

Research Article

## A new species of *Pseudoparasitus* Oudemans (Acari: Mesostigmata: Laelapidae) from Iran

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**Abstract:** *Pseudoparasitus talebii* Nemati, Malekshah-koochi & Afshari n. sp. is described and illustrated based on female specimens collected from soil in Golestan province, Gorgan region, Iran. The definition of *Pseudoparasitus oudemans* is revised and new definition is presented.

**Keywords:** Soil, Laelapidae, *Pseudoparasitus*, Iran

### Introduction

Mites of the family Laelapidae have very wide range of habitats and types of life style. Members of the subfamily Hypoaspidae (Hypoaspidae) (Karg, 1993) often are collected in litter or soil substrates (the genera *Pseudoparasitus*, *Ololaelaps*), and those often included under *Hypoaspis*, such as *Gaeolaelaps*, *Cosmolaelaps*, and *Stratiolaelaps*, are examples, while species of these and other genera are routinely or occasionally encountered in the nests of mammals or arthropods or directly associated with insects (Evans and Till 1966, 1979; Karg 1978, 1993). Some species are ectoparasites of adult bees or their brood, like *Tropilaelaps*, and some of them are also known to feed facultatively on nesting host animals by chewing or punching a hole in the skin (Lindquist *et al.*, 2009; Radovsky 1967). Some species have established close phoretic relationships with other arthropods and, less commonly, with vertebrates (Kranz 1998; Lindquist *et al.* 2009). Those are common predators in different

kinds of habitats such as: freshwater and marine habitats, the littoral-intertidal-estuarine milieu and organic matter (Costa 1962, 1968, 1974; Lindquist *et al.* 2009).

*Pseudoparasitus* is a cosmopolitan genus and currently consists of about 20 species, which are found in soil and litter, often associated with ornamental plants, and in that situation they have been intercepted in quarantine (Hunter, 1966; Joharchi *et al.* 2011b).

During our survey of soil and litter habitats in Golestan province, Gorgan, we discovered a species of the genus *Pseudoparasitus* new for science. The description and figures of the new species are given. This is the first description of a species of the genus from Iran.

### Materials and Methods

Mites were collected from various soil and litter samples from different parts of Gorgan in Golestan province. Mites were extracted from samples using Berlese funnels, placed in lactic acid at 55 °C for clearing and then mounted in Hoyer's medium on permanent micro slides. Line drawings were made by means of a drawing tube and figures were improved with Corel X-draw software, based on the scanned line drawings. All measurements are given in micrometers (µm) as mean (min-max). The

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dorsal setae notation, leg and palp chaetotaxy follows that of Lindquist and Evans (1965), Evans (1963a) and Evans (1963b). The holotype and two female paratypes are deposited in the Acarological Laboratory, Department of Plant Protection, Agricultural College, Shahrekord University, Shahrekord, and one female paratype is deposited in the Senckenberg Museum für Naturkunde Górlitz Am Museum 1 02826 Górlitz Germany.

## Results

### Genus *Pseudoparasitus* Oudemans, 1902

*Pseudoparasitus* Oudemans, 1902: 29. Type species *Laelaps meridionalis* G. & R. Canestrini, 1882, by original designation.

*Hoplolaelaps* Berlese, 1903, Zool. Anz. 27:14.

*Laelapsoides* Willmann, 1952, Verrof. Inst. Meersforsch. Bremerhaven 1: 150.

*Austrogamasellus* Domrow, 1957, Proc. Linn. Soc. N.S.W. 81: 204.

**Genus Diagnosis.** Dorsal shield covering whole dorsum of idiosoma and may be extended to the ventral surface; idiosomal setae smooth and pointed; distinct pre-sternal plates present; sternal shield well sclerotised, with three pairs of setae (four pairs in *P. indicus* Bahattacharya, 1977), and two pairs of poroids; genito-ventral shield large, expanded behind coxa IV, and extending to anal shield, at least two pairs of setae (*Zv1* and *Jv1*) on the surface of the shield well inside the edges of it, without strong  $\Lambda$ -shaped lines; anal shield free; Palp tarsal claw with three tines; epistome usually denticulate in anterior margin (smooth in anterior margin in some specimens of *P. jilinensis* Ma, 2004); exopodal plate behind coxa IV usually large and with various shapes, not fused with peritrematal shields; chelicera of female chelate-dentate; genu and tibia I normally with three ventral setae, genu II with two ventral setae, genu IV with one ventral seta.

**Note:** *Pseudoparasitus* is distinguished from *Gymnolaelaps* by the presence of two pairs of setae on the surface of the genital shield, well

inside the edges of the shield (Joharchi *et al.* 2011a).

### *Pseudoparasitus talebii* Nemati, Malekshah-koochi & Afshari n. sp.

(Figures 1-13)

**Specimens examined.** Holotype, female, Golestan province, Gorgan, Ghorogh forest (54° 40' 912", 36° 52' 248", alt. 152), litter, coll., S. Malekshah-koochi, 2009. Paratypes, same data as holotype, 3 females, 2012.

**Diagnosis.** Female sternal shield with slit-like *iv1-2*; genital shield large and abutting anal shield, with *st5* and three or four pairs of setae with different arrangements on shield; exopodal plates well sclerotised in two parts, the first part around coxa II, extending from posterior margin of coxa I (with conjunction to the antero-lateral extensions of sternal shield) to the mid-level of coxae II-III, and the second part around coxae III-IV, extending from anterior level of coxa III to the interior mid-level of coxa IV, with crescent-shaped podal shield; dorsal shield with 20 pairs of setae on podonotum (missing *z1-2*), and with different numbers of setae on opisthonotum, dorsal setae long enough to exceed from the base of next seta in the series; genu IV with nine setae including one ventral seta and two antero-lateral setae; post-stigmatal plate unusual, very elongate and extending well posterior to coxa IV to about the level of *Zv1* and *Jv1*; metapodal plates absent (apparently fused to post-stigmatal plates); endopodal plates II-III well expanded.

**Description of the female** (n = 4).

(Figures 1-13)

**Dorsal idiosoma** (Fig. 1). Dorsal shield length 846(780–900), width 463–538, oval shaped, slightly wraps around onto the ventral idiosoma, apparently lacks reticulation, with 20 pairs of elongate simple and pointed setae on podonotum (*j1-6*, *z3-6*, *s1-6*, *r2-5*, missing *z1-2*), and different pairs of setae on opisthonotum, plus 0-3 unpaired *Jx* setae between *J* series, setae increasing slightly in length from dorso-central to dorso-lateral part, dorso-central setae length

98 (86-107) and dorso-lateral setae 116 (112-120), all dorsal setae reach well past base of next posterior seta. The arrangement of dorsal setae on opisthonotum varies considerably between holotype and paratypes (Figs. 1-2). Holotype with 3 unpaired *Jx* setae (posterior to *J3*, between *J4-J4* and *Zx3-Zx3*), and with two pairs of *Zx* setae, with *Zx2-3* opposite to *Z3* and *Z4* respectively, with unsymmetrical *Z2* (the right one is missing), *Z1* is located near *J2*. Female paratypes lack unpaired *Jx* setae, have two pairs of *Zx* (*Zx2-3*), and lack *Z2* in both sides and with similar situation of *Z1* setae. Dorsal shield with 11 pairs of discernible pore-like structures (Figs. 1-2), with one pair of large pore-like structures anterior to *S1* and between *S4* and *Z4*. Without *R* and *r* setae on soft cuticle.

**Ventral idiosoma** (Fig. 3). Tritosternum with columnar base 38 (34-42) long and 14 (13-16) wide, with paired pilose laciniae 49 (48-52); well sclerotized pre-sternal shields which continues to anterior margin of sternal shield. Sternal shield reticulate, 167 (161-172) long, narrowest between coxae II 169 (162-174), widest between coxae II and III 262 (244-278), anterior margin sinuate, concave medially, posterior margin slightly concave. Sternal setae smooth, *st1* 65 (60-70), *st2* 79 (75-83) and *st3* 75 (70-78), *iv1* slit-like, located posterior to *st1*; *iv2* slit-like, between *st2* and *st3*, *iv3* pore-like, located posterior to *st3* on integument; *st4* 68 (65-70). Endopodal plates II/III fused to lateral margins of sternal shield, endopodal plates III/IV well sclerotized and curved. Genital shield broad, with surface almost with some fine reticulation especially in anterior part, 407 (398-418) long (including hyaline flap at the base of posterior margin of sternal shield), 224 (213-234) wide at level of *st5* and widest 294 (276-312) near setae *Zv1*, abutting anal shield, with *st5* (73-75), *Zv1* and *Jv1-2* normally on shield (holotype with asymmetrical *Jv2*, and lacks the right one) (Fig. 3), *Zv1* located on shield near the margin and *Jv1-2* well inside shield, in some

specimens *Zv2* located on the lateral edge of shield in one side, and on the integument adjacent to the edge of shield in another side (Figs. 4-5); circular paragenital pores (*iv5*) located on soft integument between a pair of minute platelets (posterior) and poroid-like structures (anterior) on podal plates of coxae IV. Anal shield sub triangular, 113 (104-117) long, 138 (130-143) wide, post-anal seta 55 (52-60), paranal setae 55 (49-62). Cribrum a strip of teeth, extending laterally near to the level of post-anal seta. Opisthogastric area with five pairs of pore-like structures, plus one pair on lateral margin of anal shield, that is not so obvious. exopodal plates well sclerotized in two parts, the first part around coxa II, extending from posterior margin of coxa I (with conjunction to the antero-lateral extensions of sternal shield) to the mid-level of coxae II-III, and the second part around coxae III-IV, extending from anterior level of coxa III to the interior mid-level of coxa IV, with crescent-shaped podal shield posterior to coxae IV with uniform texture. Peritreme extending from coxa IV to posterior level of coxa I, peritrematal shield wide, with four to five pairs of post-stigmatal pores, 1 pair of small pores anterior to stigmata and 2 pairs of pores (*ip*, *gp*) at level of coxae II/III, and a pore-like structure anterior to the tip of peritreme. Post-stigmatal plates very elongate, 184 (174-190) long and extending well posterior to coxa IV to the level of *Zv1* and *Jv1*, with small membranous threads at its posterior tip.

**Gnathosoma**. Hypostome (Fig. 6): with 3 pairs of smooth simple setae: *h1* (49-52), *h2* (44-47), *h3* (57-60). Palpcoxal setae 49-52. Deutosternal groove with eight rows of denticles, each bearing four to nine small teeth, and smooth line anterior to the first row; corniculi normal, horn-like. Internal malae complex, free medially, with two pairs of lobes, inner lobes simple, smooth rod-like structures, and outer lobes slightly wider, strongly fringed at tip. Epistome with reticulated dorsal surface and strongly denticulate in anterior margin (Fig. 7).

Chelicerae with dorsal seta and lyrifissures, arthrodial processes developed (Fig. 8), movable digit 75 (73-78) with 2 teeth, middle article 166 (156-177), fixed digit with 2 moderately large teeth proximal and distal to setaceous pilus dentilis. Palp chaetotaxy normal (sensu Evans & Till, 1965), with simple setae except trochanter setae, *al* on femur, and *al-12* of genu thickened, palp apotele three-tined (Fig. 9).

**Legs.** Tarsi I–IV with claws and ambulacra. Legs I 1145 (1092-1186) and IV 957 (894-998) longer than legs II 715 (689-741) and III 665 (627-694) (excluding pre-tarsus). **leg I** 1145 (1092-1186), coxa 108 (96-117), trochanter 87 (83-88), femur 240 (239-247), genu 186 (177-195), tibia 214 (205-218), tarsus 309 (291-320); **leg II** 715 (689-741) (excluding stalk and pretarsus), coxa 52 (44-60), trochanter 75 (70-78), femur 160 (143-169), genu 112 (107-114), tibia 115 (112-120), tarsus 201 (190-208); **leg III** 665 (627-694) (excluding stalk and pretarsus), coxa 56 (52-65), trochanter 76 (73-78), femur 138 (127-143), genu 101 (91-109), tibia 102 (99-104), tarsus 192 (179-200); **leg IV** 957 (894-998) (excluding stalk and pretarsus), coxa 49 (39-65), trochanter 108 (104-117), femur 207 (192-221), genu 149 (143-156), tibia 164 (156-169), tarsus 279 (260-304). Leg chaetotaxy (Figs. 10-13) normal for free-living Laelapidae: Leg I (Fig. 10): coxa 0 0/1 0/1 0, trochanter 1 1/2 0/1 1, femur 2 3/2 2/2 2, genu 2 3/2 3/1 2, tibia 2 3/2 3/1 2. Leg II (Fig. 11): coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 2 3/1 2/2 1, genu 2 3/1 2/1 2, tibia 2 2/1 2/1 2. Leg III (Fig. 12): coxa 0 0/1 0/1 0, trochanter 1 0/1 0/2 1, femur 1 2/1 1/0 1, genu 2 2/1 2/1 1, tibia 2 1/1 2/1 1. Leg IV (Fig. 13): coxa 0 0/1 0/0 0, trochanter 1 0/1 0/2 1, femur 1 2/1 1/0 1, genu 2 2/1 3/0 1, tibia 2 1/ 1 3/1 2 (Fig. 7); all setae needle-like. Tarsi I–IV with 18 setae 3 3/2 3/2 3 + *mv*, *md*. All pre-tarsi with a pair of claws and a long thin membranous ambulacrum.

**Insemination structures:** not seen, apparently un sclerotized.

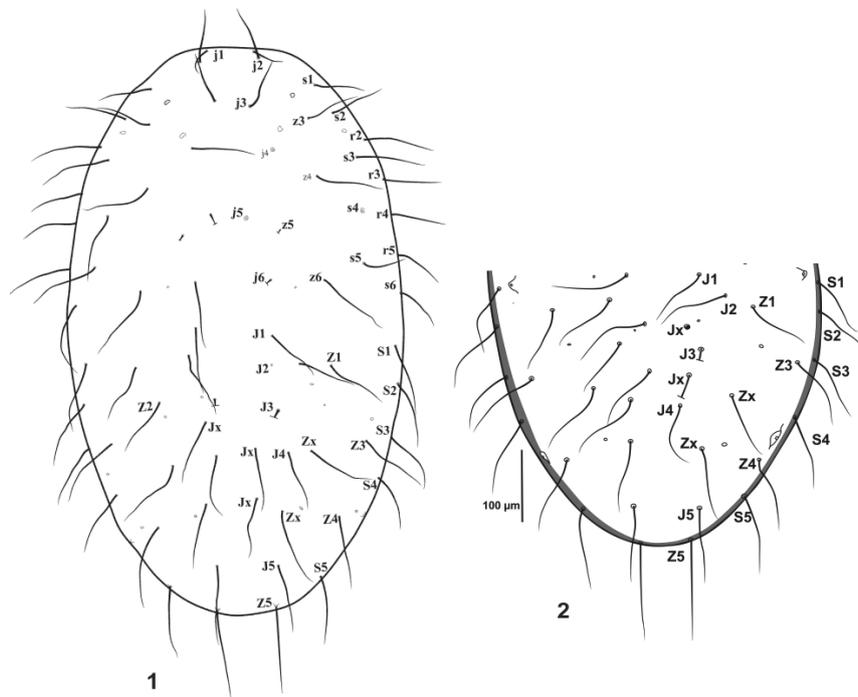
**Male:** Unknown.

**Etymology.** This species is named in honor of Dr. Ali Asghar Talebi (Department of Entomology, Faculty of Agriculture, Tarbiat Modares University, Tehran, Iran).

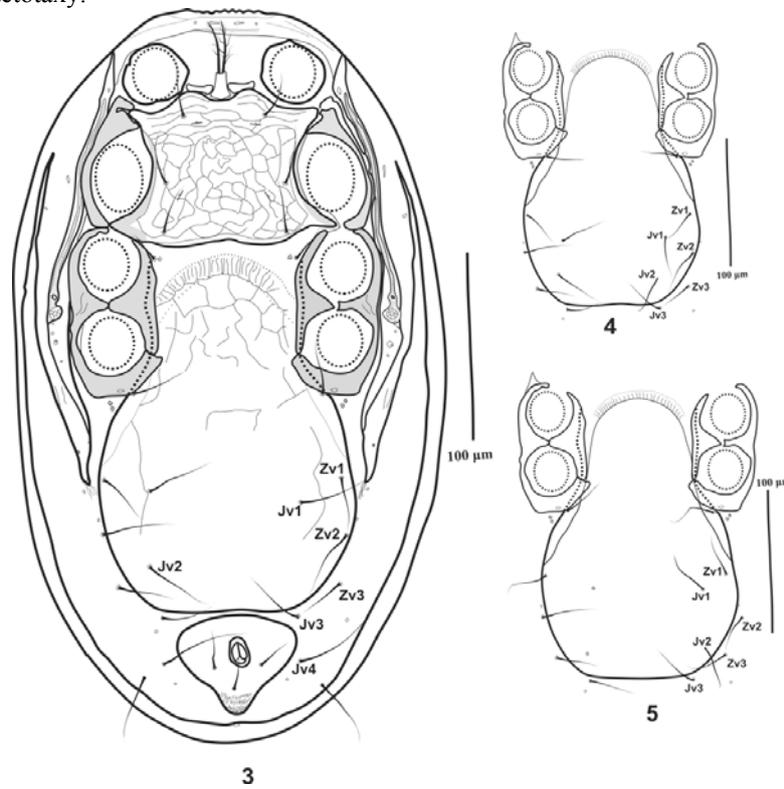
**Remarks:** *Pseudoparasitus talebii* Nemati, Malekshah-koochi & Afshari n. sp., is differentiated from almost all other species of the genus by the following combination of characters: The absence of *z1-2*; exopodal plates well sclerotised and extending from anterior margin of coxa II (with conjunction to the antero-lateral extensions of sternal shield) to the interior mid-level of coxa IV, with crescent-shaped podal shield; very elongate post-stigmatal plate, 184 (174-190) in length which extends well posterior to coxa IV to the level of *Zv1* and *Jv1*, with four to five pairs of post-stigmatal pores and finally lack of metapodal plates that are apparently fused with very elongate post-stigmatal plates.

## Discussion

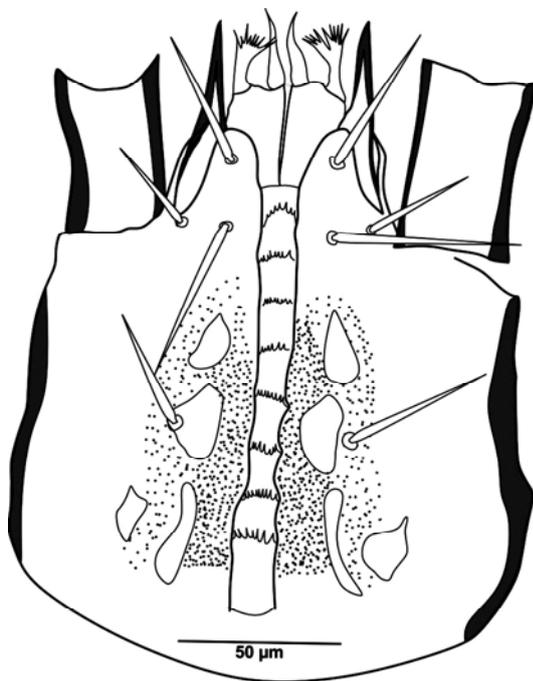
The only documented species of *Pseudoparasitus* which has been reported from Iran is *P. dentatus* (Halbert, 1920) (Joharchi *et al.* 2011b; Kazemi & Ahangaran 2011). *Pseudoparasitus oblongus* (Halbert, 1915) has been reported from Fars province, Marvdasht, Islamic Azad University, Fars Science and Research Branch, ex. apple bark beetles (Arabzadeh *et al.* 2012), and Kazemi and Rajaei, 2013 have also referred to it as a species of *Pseudoparasitus*. We didn't have the opportunity to examine this species however, it may be considered as a species of *Alloparasitus* due to the presence of eight setae on genu IV (1 2/1 3/0 1), being the unique character of this genus, while *Pseudoparasitus* members have nine setae (two antero-lateral setae) on this segment (2 2/1 3/0 1).



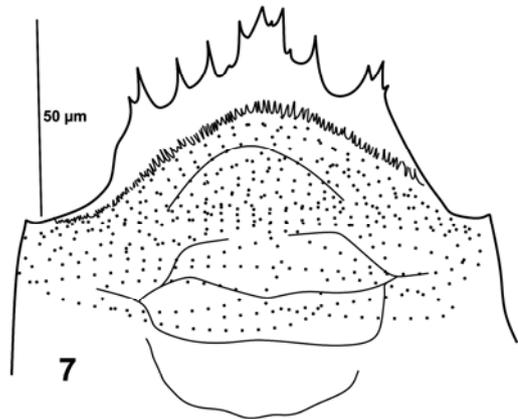
Figures 1-2 *Pseudoparasitus talebii* Nemati, Malekshah-koohi & Afshari n. sp., 1. Dorsal idiosoma, 2. Variation in dorsal shield chaetotaxy.



Figures 3-5 *Pseudoparasitus talebii* Nemati, Malekshah-koohi & Afshari n. sp., 3. Ventral idiosoma, 4-5. Variations in ventral idiosoma chaetotaxy.



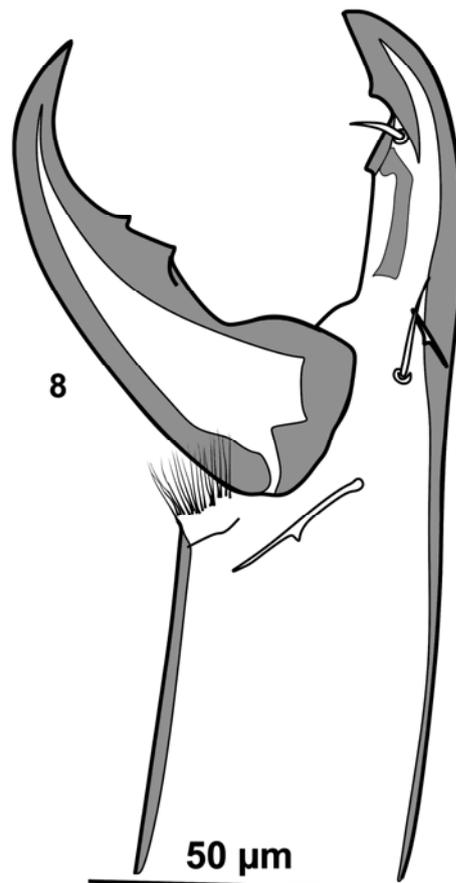
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**Figures 6-9** *Pseudoparasitus talebii* Nemati, Malekshah-koohi & Afshari n. sp., 6. Hypostome, 7. Epistome, 8. Chelicera, 9. Apotele.



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## گونه جدیدی از *Pseudoparasitus Oudemans* (Acari: Mesostigmata: Laelapidae) از ایران

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**چکیده:** گونه *Pseudoparasitus talebii* Nemati, Malekshah-koochi & Afshari n. sp. براساس نمونه‌های

جمع‌آوری شده از خاک از استان گلستان، گرگان توصیف و معرفی شد. جنس *Pseudoparasitus* مورد

بازنگری قرار گرفت و تعریف جدیدی برای آن ارائه شد.

**واژگان کلیدی:** خاک، *Pseudoparasitus*, Laelapidae، ایران