

CHEYLOSTIGMAEUS HASSANPOURI N. SP., A NEW SPECIES OF THE GENUS
CHEYLOSTIGMAEUS WILLMANN, 1951 (ACARI: TROMBIDIFORMES:
STIGMAEIDAE) FROM NORTHWEST IRAN

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ABSTRACT — A new species of the genus *Cheylostigmaeus* (Acari: Stigmaeidae) is described and illustrated based on females and males collected from soil under apple trees in Marand, East Azerbaijan Province, Iran.

KEYWORDS — Acari; Prostigmata; Stigmaeidae; *Cheylostigmaeus*; Iran

INTRODUCTION

Members of the family Stigmaeidae are ecologically diverse, acting as predators of spider mites, scale insects, especially their eggs in leaf litter and on trees, and as herbivores on moss (Akyol and Koç 2010). This family is one of the most important predatory mite family after Phytoseiidae (Santos and Laing 1985, Croft 1994, Khanjani *et al.* 2010). To date 26 species of the genus *Cheylostigmaeus* have been described worldwide (Fan and Zhang 2004, Koç 2005, Khanjani *et al.* 2010, Dönel and Dogan 2011), among them two species namely *C. iranensis* Khanjani and Ueckermann 2002 and *C. ferdowsi* Khanjani *et al.* 2010 have been described from Iran. In this paper we described the third species, collected from soil

in apple orchards from East Azerbaijan province.

MATERIALS AND METHODS

Mites were extracted from the soil using a Berlese funnel; specimens were cleared in Nesbitt's fluid, mounted in Hoyer's medium (Walter and Krantz 2009) and were examined under 1000x magnification of Olympus Bx40 phase contrast microscope. The length of the idiosoma was measured from the base of chelicerae to the posterior margin of suranal shield, the width of the idiosoma at the broadest part of the idiosoma and setae were measured from their insertions to their tips; distances between setae were measured between their insertions. The terminology and abbreviations are based on Kethley

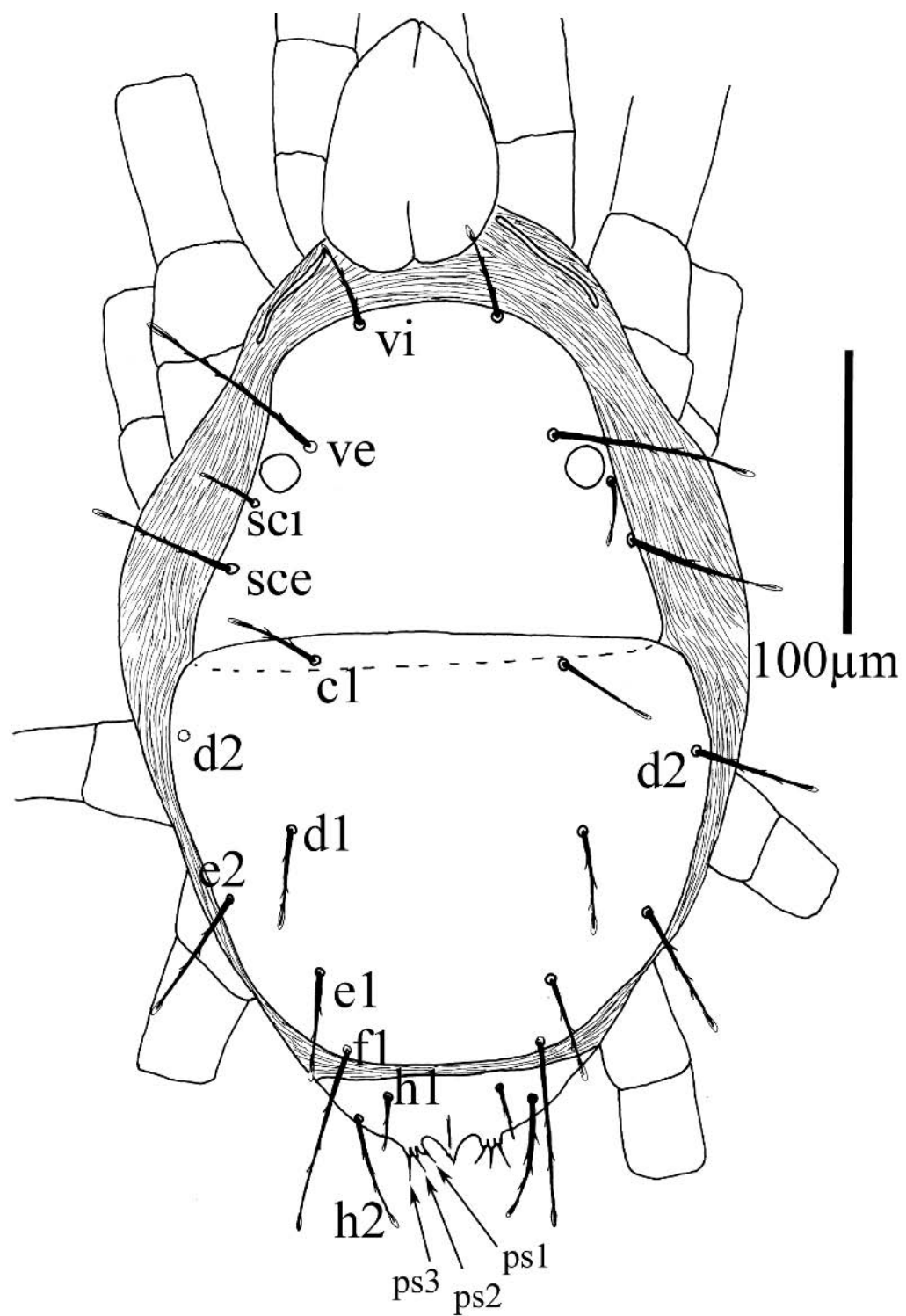


FIGURE 1: *Cheylostigmaeus hassanpouri* n. sp. (Male) – Dorsal view of body.

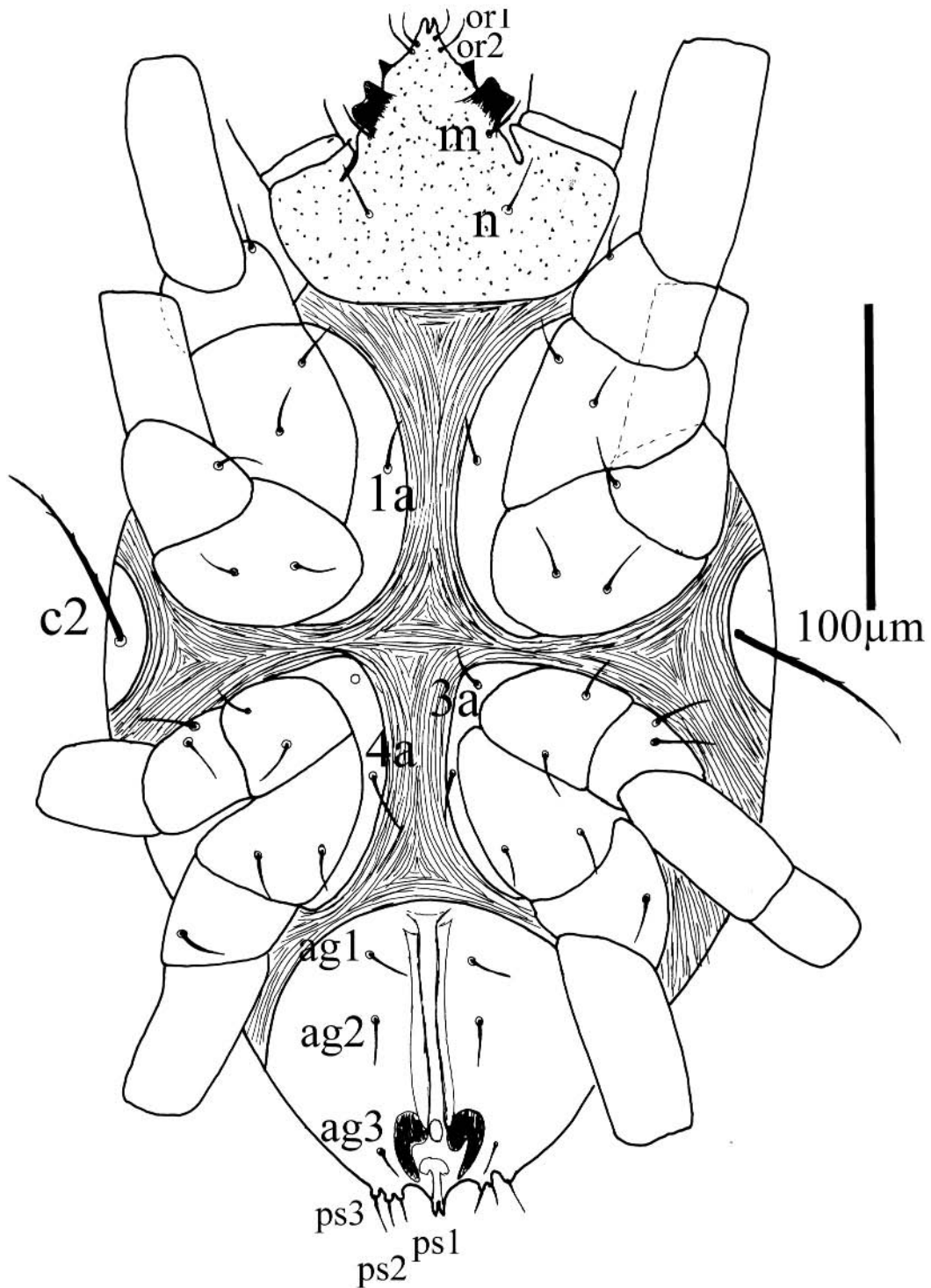


FIGURE 2: *Cheylostigmaeus hassanpouri* n. sp. (Male) – Ventral view of body.

(1990). All measurements are given in micrometers (μm). The first measurement is that of the holotype male or allotype female followed by the variation in measurements of the paratype specimens in parentheses including the holotype and allotype.

STIGMAEIDAE OUDEMANS, 1931

Cheyllostigmaeus Willmann, 1951

Cheyllostigmaeus hassanpourii n. sp. Bagheri

(Figures 1–11)

Diagnosis — Dorsal setae are thick and barbed sparsely in male and female; palpfemur without apophyses; ratios of setae *sce* : *sci* = 1.9, *ve* : *sci* = 2.6 in female; endopodal shield divided and smooth in both sex; femura I–IV and genua II–IV of male and female each with one sheathed seta; subcapitulum of male with one pair of bicuspidate lamellae; aedeagus without bulb, reversed comma-shape sclerotized appendages present on both sides of shaft distally.

Holotype male ($n = 4$) — Idiosoma oval, idiosoma length 292 (285 – 300); idiosoma width 214 (210 – 217); length of leg I 330 (325 – 331); leg II 280 (275 – 285); leg III 230 (265 – 270); leg IV 271 (267 – 274).

Dorsum — (Figure 1): Dorsum covered with three weakly sclerotized and smooth shields; no obvious dimples or micro-punctations observed; prodorsal shield truncated anteriorly, triangular and bearing four pairs of setae (*vi*, *ve*, *sci* and *sce*) and a pair of eyes; setae *ve* are the longest and setae *sci* the shortest; opisthosomal shield with six pairs of setae (*c1*, *d1*, *d2*, *e1*, *e2* and *f1*) and suranal shield with two pairs of setae (*h1* and *h2*); *h2* two-times longer than *h1*; most of dorsal setae fairly rigid, sparsely barbed and hyaline sheaths cover their tips; humeral shield bearing setae *c2* situated ventro-laterally. Length of setae : *vi* 28 (26 – 30); *ve* 67 (65 – 73); *sci* 19 (18 – 21); *sce* 49 (46 – 51); *c1* 34 (33 – 35); *c2* 52 (50 – 55); *d1* 34 (34 – 35); *d2* 40 (39 – 41); *e1* 33 (32 – 35); *e2* 42 (40 – 45); *f1* 65 (62 – 68); *h1* 23 (22 – 25); *h2* 41 (40 – 45); distances between dorsal setae: *vi-vi* 32 (30 – 35); *ve-ve* 72 (70 – 75); *vi-ve* 41 (39 – 43); *ve-sci* 22 (20 – 24); *sci-sci* 108 (106 – 110); *sci-sce*

22 (20 – 24); *sce-sce* 126 (125 – 130); *c1-d1* 55 (53 – 57); *c1-d2* 53 (50 – 55); *d1-d1* 93 (93 – 95); *d1-d2* 39 (37 – 42); *d1-e1* 50 (47 – 52); *d1-e2* 31 (30 – 33); *d2-e2* 52 (50 – 54); *e1-e1* 69 (67 – 71); *e1-e2* 35 (33 – 38); *e1-f1* 25 (23 – 27); *f1-f1* 63 (60 – 65); *h1-h1* 31 (30 – 33); *h1-h2* 11 (10 – 12); *h2-h2* 60 (57 – 63).

Venter — (Figure 2): Coxae I–II and III–IV surrounded by smooth and divided endopodal shields; length of setae *1a* 23 (21 – 25), *3a* 22 (20 – 25), and *4a* 20 (20 – 22); anogenital shield with three pairs of subequal aggenital setae (*ag1-ag3*) and three pairs of pseudanal (*ps1-ps3*) setae on tubercles; measurements of setae : *ag1* 16 (15 – 17); *ag2* 16 (15 – 18); *ag3* 20 (19 – 22); *ps1* 11 (11 – 12); *ps2* 12 (12 – 13); *ps3* 15 (14 – 15).

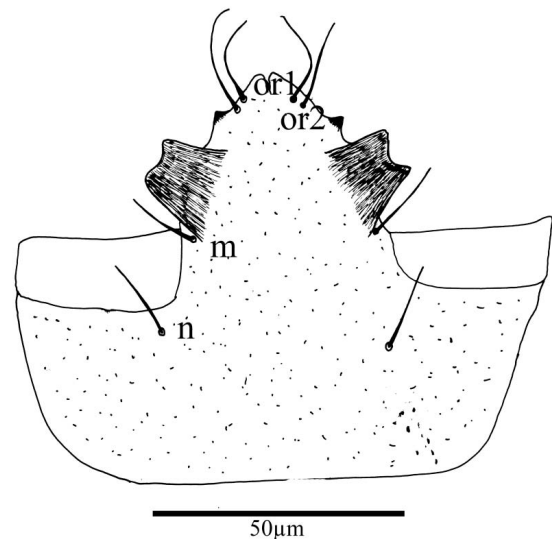


FIGURE 3: *Cheyllostigmaeus hassanpourii* n. sp. (Male) – Subcapitulum.

Gnathosoma — Chelicerae finely punctated, fixed digit 80 and moveable digit 60; palpi (Figure 5) five-segmented; palptarsus with five tactile setae plus one solenidiom (ω) and one trifold eupathidium distally; palptibia with two setae plus one claw and one spine-like accessory claw; palpgenu with two dorsal and palpfemur with three setae; palptrochanter without setae. Subcapitulum (Figure 3) finely punctated and with two pairs of subcapitular setae (*m* and *n*), *m* 19 (18 – 21), *n* 20 (18 – 24) and two pairs of adoral setae (*or1* and *or2*), *or1* 17

(17 – 19), *or*2 19 (17 – 20); subcapitulum bears a pair of strongly developed wing-like lamellae and one pair of acute teeth in front of lamellae, each lamellae thick and bicuspidate in front.

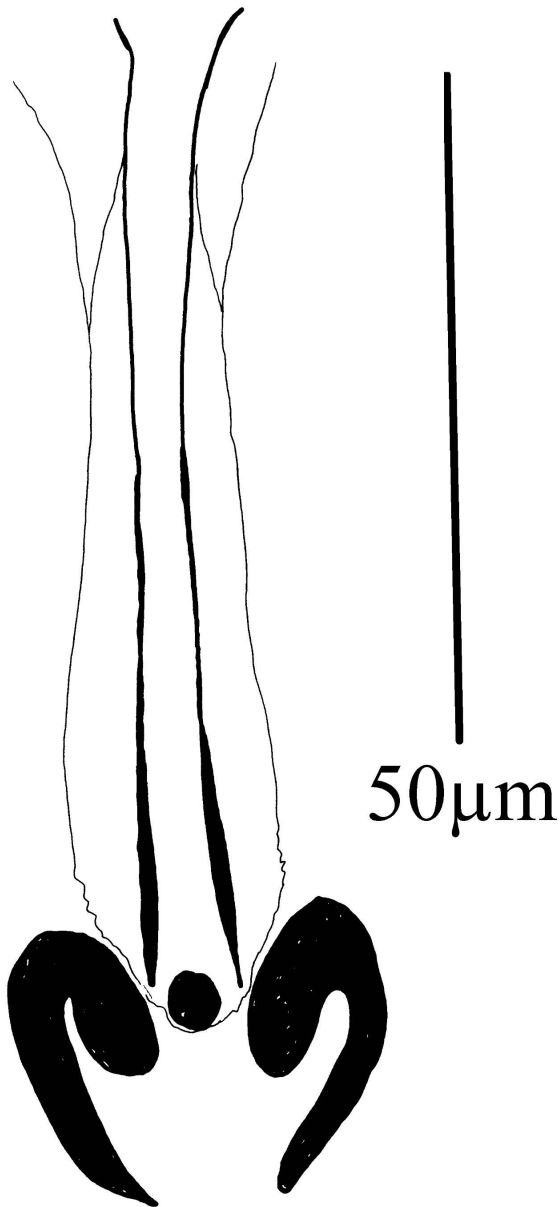


FIGURE 4: *Cheylostigmaeus hassanpourii* n. sp. (Male) – Aedeagus.

Aedeagus — (Figure 4) Calyx of the aedeagus funnel-shaped, shaft straight and pointed distally, no obvious bulb; reversed comma-shaped sclero-

tized appendages present on both sides of shaft distally.

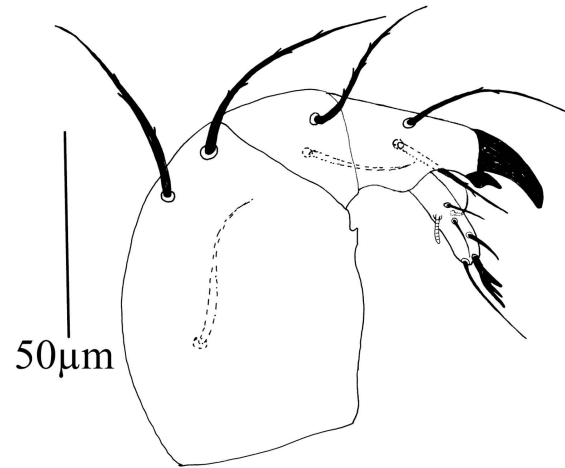


FIGURE 5: *Cheylostigmaeus hassanpourii* n. sp. (Male) – Palp.

Legs — (Figures 6): Counts of setae (excluding solenidia ; solenidia in parentheses) on legs I–IV: coxae 2-2-2-2; trochanter 1-1-2-1; femora 6-5-3-2; genua 4-3+κ-1-1; tibiae 5(+1φ+1φp)-5(+1φp)-5(+1φp)-5(+1φp); tarsi 13(+2ω)-9(+2ω)-7(+2ω)-7(+2ω); dorsal setae are rigid and sparsely barbed; femora I–IV and genua II–IV each with one distinct sheathed seta; lengths of solenidia: Iω1 29 (28 – 30), Iω2 42 (40 – 44); IIω1 20 (20 – 21); IIω2 50 (48 – 52); IIIω1 9 (8 – 10); IIIω2 41 (40 – 44); IVω1 6 (5 – 8); IVω2 37 (35 – 40); Iφ 11 (10 – 12); φp 21 (20 – 22); IIφ 19 (19 – 21); IIIφ 21 (20 – 23); IVφ 19 (18 – 20).

Female (n = 5) — Idiosoma oval, idiosoma length: 350 (340 – 365); idiosoma width 280 (270 – 292); length of leg I 360 (350 – 370); leg II 300 (294 – 305); leg III 265 (260 – 270); leg IV 320 (312 – 325).

Dorsum — (Figure 7): Dorsum covered with two shields, the shields weakly sclerotized; no obvious dimples or micro-punctations; suranal shield is displaced to ventral position; prodorsal shield with four pairs (*vi*, *ve*, *sci* and *sce*) of setae and a pair of eyes, setae *ve* are the longest and setae *sci* the shortest; opisthosomal shield with six pairs of setae (*c1*, *d1*, *d2*, *e1*, *e2* and *f1*); suranal shield with two pairs of setae (*h1* and *h2*); dorsal setae fairly

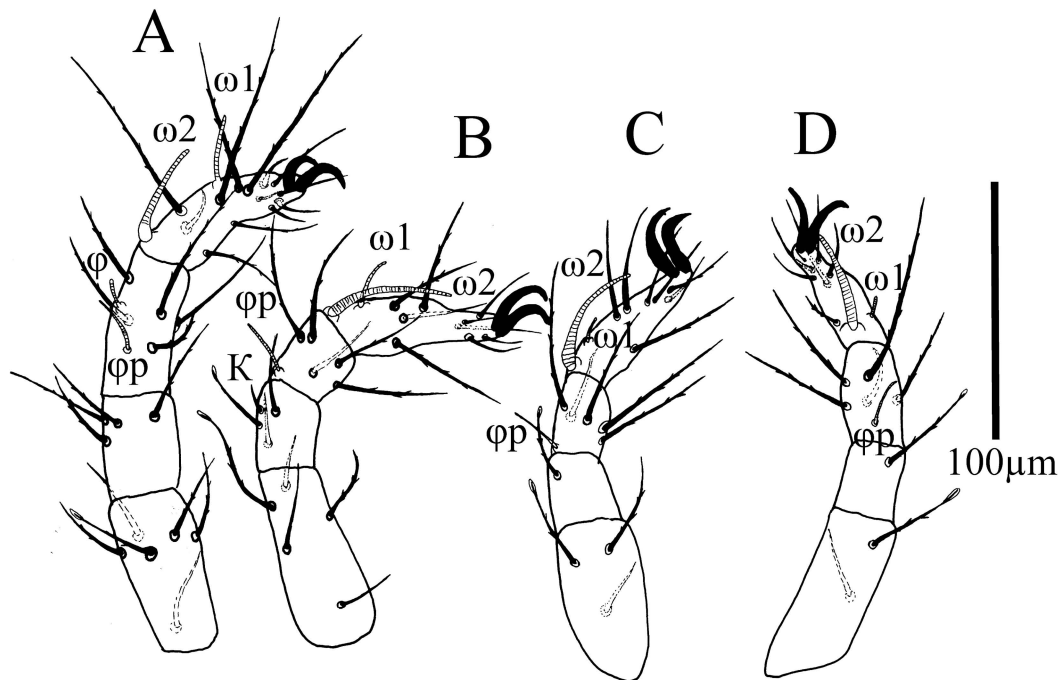


FIGURE 6: *Cheylostigmaeus hassanpouri* n. sp. (Male): A – Leg I, femur-tarsus; B – Leg II, femur-tarsus; C – Leg III, femur-tarsus; D – Leg IV, femur-tarsus

rigid, sparsely barbed and hyaline sheaths cover their tips; humeral shields bearing setae *c2* situated ventro-laterally. Length of setae: *vi* 50 (48 – 50); *ve* 90 (85 – 90); *sci* 35 (33 – 36); *sce* 65 (62 – 67); *c1* 50 (50 – 51); *c2* 70 (70 – 75); *d1* 50 (49 – 50); *d2* 60 (54 – 60); *e1* 55 (55 – 60); *e2* 60 (57 – 63); *f1* 80 (72 – 81); *h1* 55 (50 – 55); *h2* 50 (48 – 50); distances between dorsal setae: *vi* – *vi* 40 (37 – 41); *ve* – *ve* 95 (92 – 98); *vi* – *ve* 65 (64–66); *ve* – *sci* 35 (33 – 35); *sci* – *sci* 150 (145 – 152); *sci* – *sce* 30 (27 – 32); *sce* – *sce* 180 (176 – 182); *c1* – *c1* 120 (118 – 125); *c1* – *d1* 76 (75 – 77); *c1* – *d2* 60 (59 – 63); *d1* – *d1* 115 (111 – 116); *d1* – *d2* 65 (62 – 67); *d1* – *e1* 80 (79 – 82); *d1* – *e2* 55 (53 – 55); *d2* – *e2* 80 (77 – 81); *e1* – *e1* 95 (92 – 96); *e1* – *e2* 55 (55 – 57); *e1* – *f1* 60 (60 – 63); *f1* – *f1* 75 (74 – 77); *h1* – *h1* 30 (30 – 34); *h1* – *h2* 20 (19 – 22); *h2* – *h2* 50 (49 – 53); setal ratios: *vi*: *vi* – *vi* 1.25; *c1*: *c1* – *c1* 0.42; *d1*: *d1* – *d1* 0.43; *e1*: *e1* – *e1* 0.58; *f1*: *f1* – *f1* 1.06; *h1*: *h1* – *h1* 1.83; *h2*: *h2* – *h2* 1; *c1* – *c1*: *d1* – *d1*: *e1* – *e1*: *f1* – *f1* 1.60: 1.53: 1.27: 1.00.

Venter — (Figure 8): Ventral cuticle striated; coxae I–II and III–IV surrounded by smooth and divided endopodal shields; length of setae *1a* 30 (28 – 30), *3a* 30 (28 – 31), and *4a* 32 (30 – 32); anogenital

shield with three pairs of subequal aggenital setae (*ag1*–*ag3*) and three pairs of pseudanal (*ps1*–*ps3*) setae; measurements of setae: *ag1* 15 (15 – 21); *ag2* 20 (18 – 21); *ag3* 20 (19 – 22); *ps1* 20 (19 – 20); *ps2* 20 (19 – 21); *ps3* 22 (19 – 22).

Gnathosoma — Chelicerae finely punctated, fixed digit 80 and moveable digit 60; palpi (Figure 9) five-segmented; palptarsus with five tactile setae plus one solenidiom (ω) and one trifid eupathidium distally; palptibia with two setae plus one claw and one spine-like accessory claw; palpgenu with two setae and palpfemur with three setae; palptrochanter without setae. Subcapitulum (Figure 10) finely punctated and with two pairs of subcapitular setae (*m* and *n*), *m* 35 (33 – 36), *n* 25 (25 – 27) and two pairs of adoral setae (*or1* and *or2*), *or1* 17 (15 – 17), *or2* 30 (27 – 31).

Legs — (Figures 11): Counts of setae (excluding solenidia; solenidia in parentheses) on legs I–IV: coxae 2-2-2-2; trochanters 1-1-2-1; femora 6-5-3-2; genua 4-3+ κ -1-1; tibiae 5(+1 ϕ +1 ϕ p)-5(+1 ϕ p)-5(+1 ϕ p)-5(+1 ϕ p); tarsi 13(+1 ω)-9(+1 ω)-7(+1 ω)-7(+1 ω); dorsal setae are rigid and sparsely barbed;

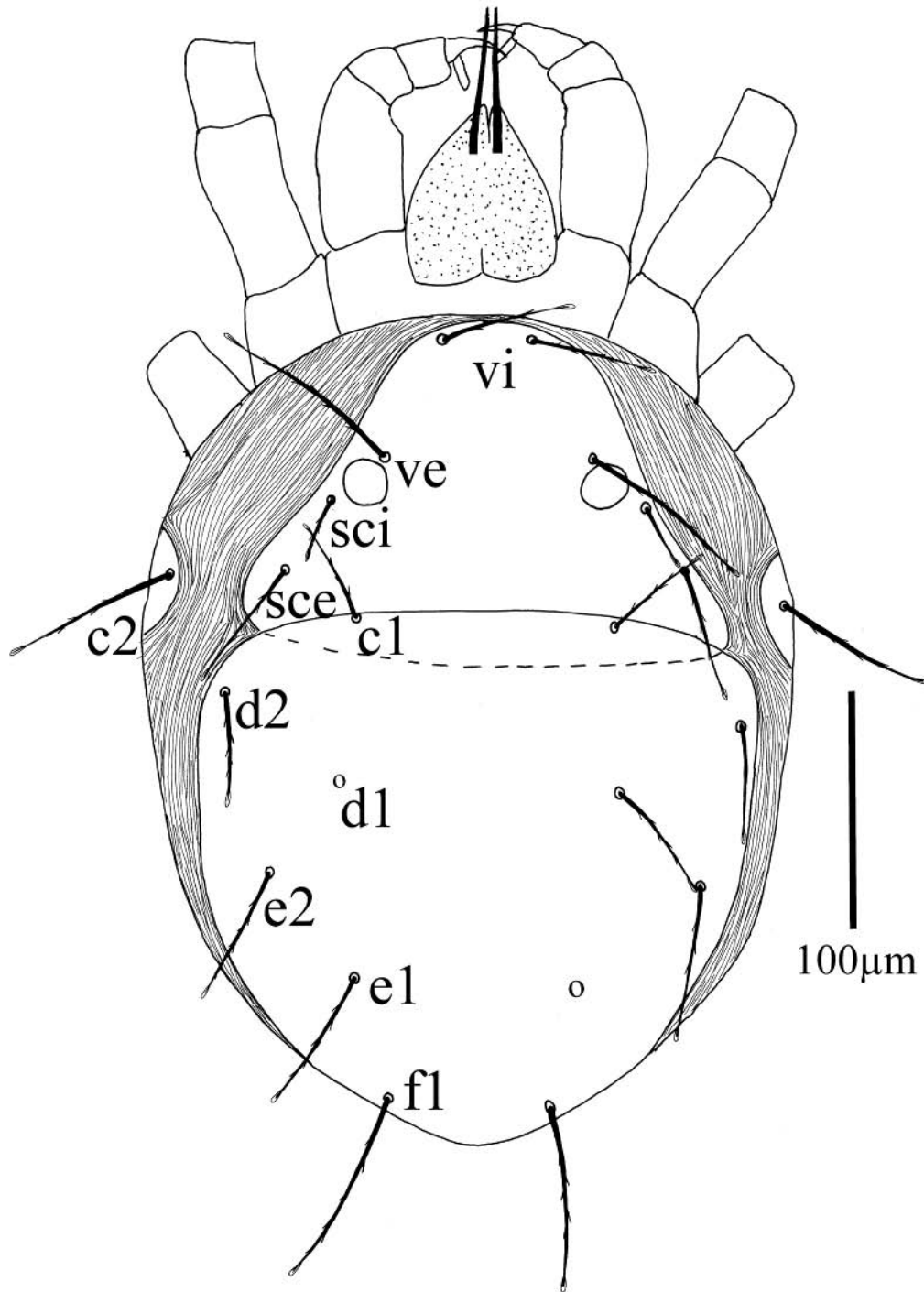


FIGURE 7: *Cheylostigmaeus hassanpouri* n. sp. (Female) – Dorsal view of body.

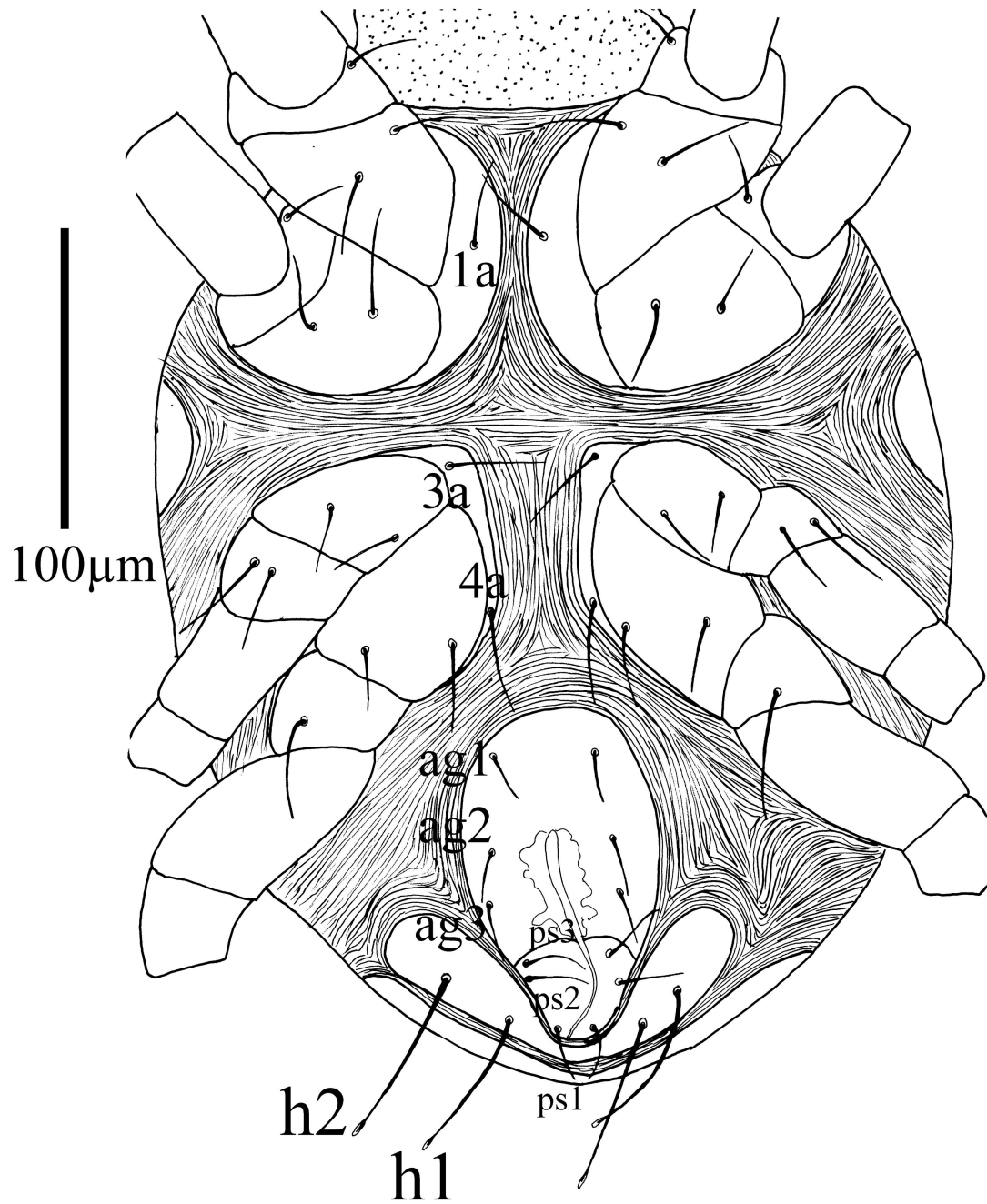


FIGURE 8: *Cheylostigmaeus hassanpouri* n. sp. (Female) – Ventral view of body.

femora I–IV and genua II–IV each with one distinct sheathed seta; lengths of solenidia: I ω 27 (25 – 27), II ω 19 (18 – 20); III ω 10 (10 – 11); IV ω 4 (4 – 5); I φ 12 (12 – 13); I φp 25 (23 – 25); II φp 20 (18 – 20); III φp 17 (16 – 17); IV φp 20 (18 – 21).

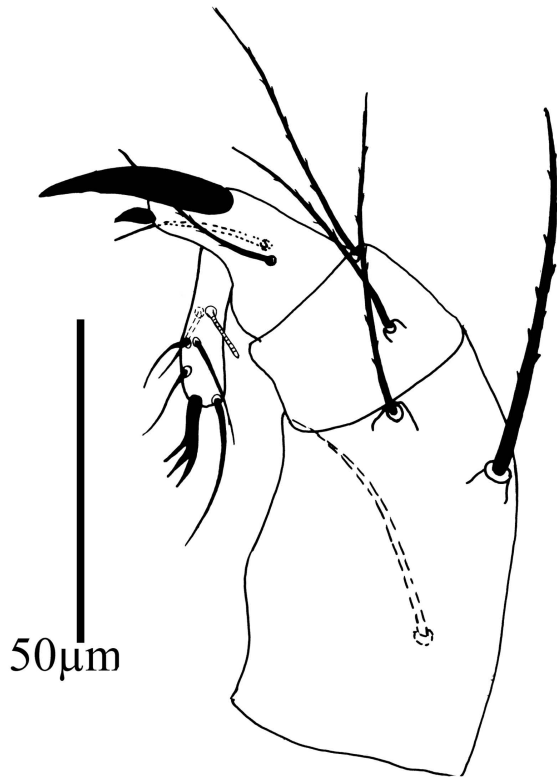


FIGURE 9: *Cheylostigmaeus hassanpouri* n. sp. (Female) – Palp.

Etymology — This species is named in honor of Dr. Mehdi Hassanpour, University of Mohaghegh Ardabili who is the friend of the first author.

Material examined — Holotype male, allotype female, paratype males (3) and paratype females (n= 4) were collected from soil in apple orchards, 20 August 2009, Marand, East Azerbaijan province, Iran, by Reza Navaei-Bonab. The holotype and one paratype female are deposited in the Arachnida Collection of Plant Protection Research Institute, Pretoria, South Africa and the rest of the paratypes are deposited in the Acarological Collection, Department of Plant Protection, Faculty of Agriculture, University of Maragheh, Maragheh, Iran.

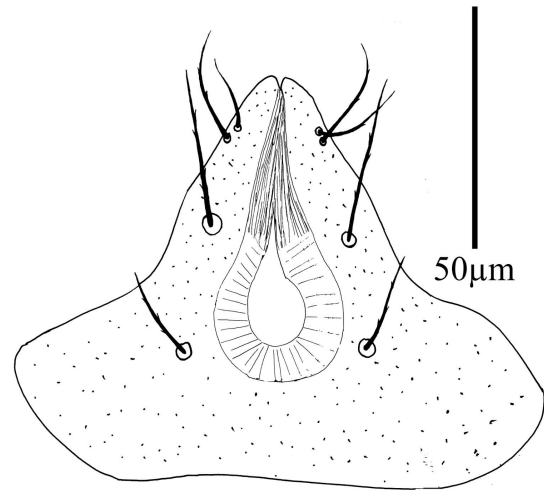


FIGURE 10: *Cheylostigmaeus hassanpouri* n. sp. (Female) – Subcapitulum.

Remarks — The new species is unique in having the following characters:

1. setae *sci* are the smallest dorsal setae and 1/3 length of *ve*, the longest setae,
2. shape of the male aedeagus.

The new species closely resembles *Cheylostigmaeus luxtoni* Wood (Wood, 1968) by having one pair of bicuspidate lamellae on subcapitulum and absence of bulb on aedeagus but differs from the latter by:

1. the length of setae *sci* 18 – 21 in new species vs 34 – 49 in *C. luxtoni*,
2. the distance *vi-vi* in the new species (30 – 35) is about the half (59 – 69) than in *C. luxtoni*,
3. shape of copulatory appendages of aedeagus in the two species distinctively differ.

Cheylostigmaeus hassanpouri n. sp. is also close to *C. pannonicus* Willmann (Summers and Ehara, 1965) by the following characters: femur of palpus without apophyse and having one pair of bicuspidate lamellae on subcapitulum. But it differs from this latter species by:

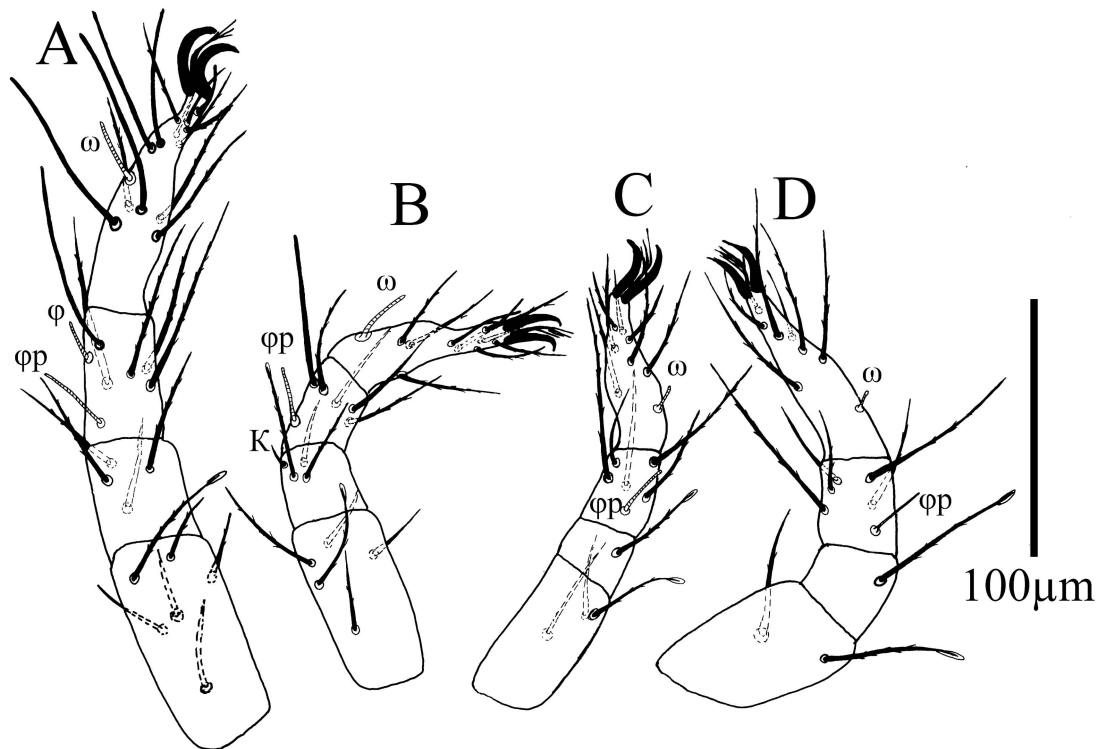


FIGURE 11: *Cheylostigmaeus hassanpouri* n. sp. (Female): A – Leg I, femur-tarsus; B – Leg II, femur-tarsus; C – Leg III, femur-tarsus; D – Leg IV, femur-tarsus.

1. aedeagus of *C. pannonicus* has a capacious bulb which is absent in the new species, additionally the copulatory appendages have different shapes in the two species,
2. ratio $ve : sci = 2.6$ in female of the new species vs 1.3 in those of *C. pannonicus*.

The new species also resembles to *Cheylostigmaeus urhani* Dönel, G. and Dogan as in both species the setae *sci* are the smallest prodorsal setae and there is a bicuspidate lamellae on subcapitulum.

However these species could be differentiated by the following characters:

1. in all specimens of the new species apophyses on the palp femur are absent whereas *C. urhani* has apophyses on the palp femur,
2. ratio of $sce : sci = 1.9$ [sce 65 (62 – 67), sci 35 (33 – 36)] in female of the new species vs 1.4 [sce 110 (105 – 125), sci 77 (65 – 97)] in *C. urhani*,

3. there is not obvious bulb on aedeagus of the new species vs capacious bulb in *C. urhani*,
4. endopodal shield of the new species is smooth vs reticulated in *C. urhani*.

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