

## Article

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### A new species of *Cunaxoides* (Acari: Trombidiformes: Cunaxidae) from Iran

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### Abstract

A new species of *Cunaxoides*, *C. shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.**, is described from soil, humus and moss from northern Iran. A key to the *Cunaxoides* species of Iran is also provided.

**Key words:** Bdelloidea; Cunaxoidinae; predatory mites; Prostigmata; systematics.

### Introduction

Mites of the family Cunaxidae are cosmopolitan predators that occur in soil, litter, moss, plants and stored products (Zhang 2003). Many cunaxids prey on phytophagous insects and mites. Ewing and Webster (1912) referred to *Cunaxoides parvus* (Ewing) as an enemy of the oyster-shell scale (*Lepidosaphes ulmi* (Linnaeus)) on apples, while *Cunaxoides oliveri* (Schruft) was observed preying on the eriophyid mite *Calepitrimerus vitis* (Can.) on grape vines (Walter *et al.* 2009).

*Cunaxoides* Baker and Hoffmann, 1948 includes a total of 22 species from different continents (Den Heyer and Hernandez 2015; Skvarla *et al.* 2014). According to Den Heyer *et al.* (2013) two species, *C. decastroae* Den Heyer, 2013 and *C. lootsi* Den Heyer, 2013 were described from Iran. Also, Kamali *et al.* (2001) in “*A catalog of mites & ticks (Acari) of Iran*” refer to *C. croceus* (Koch, 1838) from Hamedan and Mazandaran Provinces. In this paper, a new species, *Cunaxoides shahriari* **sp. nov.**, is described from Iran.

### Material and methods

Samples of soil and rotten leaves were taken from East Azerbaijan and Mazandaran Provinces. Mites were extracted using a Berlese-Tullgren funnel and specimens were collected in AGA solution (Smiley 1992). Collected specimens were cleared in Nesbitt's fluid and mounted in Hoyer's medium (Walter and Krantz 2009). They were examined under an interference contrast (Nikon, Eclipse i80) and a phase contrast microscope (Leica, DMLB). Illustrations were made with the aid of a drawing tube attached to the phase contrast microscope. Measurements were taken with a graded ocular. Length of gnathosoma was measured from its base to the tip of the subcapitulum, length of idiosoma

from the suture between the gnathosoma and idiosoma to the posterior margin of the idiosoma, width of the idiosoma at its broadest level and leg length from the ventral insertion of coxa to base of pretarsus. The setal nomenclature of Den Heyer and Castro (2008) is followed for the idiosoma except for the propodosomal setae, which follows the notation of Fisher *et al.* (2011); leg chaetotaxy follows that of Den Heyer (1981). The abbreviations of setal names are as follows: Prodorsal setae: anterior trichobothria (*at*), posterior trichobothria (*pt*), lateral proterosomal setae (*lps*), median proterosomal setae (*mps*). Hysterosomal setae: internal humerals (*c<sub>1</sub>*), external humerals (*c<sub>2</sub>*), internal dorsals (*d<sub>1</sub>*), internal lumbals (*e<sub>1</sub>*), internal sacrals (*f<sub>1</sub>*), external sacrals (*f<sub>2</sub>*), internal clunals (*h<sub>1</sub>*), external clunals (*h<sub>2</sub>*). Anal region: postanals (*ps*); genital region: aggenital setae (*ag*), genital setae (*g*). Hypognathal setae (*hg*). Leg setae: attenuate (acute) solenidion (*asl*), blunt-pointed rod-like solenidion (*bsl*), peg-like seta (*pe*), trichobothria (*T*), simple tactile seta (*sts*), macroseta (*ms*), duplex setae (*dxs*), famulus (*fam*), dorsoterminal solenidion (*dtsl*), terminal solenidion (*tsl*). All measurements are given in micrometers for the holotype and paratypes (in parentheses).

## Results

### Subfamily Cunaxoidinae Den Heyer, 1978

#### Genus *Cunaxoides* Baker and Hoffmann, 1948

Type species: *Eupalus croceus* Koch, 1838

Neotype designation: *Cunaxoides croceus* (by Den Heyer, 1978)

#### *Cunaxoides shahriari* Bagheri, Paktinat-Saeij and Castro sp. nov. (Figs. 1–11)

##### Description

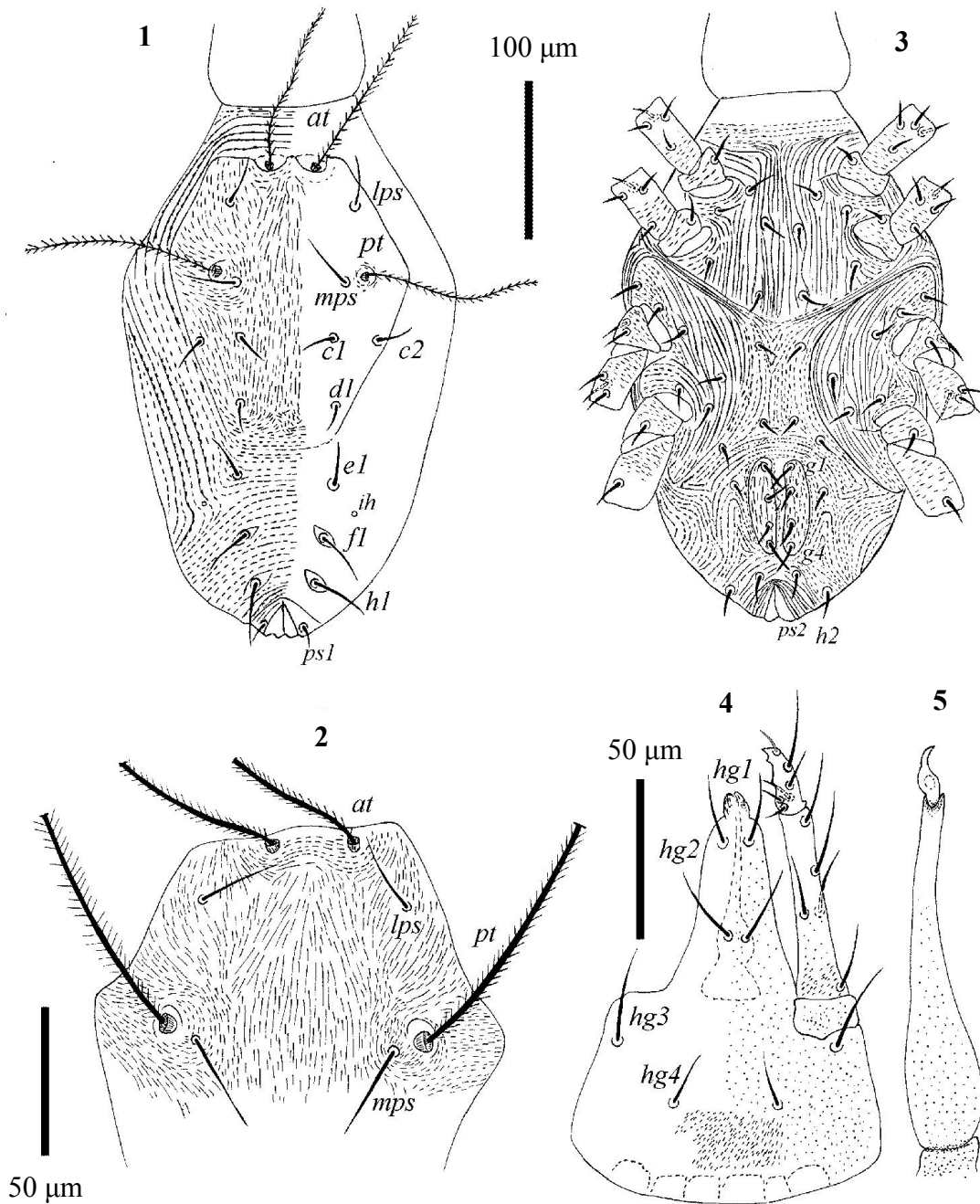
*Female* (n = 4) – Length of idiosoma 320 (301–310); width of idiosoma 204 (191–200). Length of legs I–IV: 256 (234–242); 226 (221–232); 238 (234–237); 270 (262–274). Length of tarsi I–IV: 79 (78–80); 68 (70–71); 66 (68–70); 74 (75–78).

*Dorsum* (Figs. 1–2, 10–11). Dorsal shield visible and sclerotized with diffuse lobed striae longitudinally arranged (Figs. 2, 10–11), extending from anterior margin of propodosoma to hysterosoma between setae *d<sub>1</sub>* and *e<sub>1</sub>*, and carrying sensillae *at*, *pt* and setae *lps*, *mps*, *c<sub>1</sub>*, *c<sub>2</sub>*, *d<sub>1</sub>*. Sensillae (*at* and *pt*) setose. Lyrifissures *ih* laterad of an imaginary line between *e<sub>1</sub>* and *f<sub>1</sub>*. Lengths of dorsal setae: *at* 107 (102–104), *lps* 32 (27–30), *pt* 121 (117–120), *mps* 37 (33–37), *c<sub>1</sub>* 18 (19–21), *c<sub>2</sub>* 19 (21–23), *d<sub>1</sub>* 21 (21–22), *e<sub>1</sub>* 23 (22–26), *f<sub>1</sub>* 33 (32–33), *h<sub>1</sub>* 41 (38–41), *h<sub>2</sub>* 17 (20–21). Distances between setae: *at*–*at* 29 (25–28); *at*–*lps* 21 (27–32); *lps*–*lps* 74 (70–72); *pt*–*pt* 91 (86–90); *pt*–*mps* 9 (7–8); *mps*–*mps* 69 (68–71); *mps*–*c<sub>1</sub>* 35 (30–34); *c<sub>1</sub>*–*c<sub>1</sub>* 57 (50–53); *d<sub>1</sub>*–*d<sub>1</sub>* 60 (55–58); *e<sub>1</sub>*–*e<sub>1</sub>* 60 (50–54); *f<sub>1</sub>*–*f<sub>1</sub>* 47 (40–46); *h<sub>1</sub>*–*h<sub>1</sub>* 36 (35–37).

*Venter* (Fig. 3). Propodosomal coxal plates completely fused medially. Integument with a one pair of propodogastral setae and three pairs of hystergastral setae. One pair of paragenital setae occur laterad to the genital valves. Genital valves with longitudinal rows of papillae; Genital setae *g<sub>1</sub>* and *g<sub>4</sub>* longer than *g<sub>2</sub>* and *g<sub>3</sub>*; longitudinally aligned.

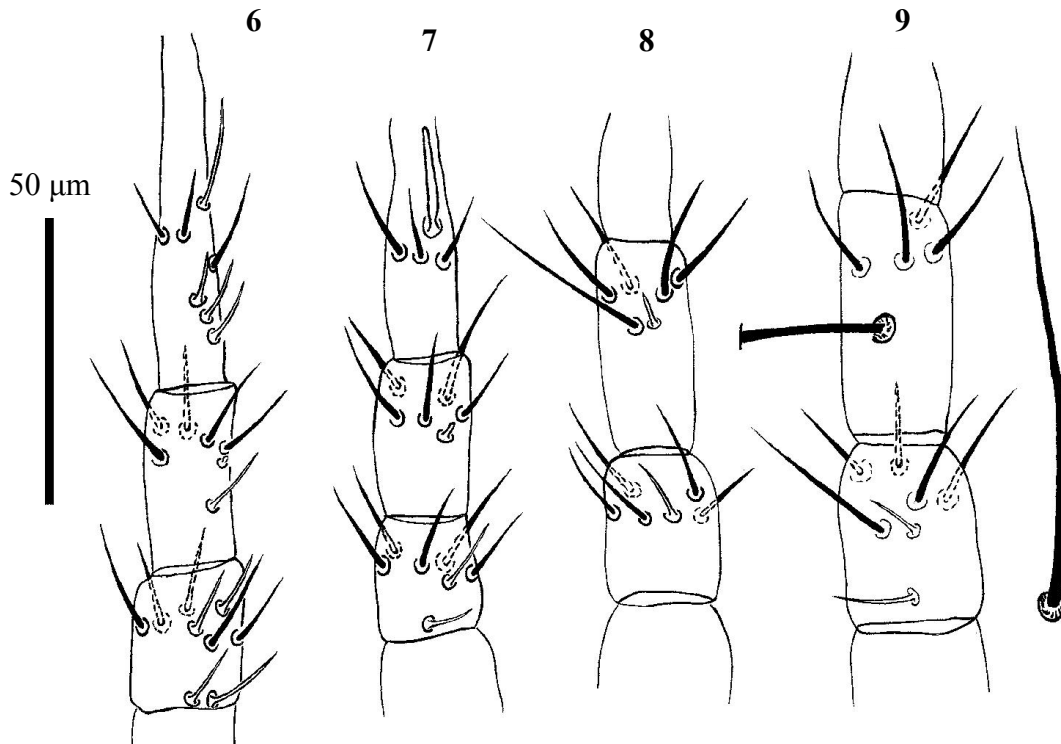
*Gnathosoma* (Figs. 4, 5). Hypognathum 124 (120–127) with 4 pairs of *hg*-setae, *hg<sub>1</sub>* 20 (18–20), *hg<sub>2</sub>* 25 (26–30), *hg<sub>3</sub>* 32 (31–35) and *hg<sub>4</sub>* 21 (21) and 2 pairs of adoral setae. Most of the ventral surface of subcapitulum punctated and with lobed striae posterior to setae *hg<sub>4</sub>* (Fig. 4). Three-jointed palp, 92 (86–90) long. Trochanter and base of

femorogenu papillated. Trochanter without setae; femorogenu, 5 sts; tibiotarsus, 5 sts, a terminal solenidion and a terminal claw (Fig. 4). Chelicera (Fig. 5) 131 (123–126) long.



**Figures 1–5.** *Cunaxoides shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.** (female) – 1. Dorsal view of idiosoma; 2. Dorsal view of propodosoma; 3. Ventral view of idiosoma; 4. Gnathosoma: Subcapitulum (Ventral view), Palp (Dorsal view), 5. Chelicera.

*Legs* (Fig. 6–9). Trichobothria of tibiae IV 80 (79). Chaetotaxy as follows: coxae I–IV, 1peg, 3-1-3-3sts; trochanters I–IV, 1-1-2-1sts; basifemora I–IV, 4-4-3-1sts; telofemora I–IV, 4-4-3-2sts; genua I–IV, 4asl, 5sts-2asl, 5sts-1asl, 5sts-2asl, 5sts; tibiae I–IV, 1asl, 1peg, 5sts-1bsl, 5sts-1bsl, 5sts-1T, 4sts; tarsi I–IV, 4asl, 1fam, 1dtsl, 2tsl, 19sts-1bsl, 1dtsl, 1tsl, 16sts-1tsl, 12sts-13sts.



**Figures 6–9.** *Cunaxoides shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.** (female) – 6. Leg I; 7. Leg II; 8. Leg III; 9. Leg IV.

*Immature stages and male* – Unknown.

#### Remarks

The new species resembles *Cunaxoides croceus* (Koch, 1838); *C. decastroae* Den Heyer *et al.*, 2013; *C. kielczewskii* Michocka, 1982 and *C. paracroceus* Sionti and Papadoulis, 2003, in having dorsal shield with lobed striae and proterosomal and hysterosomal shields fused. However it can be distinguished by 1) having a dorsal shield visible and sclerotized (not be visible or sclerotized in *C. kielczewskii*); 2) having the striae on the dorsal shield longitudinally arranged and more widely spaced (Figs. 10–11) compared to that of *C. croceus* (Figs. 12–13); 3) the combination of characters provided in Table 1.

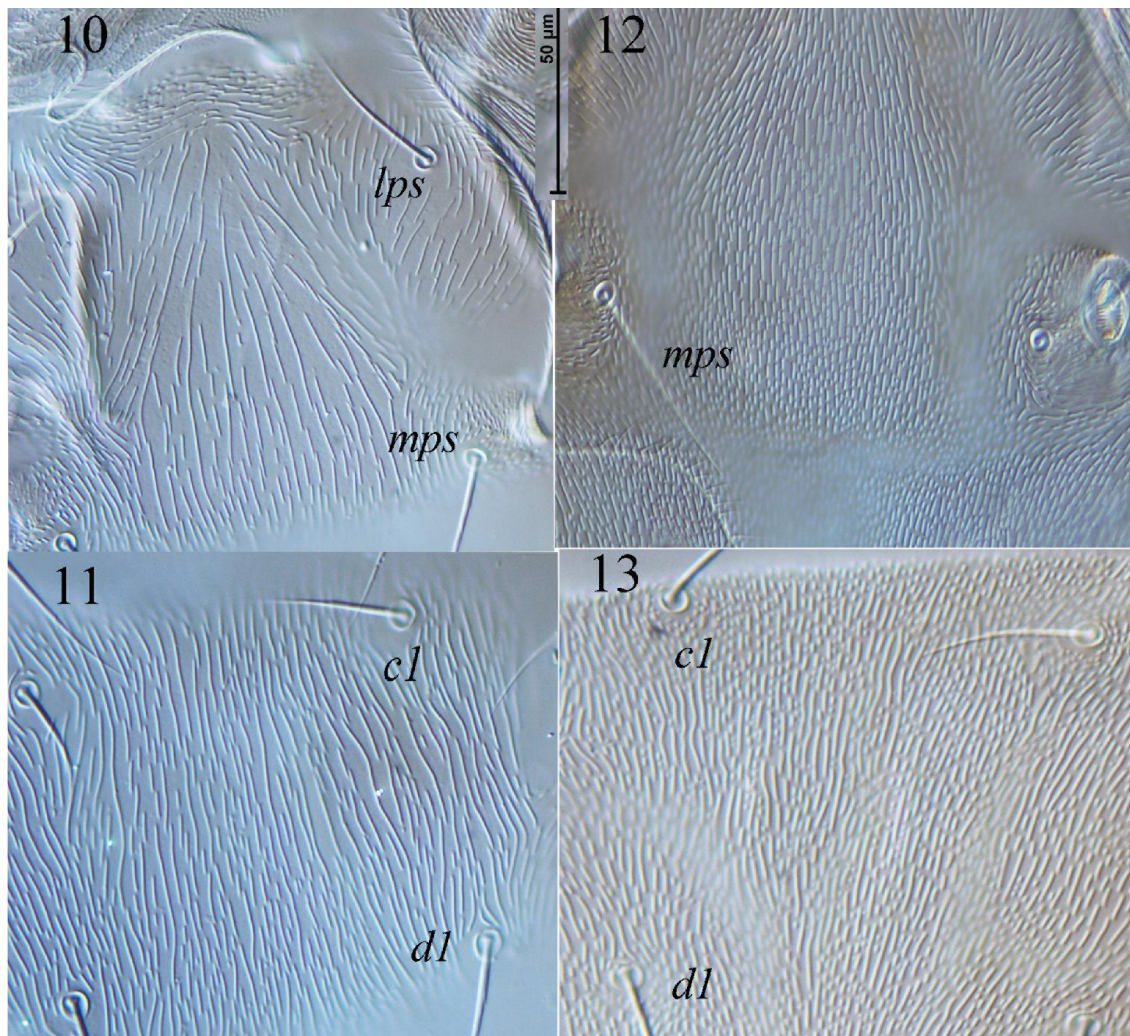
#### Etymology

The name “*shahriari*” is named in memory of “Mohammad Hossein Behjat Tabrizi, Shahriar” (1906–1988) who was a notable Iranian poet of Iranian Azerbaijani origin, who wrote in Azeri, Turkish and Persian.

#### Type materials

Holotype female and one paratype female were collected from soil and rotten leaves under beech trees, 12 August 2015, Alasht region, Savadkooch city, Mazandaran Province, Iran, by Saeid Paktinat-Saeij. Two paratype females were collected from soil and rotten apple leaves, 10 September 2014, Yanekh village, Hashtroud city, East Azerbaijan Province, Iran, by Mohammad Bagheri. Holotype and two paratype females deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran. One paratype female is deposited in the

Acarological Collection, Jalal Afshar Zoological Museum, Department of Plant Protection, Faculty of Agriculture, University of Tehran, Karaj, Iran.



**Figures 10–13.** Left (10, 11) – *Cunaxoides shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.** (female) – (Dorsal striation pattern of the propodosoma between *cl*–*dl*); Right (12, 13) – *Cunaxoides croceus* (Koch, 1938) (female) – (Dorsal striation pattern of the propodosoma between *cl*–*dl*).

#### Key to the Iranian species of *Cunaxoides* Baker and Hoffmann (female)

1. Dorsal shield entire; genu IV with two asl ..... 2
- Dorsal shield divided; genu IV with one asl ..... *Cunaxoides lootsi* Den Heyer
2. Dorsal shield complemented with setae *cl*, *dl* and *c2* ..... 3
- Dorsal shield complemented with setae *cl*–*e1* and *c2* ..... *C. decastroae* Den Heyer
3. Dorsal shield with normal striae; gnathosoma with fine striae ..... *C. croceus* (Koch)
- Dorsal shield with diffuse striae; gnathosoma with punctated and lobed striae ..... *C. shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.**

**Table 1.** Comparative characters between *Cunaxoides shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.** and closely related species.

Species	Characters					
	Dorsal pattern	Gnathosoma	Size <i>lps</i> and <i>mps</i>	Situation of setae <i>c2</i> , <i>d1</i> and <i>e1</i>	Basifemur II	Number of Solenidia on Genu IV
<i>C. shahriari</i> Bagheri <i>et al.</i> <b>sp. nov.</b>	Diffuse striae	Punctated and lobed striae	<i>mps</i> longer than the <i>lps</i>	<i>c2</i> and <i>d1</i> on dorsal shield, <i>e1</i> on integument	4	2
<i>C. croceus</i>	Normal parallel striae	Fine striae	equal	<i>c2</i> and <i>d1</i> on dorsal shield, <i>e1</i> on integument	4	2
<i>C. decastroae</i>	Normal parallel striae	Papillate	<i>mps</i> longer than the <i>lps</i>	On dorsal shield	3	2
<i>C. kielczewski</i>	Diffuse striae	-	<i>mps</i> longer than the <i>lps</i>	On integument	-	-
<i>C. paracroceus</i>	Normal striae, with U-shaped striae between <i>mps</i> and <i>c1</i>	Fine striae	<i>mps</i> longer than the <i>lps</i>	<i>c2</i> and <i>d1</i> on dorsal shield, <i>e1</i> on integument	4	1

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## گونه جدیدی از *Cunaxoides* (Acari: Trombidiformes: Cunaxidae) از ایران

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### چکیده

گونه جدیدی از *Cunaxoides*، *C. shahriari* Bagheri, Paktinat-Saeij and Castro **sp. nov.**

از خاک، خاکبرگ و خزّه از شمال و شمال‌غرب ایران، توصیف می‌شود. کلید گونه‌های *Cunaxoides* ایران نیز تهیه شده است.

واژگان کلیدی: بالانواده Bdelloidea؛ زیرخانواده Cunaxoidinae، کنه‌های شکارگر، زیرراسته پیش‌استیگمایان، آرایه‌شناسی.

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