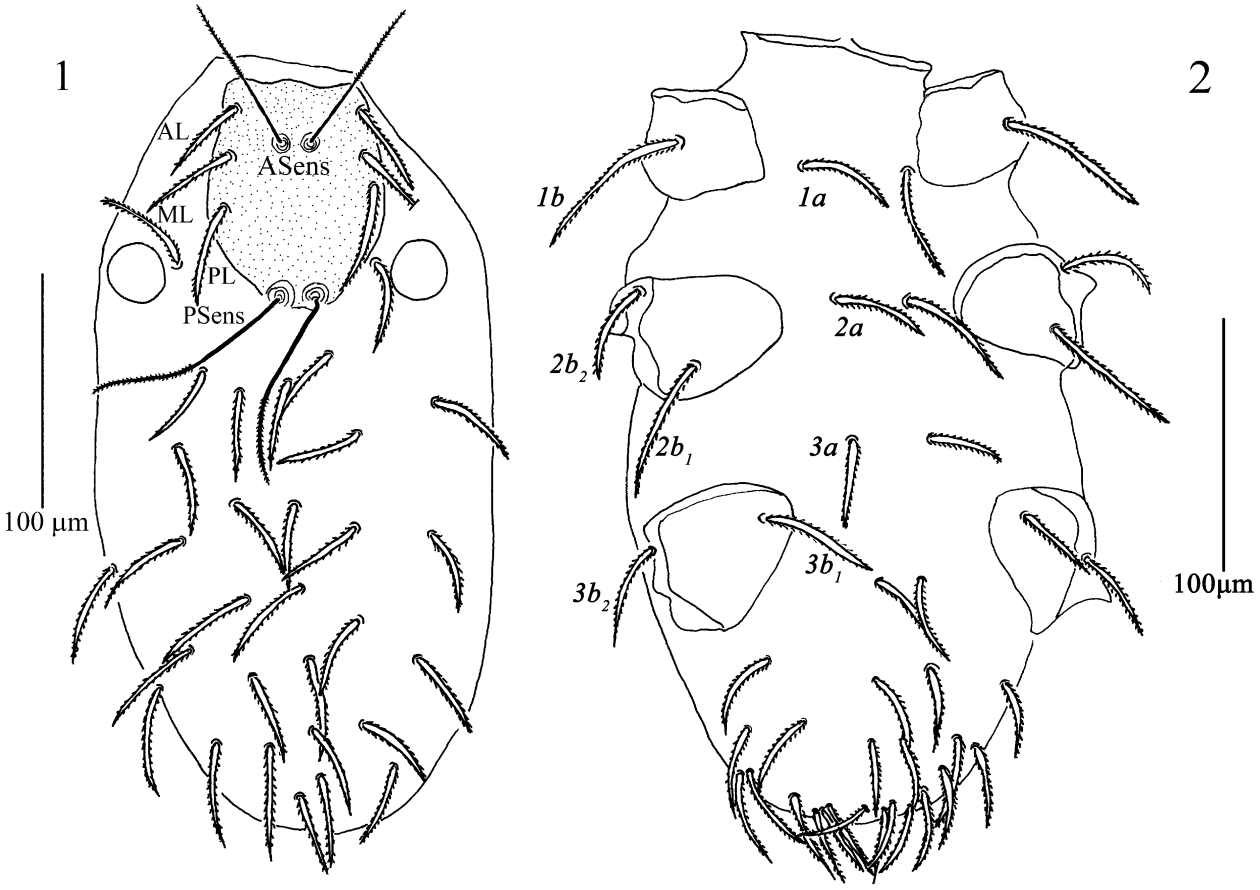
Four larvae (ZUTC15001a-d) on *Acrida oxycephala* (Pallas, 1771), 1♂; three larvae (ZUTC15001e-g) on *Calliptamus barbarus* (Costa, 1836), 1♀, two larvae (ZUTC15001h-i) on *C. barbarus*, 1♂, Shiraz–Bushehr Road, Amirkabir Blvd., Shiraz, Iran, (29° 37' 32.90" N, 52° 23' 23.45" E, 1776 m), 9 August 2020; 6 larvae (ZUTC15001j-o) on *C. barbarus* (Orthoptera: Acrididae), 2♀, Darengoon, Fars province, Iran, (29° 24' 52.36" N, 52° 20' 12.33" E, 1805m), 30 May 2020; one larva (ZUTC15001p) on *Calliptamus* sp., 1 imm., Tange Ghanimi, Sarvestan Kharameh Road, Fars province, Iran, (29° 22' 34.04" N, 53° 10' 33.79" E, 2209 m), 13 June 2021, col. N. Kiany and M. Kiany. Also, three additional larvae were examined from Tarbiat Modares University, Tehran, Iran (ACTMU) collection. Two larvae (ACTMU, no accession number), on Thrinchinae (Orthoptera: Pamphagidae), Sisab, Bojnurd, North Khorasan province, Iran, 37° 27' 16.9" N, 57° 39' 16.0" E, 25 June 2011; 1 larva on Gomphocerinae (Orthoptera: Acrididae), 23 May 2010, Gonabad, Khorasan Razavi province, Iran, (34° 06' 36.0" N, 58° 19' 12.0" E, 1622 m), collected by S. Ahmadi.

Specimen deposition

The mite specimens (ZUTC15001c–e, ZUTC15001g–i & ZUTC15001k–p) and grasshopper hosts are deposited in the Zoological Museum, Faculty of Biology, University of Tehran, Iran and the mite specimens (ZUTC15001a–b, ZUTC15001f, ZUTC15001j) are deposited in the Acarological Collection, Jalal Afshar Zoological Museum, Faculty of Agriculture, University of Tehran, Karaj, Iran.

Redescription

Larva (N = 20) – Dorsal surface of idiosoma with 25–39 barbed and pointed setae (fD), scutum pentagonal, uniformly punctate and longer than wide; lateral parts of anterior border slightly concave, median part convex; anteromedian border of scutum convex; scutum with two pairs of sensilla and three pairs of normal setae (scutalae). Scutalae (AL, ML and PL) barbed and pointed. Posterior sensilla (PSens) longer than anterior sensilla (ASens) (1.15–1.43 ×), ASens and PSens with short barbs in distal 1/3. One eye on each side of idiosoma, 30 in diameter (Fig. 1).



Figures 1–2. *Charletonia nazeleae* (larva collected from Zagros Mountains, ZUTC15001h) – 1. Dorsal view of idiosoma; 2. Ventral view of idiosoma.

Gnathosoma with one pair of smooth and parsnip-shaped galealae (*cs*) and two pairs of hypostomalae (*as*, *bs*); *as* smooth and *bs* barbed, *bs* > *as* (at least 2.5–3.6 ×) (Fig. 3). Palpfemur and palpgenu each with one barbed seta. Palptibia with three barbed setae. Palptarsus with five setae, one solenidion and one eupathidium. Palpal setal formula: 0-B-B-BBB$_2$-BBBNNωζ. Cheliceral basis punctate. Cheliceral blade with a subterminal tooth (like most of *Charletonia* species). Supracoxal seta peg-like (*ep*) 4–5 long (Fig. 3). Measurements are given in Table 1.

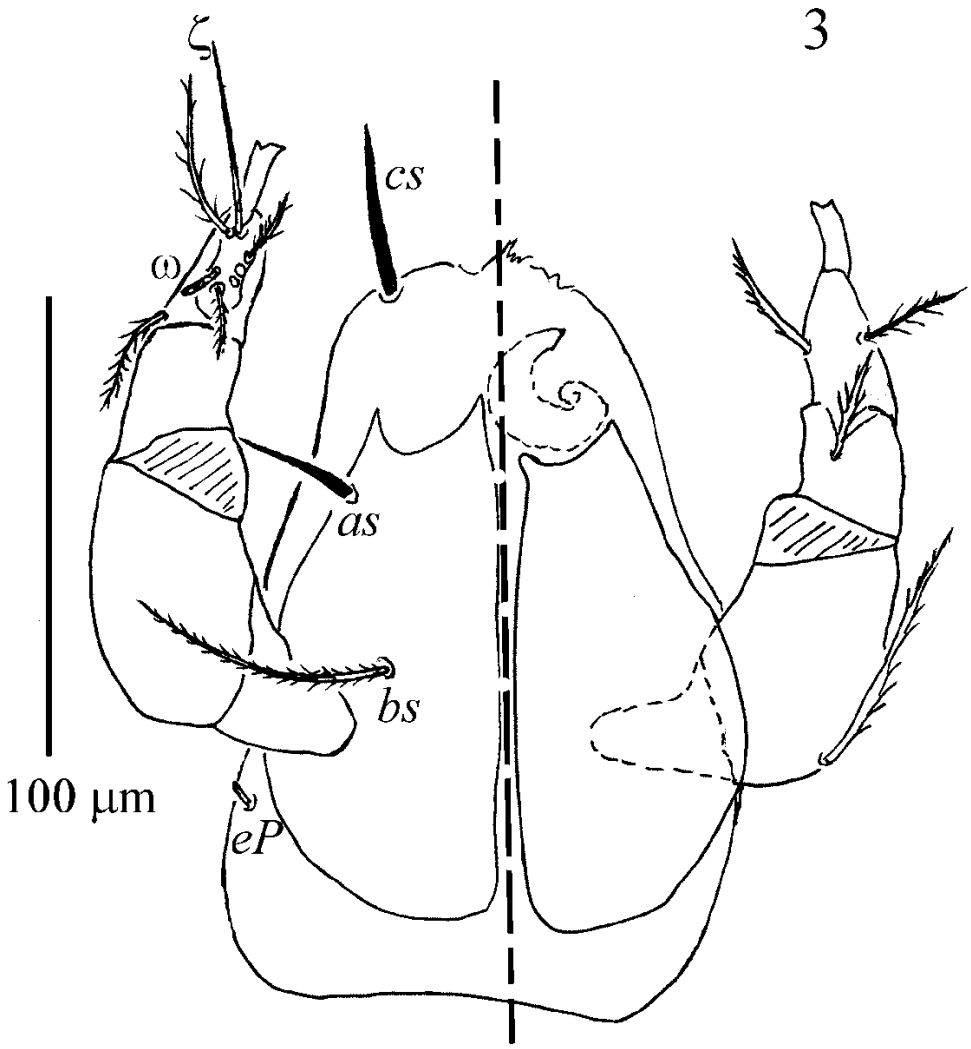


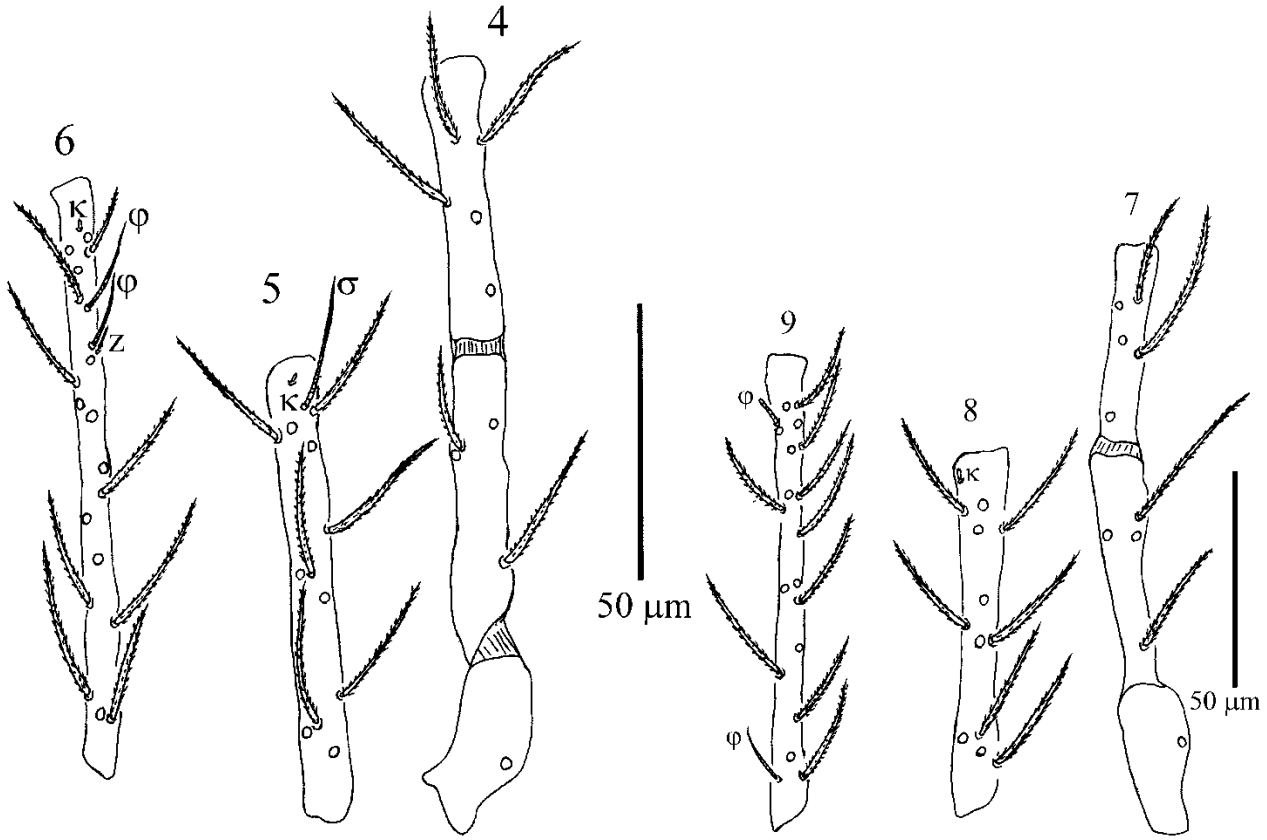
Figure 3. *Charletonia nazaleae* (larval holotype) – Ventral view (left) and dorsal view (right) of gnathosoma.

Ventral surface of idiosoma with 19–29 barbed and pointed setae behind coxae III (fV). Sternalae *1a* (between coxae I), *2a* (between coxae II) and *3a* (two setae between coxae II and III) barbed and pointed (Fig. 2); NDV = 37 + 26 = 63 (holotype). Coxa I with one seta (*1b*); coxae II and III, each with two setae (*2b*$_1$, *2b*$_2$; *3b*$_1$, *3b*$_2$). All coxalae barbed and pointed. Seta *lb* distinctly longer than setae *2b* and *3b* (Fig. 2). Coxae I with a peg-like supracoxal seta (*eI*) 4 long.

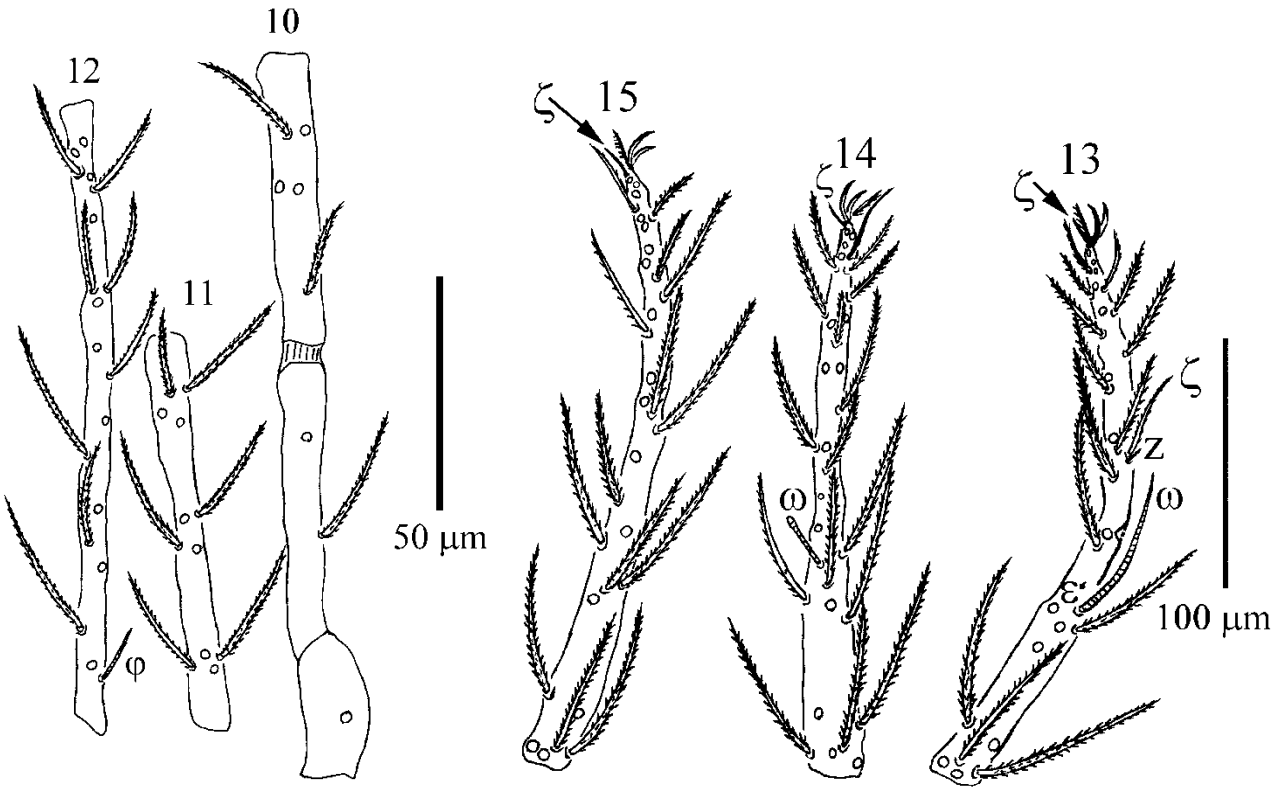
Leg segmentation formula: 7–7–7. Leg setal formula: Leg I: Ta – 1ω, 1ε, 2ζ, 1*z*, 29n (specimens c, L 29/R 28; k, L 28/R 28 and q, L 28); Ti – 2φ, 1κ, 1*z*, 18n; Ge – 1σ, 1κ, 12n (specimen b, L 12/R 13); TFe – 5n, BFe – 4n; Tr – 1n. Leg II: Ta – 1ω, 1ζ, 29n (specimens b & e, L 28/R 29); Ti – 2φ, 18n; Ge – 1κ, 12n (specimen i, L 11/R 12); TFe – 5n, BFe – 4n (specimen a, L 5/R 4); Tr – 1n. Leg III: Ta – 1ζ, 30n; Ti – 1φ, 18n (specimen c, L 18/R 17); Ge – 12n; TFe – 5n (specimen b, L 5/R 4), BFe – 2n; Tr – 1n (Figs. 4–12). All setae on legs barbed.

DISCUSSION

Charletonia nazeleae belongs to the *berlesiana* species group and *berlesiana* species subgroup of *Charletonia* which can be identified based on the following characters: two setae between coxae II–III; solenidion on Ge I placed in distal half of the segment (see Saboori *et al*. 2022).



Figures 4–9 *Charletonia nazaleae* (holotype larva) – 4. Tr-TFe I; 5. Ge I; 6. Ti I; 7. Tr-TFe II; 8. Ge II; 9, TiII.



Figures 10–15. *Charletonia nazaleae* (holotype larva) – 10. Tr-TFe III; 11. Ge III; 12. Ti III. 13. Ta I; 14. Ta II; 15. Ta III.

The new collected specimens show conformity with the type specimen by their morphological and meristic data. After the comparison of several specimens, it became clear that the usual state of the solenidion on Ge I was at the same level or distal to normal seta for most of the specimens collected from locations, except the specimens collected from Shiraz-Bushehr road (ZUTC15001 a-e & i). It isn't clear whether this is a taxonomic character for this species or it is an abnormality; further sampling in different locations will help reaching a final decision. The first description of *C. nazeleae* was in Farsi and the leg setal formula was incorrect, palptarsus formula and gnathosomal structure was indistinct and the biometry was based on one single specimen (only holotype) and had considerable errors in measurements of Ta I, Ta III, Ge I and Ge II; the holotype has legs only on one side of idiosoma and the legs of other side were ripped off, so there was a need for redescribing this species and providing more accurate data with newly obtained materials for better understanding the status of this species.

There are 13 species in *berlesiana* species subgroup (see Saboori *et al*. 2022): *C. berlesiana* (Paoli, 1937), *C. bucephalia* Beron, 1975, *C. blascoi* Southcott, 1993, *C. damavandica* Karimi Irvanlou, Kamali and Talebi, 2002, *C. kaliksti* Haitlinger, 2003, *C. kalithensis* Haitlinger, 2006, *C. samosensis* Haitlinger, 2006, *C. austisensis* Haitlinger, 2007, *C. behbahanensis* Haitlinger & Saboori, 2008, *C. talebii* Sedghi, Saboori & Hakimitabar, 2010, *C. behshahriensis* Hakimitabar & Saboori, 2014, *C. kosensis* Haitlinger & Šundić, 2016, *C. elbasani* Šundić, Haitlinger & Milošević, 2017.

Charletonia nazeleae differs from *C. kaliksti* by the status of two φ setae on Ti II with one proximal in *C. nazeleae* while in *C. kaliksti* both setae are placed on the distal half; from *C. talebii*, *C. elbasani*, *C. kosensis*, *C. austisensis*, *C. behshahriensis*, *C. blascoi* by longer Ti III (276–336 vs. < 180); from *C. damavandica* by longer SD (96–124 vs. 84–86), Ta I (190–216 vs. 116–149), Ti I (228–274 vs. 126–155), Ge I (173–216 vs. 109–129), Ta II (175–206 vs. 122–145), Ti II (204–254 vs. 126–151), Ge II (151–192 vs. 99–108), Ta III (190–226 vs. 137–158), Ti III (276–336 vs. 183–215), Ge III (170–206 vs. 105–125), galealae (*cs*) nude (vs. barbed); from *C. bucephalia* by longer Ta I (190–216 vs. 136–180), Ti I (228–274 vs. 143–190), Ge I (173–216 vs. 104–137), Ta II (175–206 vs. 130–172), Ti II (204–254 vs. 127–165), Ge II (151–192 vs. 92–125), Ta III (190–226 vs. 140–192), Ti III (276–336 vs. 180–231), Ge III (170–206 vs. 105–143), hypostomalae *bs* barbed (vs. nude); from *C. behbahanensis* by longer SD (96–124 vs. 90) AL (34–50 vs. 32), ML (41–53 vs. 30), PL (36–53 vs. 32), Psens (94–108 vs. 86), *1a* (48–58 vs. 44), GL (142–161 vs. 100), Ta I (190–216 vs. 156), Ti I (228–274 vs. 186), Ge I (173–216 vs. 154), Ta II (175–206 vs. 156), Ti II (204–254 vs. 168), Ge II (151–192 vs. 138), Ti III (276–336 vs. 228), Ge III (170–206 vs. 154); from *C. samosensis* by longer SD (96–124 vs. 84), ISD (67–84 vs. 60), ML (41–53 vs. 30), *1a* (48–58 vs. 34), *2a* (43–55 vs. 34), *1b* (60–79 vs. 56), GL (142–161 vs. 118), Ta I (190–216 vs. 126), Ti I (228–274 vs. 172), Ge I (173–216 vs. 148), Ta II (175–206 vs. 126), Ti II (204–254 vs. 142), Ge II (151–192 vs. 116), Ta III (190–226 vs. 146), Ti III (276–336 vs. 226), Ge III (170–206 vs. 144), solenidion on Ta I (ω) shorter (47–60 vs. 68), and hypostomalae *bs* barbed (vs. nude).

New host records

In this study, two new grasshopper hosts for this species were identified (*Calliptamus barbarus*, *Acrida oxycephala*). Hence, so far seven grasshopper species and additionally two unidentified species from two subfamilies (Thrinchinae of Pamphagidae and Gomphocerinae of Acrididae) have been identified as hosts of *C. nazaleae* namely: *C. barbarus* (Calliptaminae: Acrididae), *Heliopteryx humeralis* (Oedipodinae: Acrididae), *A. oxycephala* (Acridinae: Acrididae), *Ramburiella turcomana* (Gomphocerinae: Acrididae), *Dociostaurus* (*Stauronotulus*) *crassiusculus nigrogeniculatus* (Gomphocerinae: Acrididae), *Pyrgodera armata* (Oedipodinae: Acrididae), from Iran and *C. italicus* (Linnaeus, 1758) (Calliptaminae: Acrididae) from Croatia by Haitlinger (2004). The host specimens collected from Greece (Haitlinger 2003; 2006; Antonatos and Emmanouel, 2014) and Corsica (Haitlinger 2007), were unknown. Hence, so far, the species has been detected on two families and five subfamilies of the suborder Caelifera.

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REFERENCES

Ahmadi, S., Hajiqanbar, H., Saboori, A. & Hakimitabar, M. (2012) First record of the species *Charletonia dalegori* (Acari: Erythraeidae), ectoparasite of the short-horned grasshoppers from Asia. *In*: Sarafrazi, A., Asef, M.R., Mozhdehi, M., Mozhdehi, M., Solhjouy Fard, S. & Abdollahi, T. (Eds.), *Proceeding of the 20th Iranian Plant Protection Congress, 25–28 August 2012, University of Shiraz, Shiraz, Iran*, p. 416.

Antonatos, S.A. & Emmanouel, N. G. (2014) A qualitative study of Eutrombidiidae and Erythraeidae, ectoparasites on Orthoptera, in two grassland areas of Attica–Greece. *International Journal of Acarology*, 40(1): 23–30.

Beron, P. (1975) Erythraeidae (Acariformes) larvaires de Bulgarie. *Acta Zoologica Bulgarica*, 1(1): 45–75.

Haitlinger, R. (2003) Three new species of larval *Charletonia* Oudemans, 1910 (Acari: Prostigmata: Erythraeidae) and the first record of *Charletonia krendowskyi* (Feider, 1954) from Rhodes, Greece. *Systematic Parasitology*, 56(1): 49–55.

Haitlinger, R. (2004) New records of mites (Acari: Prostigmata: Erythraeidae, Trombidiidae, Eutrombidiidae) from Croatia, with descriptions of three new species. *Natura Croatica*, 13(2): 143–160.

Haitlinger, R. (2006) New records of mites (Acari: Prostigmata: Erythraeidae, Trombidiidae) from Samos, Greece, with descriptions of six new species. *Systematic and Applied Acarology*, 11(1): 107–123. DOI: 10.11158/saa.11.1.12

Haitlinger, R. (2007) New records of mites from Corsica and Sardinia, with descriptions of five new species (Acari: Prostigmata: Erythraeidae, Trombidiidae, Eutrombidiidae). *Genus*, 18(3): 529–543.

Haitlinger, R. & Saboori, A. (2008) *Charletonia behbahanensis* sp. n. and *C. bojnordensis* sp. n. from Iran (Acari: Prostigmata: Erythraeidae). *Zeszyty Naukowe Uniwersytetu Przyrodniczego we Wroclawiu: Biologia i Hodowla Zwierzat*, 56(566): 73–80.

Haitlinger, R. & Šundić, M. (2016) *Charletonia kosensis*, a new species from Kos, Greece, with notes on *C. austisensis* Haitlinger, 2007 (Acari: Erythraeidae). *Systematic and Applied Acarology*, 21(8): 1009–1016.

Hakimitabar, M. & Saboori, A. (2022) A review of *Charletonia* Oudemans (Trombidiformes: Erythraeidae) based on the larval stage. *Systematic and Applied Acarology*, 27(6): 103–1056.

Hakimitabar, M., Saboori, A., Samanipour, M. & Jalalizand, A. (2014) *Charletonia behshahriensis* (Acari: Erythraeidae) from Iran with a key to species with two intercoxalae II and III. *International Journal of Acarology*, 40(8): 595–604. DOI: 10.1080/01647954.2014.969769

Karimi Iravanlou, J.S., Kamali, K. & Talebi, A. (2002) Three new species of larval Callidosomatinae (Acari: Prostigmata: Erythraeidae) parasitic on short horned grasshoppers (Orthoptera: Acrid-

idae) from Varamin and Karaj region of Iran. *Applied Entomology and Phytopathology*, 69(2): 129–153 (In persian with English abstract).

Saboori, A., Azimi, S. & Shirdel, D. (2012) A new species of *Charletonia* (Acari: Erythraeidae) described from larvae ectoparasitic on cercopids (Hemiptera: Cercopidae) from Iran. *Persian Journal of Acarology*, 1(1): 33–40. DOI: 10.22073/pja.v1i1.9929

Saboori, A., Khaustov, A., Hakimitabar, M. & Hajiqanbar, H. (2009) A new genus and species of larval Erythraeinae (Acari: Prostigmata: Erythraeidae) from Ukraine and the taxonomic state of *Zhangiella*. *Zootaxa*, 2203(1): 22–30. DOI: 10.11646/zootaxa.2203(1): 22–30

Sedghi, A., Ravan, S., Saboori, A., Hakimitabar, M. & Akrami, M.A. (2010) *Charletonia talebii* n. sp. from Iran (Acari: Prostigmata: Erythraeidae). *Acarologia*, 50(3): 335–341. DOI: 10.1051/acarologia/20101976

Southcott, R. (1991) A further revision of *Charletonia* (Acarina: Erythraeidae) based on larvae, protonymphs and deutonymphs. *Invertebrate systematics*, 5(1): 61–131.

Southcott, R. (1993) A new larval *Charletonia* (Acarina: Erythraeidae) from Sapin. *Acarologia*, 34(1): 51–56.

Šundić, M., Haitlinger, R., & Milošević, D. (2017) *Charletonia elbasani*, a new species from Albania (Acari: Erythraeidae), with notes on *C. kalithensis* Haitlinger, 2006. *Acarologia*, 57(3): 563–569.

Walter, D.E. & Krantz, G.W. (2009) Collecting, rearing, and preparing specimens. *In:* Krantz, G.W. & Walter, D.E. (Eds.), *A manual of Acarology*. 3rd edition. Texas Tech University Press, pp. 83–96.

Wohltmann, A., Gabryś, G. & Mąkol, J. (2007) Acari: Terrestrial Parasitengona inhabiting transient biotopes. *In*: Gereke, R. (Ed.), *Süßwasserfauna von Mitteleuropa, Vol. 7/2–1 Chelicerata: Araneae/Acari I*. Springer, Italy, pp. 158–240**.**

Table 1. Metric and meristic data for *Charletonia nazeleae* in the present study (a–p); larvae from Sisab (q–r) and Gonabad (s) region; holotype (t).

Character	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
SD	115	113	110	113	–	108	113	108	115	115	108	96	110	113	110	110	110	112	110	124
W	89	101	91	89	101	86	89	86	94	91	96	67	82	89	98	84	89	94	91	107
AW	65	67	65	67	84	67	62	62	65	65	70	55	62	70	62	62	65	65	60	65
MW	70	77	67	72	60	67	67	67	72	72	72	58	65	72	67	72	72	67	67	77
PW	72	67	74	82	62	74	72	74	79	77	79	65	72	77	72	74	79	77	74	89
AA	12	14	14	14	14	14	12	12	14	14	17	12	12	14	14	14	17	12	12	14
SB	17	19	17	19	14	17	17	17	19	17	19	17	17	19	17	19	22	19	17	19
ISD	82	79	74	84	72	74	77	74	79	82	77	67	79	82	84	82	82	77	77	82
AP	43	50	46	50	46	48	48	48	50	50	48	41	41	43	43	48	48	46	48	53
AL	50	43	48	41	43	43	43	41	48	46	46	34	43	41	43	38	41	48	50	46
ML	43	50	43	41	48	48	48	48	50	46	46	41	41	50	46	41	46	53	46	41
PL	48	43	46	43	36	46	48	43	48	48	48	38	53	53	43	41	46	50	43	41
ASens	77	82	79	79	74	74	72	77	79	84	79	74	79	79	72	77	74	72	70	77
PSens	98	94	108	96	98	98	84	101	108	106	106	96	103	101	96	96	96	103	96	94
DS	48	41	48	43	41	41	41	43	43	48	48	41	41	43	41	41	46	48	41	48
1a	50	50	58	50	50	53	48	53	50	55	53	50	50	50	48	50	53	53	53	55
1b	74	70	79	70	60	74	62	72	62	74	70	65	62	67	65	62	67	72	67	67
2a	50	48	55	48	43	48	48	50	46	48	48	43	46	–	0	50	46	50	48	53
2b₁	65	58	60	70	50	60	60	60	60	62	60	53	55	62	65	65	60	62	60	58
2b₂	50	46	50	48	41	50	46	43	48	48	50	41	43	48	50	48	55	50	48	48
3b₁	62	48	62	–	43	55	50	62	55	55	58	48	48	53	50	53	58	55	55	50
3b₂	43	41	50	–	48	48	46	43	48	43	43	38	43	46	48	48	48	50	46	41
GL	149	154	154	151	–	156	158	151	–	154	158	142	149	–	–	149	161	156	154	151
cs	36	34	36	36	36	36	36	36	36	34	36	31	36	36	36	–	36	34	34	36
as	22	19	24	22	17	19	17	24	–	22	22	22	19	17	19	17	–	19	–	17
bs	55	60	62	55	53	62	62	60	–	65	62	55	55	62	55	50	60	55	53	46
ζ₁ Ta I	17	17	17	–	17	14	14	14	12	17	14	17	14	14	14	14	15	15	12	14
ζ₂ Ta I	34	29	34	–	26	26	31	26	22	29	29	26	26	29	26	29	31	30	25	31
ω Ta I	53	50	55	–	50	50	53	50	58	50	48	48	48	48	55	50	47	60	59	53
φ₁ Ti I	48	48	53	48	43	41	50	43	–	41	38	38	46	53	50	–	45	53	51	38
φ₂ Ti I	34	36	43	38	41	36	36	36	41	34	36	34	34	41	41	31	36	42	40	36
K Ti I	5	7	7	7	7	5	5	5	5	5	5	7	5	5	7	7	5	5	5	7
σ Ge I	50	50	58	48	46	48	53	48	48	48	50	48	48	55	48	48	46	49	50	48
κ GeI	7	7	7	5	7	5	7	5	7	5	7	5	7	7	7	5	7	7	6	5
ζ₁ Ta II	14	17	17	17	14	19	17	17	14	19	17	14	14	17	17	17	12	16	16	12
ζ₂ Ta II	24	24	24	24	24	19	24	24	24	24	24	24	19	22	24	24	18	24	23	22
ω Ta II	22	24	24	17	22	14	24	22	19	22	24	19	17	19	24	22	22	22	23	21
φ₁ Ti II	19	19	17	17	17	17	19	19	19	17	17	19	17	17	–	19	19	19	20	14
φ₂ Ti II	34	31	38	34	29	26	36	29	29	38	29	29	34	34	29	26	30	32	32	31
κ Ge II	7	7	7	7	7	7	7	5	7	7	7	7	7	7	7	7	7	7	–	5
ζ Ta III	17	14	17	17	12	14	14	14	17	17	17	17	17	14	14	17	14	17	13	14
φ Ti III	29	29	36	31	22	26	–	26	36	29	26	22	29	36	29	29	25	33	33	26
Ta I (L)	214	204	206	–	206	209	199	207	204	209	197	19	216	214	214	199	190	209	209	216
Ti I	264	274	259	269	240	254	254	264	252	262	254	22	242	269	259	250	257	257	264	259
Ge I	216	192	194	192	187	202	199	197	204	194	199	17	187	204	199	190	204	199	197	192
TFe I	132	125	120	125	115	118	130	122	125	113	120	10	120	132	125	118	132	122	125	122
BFe I	134	137	132	132	125	137	132	139	134	132	130	11	127	139	137	132	142	125	134	132
Tr I	60	65	67	72	58	70	65	67	65	67	72	55	60	72	65	67	72	62	60	70
Cx I	55	67	60	79	74	74	82	60	82	60	55	65	79	79	82	77	60	58	60	65

Table 1. Continued.

Character	a	b	c	d	e	f	g	h	i	j	k	l	m	n	o	p	q	r	s	t
Leg I	1075	1064	1038	–	1005	1064	1061	1056	1066	1039	1027	930	1031	1109	1081	1033	1057	1032	1049	1056
Ta II (L)	190	192	194	192	190	197	192	194	204	197	197	175	197	204	194	185	190	197	204	206
Ti II	235	226	235	226	216	226	226	233	228	235	209	204	216	254	228	216	228	223	216	228
Ge II	180	168	170	168	163	175	168	170	168	173	166	151	163	192	180	163	187	173	163	168
TFe II	103	101	101	106	96	106	108	103	103	106	106	96	108	115	103	94	115	106	106	101
BFe II	125	120	122	132	110	115	120	122	120	127	120	110	122	130	122	149	120	113	120	118
Tr II	60	65	62	79	62	70	67	67	77	65	65	74	60	70	70	58	65	60	65	70
Cx II	84	72	77	84	74	79	84	79	84	84	82	72	77	72	79	82	77	77	77	79
Leg II	911	944	961	968	911	951	965	968	984	987	945	970	943	1037	976	947	982	949	951	970
Ta III (L)	211	206	216	216	204	214	211	216	223	209	214	190	216	226	209	204	209	216	216	223
Ti III	317	300	307	307	310	312	312	305	307	322	310	276	300	336	324	295	327	300	300	310
Ge III	204	185	192	194	180	194	199	190	192	192	190	170	190	204	199	192	206	197	199	192
TFe III	154	134	139	139	134	137	146	137	144	137	137	125	144	156	144	132	161	142	144	132
BFe III	158	146	151	156	137	156	156	159	149	163	151	137	149	163	156	156	154	144	156	154
Tr III	72	70	67	79	67	77	72	72	74	72	74	65	67	72	72	72	74	62	62	72
Cx III	72	82	74	84	72	84	84	77	72	89	79	77	79	96	74	86	89	70	77	74
Leg III	1188	1123	1146	1175	1104	1174	1180	1156	1161	1184	1155	1040	1145	1253	1178	1137	1220	1131	1154	1157
IP	3174	3131	3145	-	3020	3189	3206	3180	3211	3210	3127	2940	3119	3399	3235	3117	3259	3112	3154	3183
fD	39	28	38	–	39	25	–	30	–	38	–	–	36	–	–	36	30	30	30	37
fV	19	26	28	–	19	25	–	26	–	28	–	–	20	–	–	29	–	22	22	26

Ch.: character

Table 2. Position of solenidion on Ge I; in the present study (a–p); larvae from Sisab (q–r) and Gonabad (s) region; holotype (t).

Character		a	b	c	d	e	f	g	h	i	J	k
Position of Solenidion on Ge I	**R**	proximal	proximal	same level	–	proximal	slightly distal	same level	slightly distal	proximal	slightly distal	same level
	L	same level	same level	proximal	proximal	same level	slightly distal	same level	slightly distal	same level	same level	same level
Host		*Acrida oxycephala*	*A. oxycephala*	*A. oxycephala*	*A. oxycephala*	*Calliptamus barbarus*	*C. barbarus*	*C. barbarus*	*C. barbarus*	*C. barbarus*	*C. barbarus*	*C. barbarus*

Character		l	m	n	o	p	q	r	s	t
Position of Solenidion on Ge I	**R**	same level	slightly distal	same level	same level	slightly distal	same level	same level	same level	slightly distal
	L	proximal	slightly distal	slightly distal	same level	slightly distal	slightly distal	same level	slightly distal	–
Host		*C. barbarus*	*C. barbarus*	*C. barbarus*	*C. barbarus*	*Calliptamus* sp.	Thrinchinae (Pamphagidae)	Thrinchinae (Pamphagidae)	Gomphocerinae (Acrididae)	*Heliopteryx humeralis*

R: right; L: left

اطلاعاتی در مورد گونهٔ *Charletonia nazeleae* (Acari: Erythraeidae)

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چکیده

لاروهای *Charletonia nazeleae* Karimi Iravanlou, Kamali & Talebi پیش از این، از کرج، استان البرز، ایران جمع‌آوری شده و انگل بیرونی دو گونهٔ مختلف ملخ شاخک کوتاه بودند. در این مطالعه، پس از بررسی نمونه‌های جدید جمع‌آوری شده از کوه‌های زاگرس، استان فارس، ایران، داده‌های ریخت‌شناسی و مریستیک جدید ارایه و تصحیح توصیف پیشین این گونه، با بازنگری نمونهٔ تایپ و افزودن به داده‌های پیشین ارایه شد. دو میزبان جدید برای این کنه نیز شناسایی شدند.

واژگان کلیدی: Acrididae؛ بیومتری؛ ایران؛ Parasitengona؛ Trombidiformes.

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