

Two New Records of the Genus *Raphignathus* (Acari: Actinedida) for the Turkish Fauna

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Received: 26 May 2006
Accepted: 17 January 2007

Abstract

Two new records of *Raphignathus* viz. *Raphignathus giselae* Meyer and Ueckermann, 1989, *Raphignathus protaspus* Khanjani and Ueckermann, 2003, male *Raphignathus zhaoi* Hu, Jing and Liang, 1995, are recorded for the first time in Turkey and the unknown male of *R. protaspus* are described and illustrated.

Key words: Acari, Raphignathidae, *Raphignathus*, new records, Turkey

INTRODUCTION

Members of the family Raphignathidae are predacious [18]. They are found on tree barks, litter, moss, lichens, soil, in stored products, house dust, bird's nests, near swamps, intestine of a wedded seal and the urine of a human [2-4, 9, 13, 17]. This genus in Turkey is represented by sixteen species [1, 4-7, 14-16].

In this study, female of *Raphignathus giselae*, female and male of *Raphignathus protaspus*, male of *Raphignathus zhaoi* are re-described. They are recorded for the first time from Turkey.

MATERIAL AND METHODS

The litter and soil samples taken from *Astragalus* sp., *Euphorbia* sp., *Verbascum* sp., *Populus* sp., *Juniperus oxicedrus*, *Quercus* sp., *Prunus* sp., *Triticum* sp., *Phragmites australis* and soil in a mole's nest, province of Afyonkarahisar were brought to the laboratory in nylon bags and extracted in Berlese funnels. Mites were collected in 70% ethanol and mounted on slides in modified Hoyer's medium.

Dorsal and leg setal designations follow Kethley [12] and Grandjean [10], respectively. All measurements are given in micrometers (μm).

RESULTS AND DISCUSSION

Taxonomy

Raphignathus Dugés, 1834

Type species: *Raphignathus ruberrimus* Dugés, 1834.

Cheliceral bases fused to form a conical stylophore; peritremes arising from midbasal part of stylophore, extending along anterior margin of idiosoma; palptibial claw small; subcapitulum with two pairs of supcapitular setae and two pairs of adoral setae; propodosoma with three shields, opisthosoma with a large shield; dorsum with 11-12 pairs of setae; one pair

of eyes on lateral propodosomal shields; two pairs of aggenital setae, genital and anal shield each with three pairs of setae.

Raphignathus giselae Meyer and Ueckermann, 1989

Female (Fig.1)

Length of body (including gnathosoma) (minimum and maximum measurements in parenthesis) 353 (286–378), width 198 (182–234).

Gnathosoma. Length of gnathosoma 52. Subcapitulum with two pairs of long setae ($n=m=26$) and two pairs of pilose adoral setae ($ad_{1,2}$). Dorsal stylophore with striae. Palp setal formula (from femur to tarsus): 2-2-3+1 claw, 4+1 ω +4 eupathidia.

Dorsum. With one median and two lateral shields, without small shields behind median propodosomal shield. Opisthosoma with one shield. Median prodorsal shield which is widely separated from the peritremes anteriorly and with three pairs of setae. Each lateral shield with one pair of eyes, three pairs of setae and one pair of lyrifissures (ia). Two pairs of setae, (d_1), (e_1) and one pair of lyrifissures (im), located on interscutal membrane. Setae e_1 do not reach anterior margin of opisthosomal shield. Opisthosomal shield with four pairs of setae and one pair of lyrifissures (ip). Setae f_1 behind anterior margin on opisthosomal shield. All dorsal shields punctated. Body surface striated between propodosomal and opisthosomal shields. Dorsal setae simple. Dimensions of dorsal setae as follows: $vi=31$, $sci=27$, $ve=27$, $sce=27$, $c_1=21$, $c_2=26$, $d_1=26$, $e_1=26$, $f_1=26$, $h_1=26$, $h_2=26$, $h_3=18$; distances between of setae: $vi-vi=18$, $vi-ve=52$, $vi-sci=27$, $ve-ve=107$, $ve-sci=31$, $sci-sci=44$, $ve-sce=21$, $sce-sce=143$, $sce-c_1=78$, $c_1-c_1=16$, $c_1-c_2=42$, $c_2-c_2=125$, $c_1-d_1=47$, $d_1-d_1=57$, $d_1-e_1=39$, $e_1-e_1=65$, $e_1-f_1=42$, $f_1-f_1=39$, $f_1-h_1=27$, $h_1-h_1=18$, $h_1-h_2=27$, $h_2-h_2=42$, $h_3-h_3=68$.

Venter. Setae $1a$ near coxa I. Coxae III and IV flanked by coxisternal shields with setae $3a$. Venter striated and with three pairs of setae. Setae $4a$ set on membrane posterior to coxae IV. Setae $4c$ set on membrane between setae $4a$ and ag . Anogenital area with one pair of aggenital setae (ag) and three pairs of genital setae ($g_{1,3}$). A pair of lyrifissures (ih) located laterally of

genital shield. Anal shield with three pairs of setae (ps_{1-3}). All ventral shields punctuated.

Legs. Length of legs I-IV (from base of femur to tip of tarsal claw): 250-198-224-276. Setal formulae of legs I-IV: coxae 2-2-2-1, trochanters 1-1-2-1, femora 6-5-3-3, genua 6(k)-6(k)-4-4, tibiae 6(ϕ)-6(ϕ)-6(ϕ)-5(ϕ), tarsi 21(ϕ + ω)-16(ω)-14(ω)-13.

Examined materials: One female from litter under *Verbascum* sp., Emirdağ district, at border of Eskişehir province, 925 m, 17.10.2004; 1 ♀ from litter under *Cistus laurifolius*, Bayat district, Köroğlubeli mountains, 1400 m, 17.10.2004; 1 ♀ from sheepfold, Bolvadin district, B.Karabağ town, Kayadanağıl place, 1100 m, 17.12.2004; 1 ♀ from litter under *Helianthus annuus*, İhsaniye district, Ablak village, an agricultural area, 1100 m, 26.07.2005; 10 ♀♀ from litter under *Amygdalus communis*, Evciler district, Baraklı village, 910 m, 17.10.2005; Afyonkarahisar, Turkey, leg. M. Akyol.

Remarks: *Raphignathus giselae* Meyer and Ueckermann 1989, closely resembles *R. gracilis* (Rack); however, it can be separated from the latter by the median prodorsal shield which is widely separated from the peritremes anteriorly; dorsal setae e_1 do not reach anterior margin of opisthosomal shield. General features of Turkish specimens like that given by Meyer and Ueckermann 1989, but body size 353 (286–378) / 198 (182–234) smaller than holotype 408 (377–416) / 231 (208–254).

Distribution: Zimbabwe, South Africa [17].

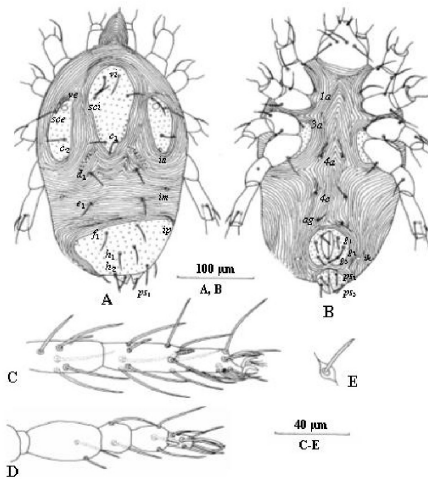


Figure 1. *Raphignathus giselae* (female). A. dorsal view, B. ventral view, C. tarsus of leg I, D. palpus, E. seta d_1 . *Raphignathus protaspus* Khanjani and Ueckermann, 2003 Female (Fig.2)

Length of body (including gnathosoma) (minimum and maximum measurements in parenthesis) 442 (421–478), width 213 (213–228).

Gnathosoma. Length of gnathosoma 73 (62–73). Subcapitulum with two pairs of long setae ($n=31$, $m=31$) and two pairs of pilose adoral setae (ad_{1-2}). Dorsal stylophore with striae. Palp setal formula (from femur to tarsus): 3-2-3+1 claw, 4+1 ω +4 eupathidia.

Dorsum. Body broadly oval; propodosoma with one median and two lateral shields separated by striae; propodosoma with

one pair of small shields behind median propodosomal shield; opisthosoma with a large shield; dorsal setae simple; median shield bearing three pairs of setae; each lateral shield ovoid with three pairs of setae, one pair of eyes, and one pair of lyrifissures (ia); five pairs of setae and two pairs of lyrifissures on opisthosomal shield (im and ip); setae e_1 well behind anterior margins of opisthosomal shield; setae h_3 situated on ventral extension of opisthosomal shield; lyrifissure (im) almost longitudinally in line with lyrifissure (ia) and situated on or near anterolateral margin; lyrifissure (ip) lateral or anterolateral of f_1 ; d_1 only setae located on small plates on the interscutal membrane; all dorsal shields punctuated but not striated; body surface striated between propodosomal and opisthosomal shields. Dimensions of dorsal setae as follow: $vi=21$, $sci=26$, $ve=26$, $sce=26$, $c_1=21$, $c_2=23$, $d_1=23$, $e_1=16$, $f_1=16$, $h_1=16$, $h_2=18$, $h_3=18$; distances between of setae: $vi-vi=27$, $vi-ve=70$, $vi-sci=39$, $ve-ve=112$, $ve-sci=31$, $sci-sci=52$, $ve-sce=26$, $sce-sce=153$, $sce-c_1=96$, $c_1-c_1=23$, $c_1-c_2=52$, $c_2-c_2=96$, $c_1-d_1=31$, $d_1-d_1=36$, $d_1-e_1=49$, $e_1-e_1=78$, $e_1-f_1=65$, $f_1-f_1=57$, $f_1-h_1=44$, $h_1-h_1=21$, $h_1-h_2=27$, $h_2-h_2=57$, $h_3-h_3=70$.

Venter. With two pairs of coxisternal shields, one pair coxisternal shields between coxae I and II with setae $1a$, one pair of much larger coxisternal shields between coxae III and IV with setae $3a$; venter striated, with three pairs of setae, ($4a$, $4c$ and ag); three pairs of genital setae (g_{1-3}); genital and coxisternal shields punctuated; one pair of lyrifissures (ih) located laterally of genital shield; anal shield with three pairs of setae (ps_{1-3}).

Legs. Length of legs I-IV (from base of femur to tip of tarsal claw with minimum and maximum measurements in parenthesis): 239 (239–286)-198 (198–239)-218 (218–250)-244 (244–312). Setal formulae of legs I-IV: coxae 2-2-2-1, trochanters 1-1-2-1, femora 6-6-4-4, genua 6(k)-6(k)-4-4, tibiae 6(ϕ)-6(ϕ)-6(ϕ)-5(ϕ), tarsi 21(ϕ , ω)-16(ω)-14(ω)-13.

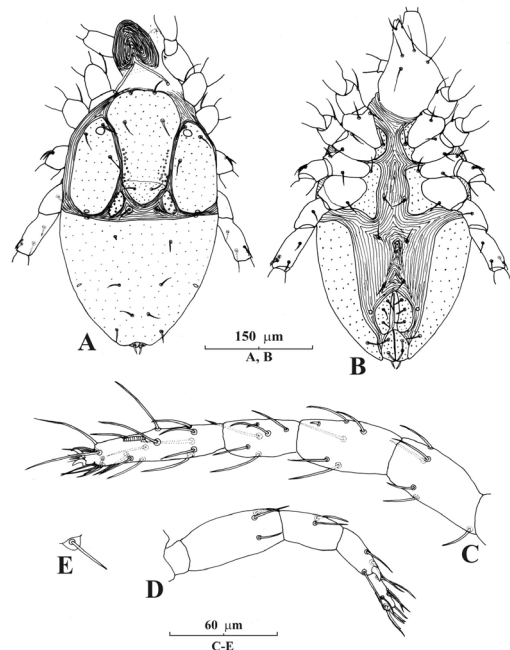


Figure 2. *Raphignathus protaspus* (female). A. dorsal view, B. ventral view, C. leg I, D. palpus, E. seta d_1 . **Male** (Fig. 3)

Length of body (including gnathosoma) (minimum and maximum measurements in parenthesis) 426 (385–426), width 213 (192–234).

Gnathosoma. Length of gnathosoma 62. Subcapitulum with two pairs of long setae ($n=31$, $m=31$) and two pairs of pilose adoral setae (ad_{1-2}). Dorsal stylophore with striae. Palp setal formula (from femur to tarsus): 3-2-3+1 claw, 4+1 ω +4 eupathidia.

Dorsum. Dorsal body shields fused, only striated near lateral margin of body; one pair of eyes located between ve and sce setae; three pairs of lyrifissures (ia , im , ip) on idiosoma; all dorsal shields punctuated; dorsal setae approximately same lengths as in female. Dimensions of dorsal setae as follow: $vi=23$, $sci=23$, $ve=23$, $sce=23$, $c_1=21$, $c_2=21$, $d_1=18$, $e_1=18$, $f_1=21$, $h_1=18$, $h_2=18$, $h_3=18$; distances between of setae: $vi-vi=18$, $vi-ve=73$, $vi-sci=47$, $ve-ve=125$, $ve-sci=47$, $sci-sci=39$, $ve-sce=26$, $sce-sce=172$, $sce-c_1=96$, $c_1-c_1=21$, $c_1-c_2=65$, $c_2-c_2=125$, $c_1-d_1=44$, $d_1-d_1=65$, $d_1-e_1=42$, $e_1-e_1=78$, $e_1-f_1=49$, $f_1-f_1=57$, $f_1-h_1=44$, $h_1-h_1=27$, $h_1-h_2=47$, $h_2-h_2=83$, $h_3-h_3=86$.

Venter. Venter as in female, except for combined genital and anal openings and plates.

Legs. Lengths of legs I-IV (from base of femur to tip of tarsal claw): 312-244-302-364. Setal formulae of legs I-IV: coxae 2-2-2-1, trochanters 1-1-2-1, femora 6-6-4-4, genua 6(k)-6(k)-4-4, tibiae 6($\varphi\varphi$)-6($\varphi\varphi$)-6($\varphi\varphi$)-5($\varphi\varphi$), tarsi 21($\varphi\varphi+\omega\delta$)-16($\omega\delta$)-14($\omega\delta$)-14($\omega\delta$).

Examined materials: One female and one male from litter under *Verbascum* sp., Emirdağ district, border of Eskişehir province, 925 m, 17.10.2004; 1 ♀ from litter under *Cistus laurifolius*, Bayat district, Köroğlubeli mountains, 1400 m, 17.10.2004; 1 ♀ from litter under *Verbascum* sp., Bolvadin district, B.Karabağ town, Emirdağları, Kayadanağıl place, 1300 m, 17.12.2004; 1 ♀ from litter under *Alhagi pseudalhagi*, Sultandağı district, near the train station, 950 m, 18.12.2004; 1 ♀ and 1 ♂ from litter under *Populus* sp., border of Afyonkarahisar-Kütahya province, 1000 m, 15.09.2005; 1 ♂ from litter under *Quercus* sp., Sincanlı district, Güney town, 1100 m, 15.09.2005; 3 ♀♀ and 1 ♂ from litter under *Amygdalus communis*, Evciler district, Baraklı village, 910 m, 17.10.2005; Afyonkarahisar, Turkey, leg. M. Akyol.

Remarks: Turkish specimens differ from the type species in that lyrifissures (im) are almost longitudinally in line with lyrifissures (ia) (lyrifissures (im) not longitudinally in line with lyrifissures (ia) as in Khanjani & Ueckermann, 2003). Body size of *R. protaspus* is 507 (491–516) and width 233 (230–268) [13], but 442 (421–478) long and 213 (213–228) wide in the Turkish specimens. Our specimens were therefore smaller than the type specimen.

The male of *Raphignathus protaspus* Khanjani and Ueckermann, 2003 closely resembles the male of *Raphignathus zhaoi* Hu, Jing and Liang, 1995 and *R. collegiatus* Atyeo, Baker & Crossley, 1961. However, it can be separated from the male of *R. zhaoi*, in that femur IV has 4 setae (femur IV with 2 setae in *R. zhaoi*) and from the male of *R. collegiatus*, in that the dorsal shields are fused, only striated near lateral margin of body (prodorsum with 2 lateral and 1 rectangular median shield, latter indistinctly connected with opisthosomal shield in *R. collegiatus*).

Distribution: Iran [13].

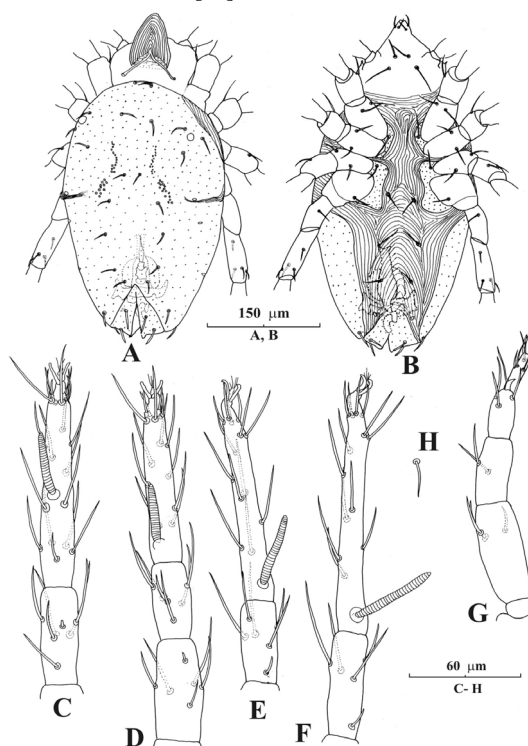


Figure 3. *Raphignathus protaspus* (male).

A. dorsal view, B. ventral view, C. leg I, D. leg II, E. leg III, F. leg IV, G. palpus, H. seta d_1 .

Raphignathus zhaoi Hu, Jing and Liang, 1995

Male (Fig. 4)

Length of body (including gnathosoma) (minimum and maximum measurements in parenthesis) 302 (286–312), width 198 (151–198).

Gnathosoma. Length of gnathosoma 52. Subcapitulum with two pairs of long setae ($n=26$, $m=27$) and two pairs of pilose adoral setae (ad_{1-2}). Dorsal stylophore with striae. Palp setal formula (from femur to tarsus): 3-2-3+1 claw, 4+1 ω +4 eupathidia.

Dorsum. Dorsal body shields fused, only striated near lateral margin of body; one pair of eyes located between ve and sce ; three pairs of lyrifissures (ia , im , ip) on idiosoma; all dorsal shields punctuated. Dimensions of dorsal setae as follow: $vi=23$, $sci=27$, $ve=26$, $sce=26$, $c_1=16$, $c_2=26$, $d_1=16$, $e_1=16$, $f_1=26$, $h_1=16$, $h_2=26$, $h_3=26$; distances between of setae: $vi-vi=16$, $vi-ve=55$, $vi-sci=26$, $ve-ve=94$, $ve-sci=34$, $sci-sci=27$, $ve-sce=26$, $sce-sce=130$, $sce-c_1=73$, $c_1-c_1=13$, $c_1-c_2=44$, $c_2-c_2=88$, $c_1-d_1=31$, $d_1-d_1=65$, $d_1-e_1=26$, $e_1-e_1=65$, $e_1-f_1=18$, $f_1-f_1=78$, $f_1-h_1=34$, $h_1-h_1=21$, $h_1-h_2=26$, $h_2-h_2=55$, $h_3-h_3=86$.

Venter. With two pairs of coxisternal shields, one pair between coxae I and II with setae $1a$, one much larger pair between coxae III and IV with setae $3a$; venter striated, with two pairs of setae ($4a$, ag_1) and one abnormal seta; combined genital and anal openings and plates; one pair of lyrifissures (ih) located laterally to anal shield; anal shield with three pairs of setae (ps_{1-3}).

Legs. Length of legs I-IV (from base of femur to tip of tarsal claw): 198-156-182-218. Setal formulae of legs I-IV: coxae 2-2-2-1, trochanters 1-1-2-1, femora 6-5-3-2, genua 6(*k*)-6(*k*)-4-4, tibiae 6(φφ)-6(φφ)-6(φφ)-5(φφ), tarsi 21(φφ+ω♂)-16(ω♂)-14(ω♂)-14(ω♂).

Examined materials: One male from litter under *Astragalus* sp., Sincanlı district, Güney town, border of Uşak province, 1300 m, 19.06.2005; 6 ♂♂ from litter under *Quercus* sp., Afyonkarahisar, Çakırköy town, Kestanelik place, 1100 m, 18.08.2005; Afyonkarahisar, Turkey, leg. M. Akyol.

Remarks: The Turkish specimens resembles the type species of *Raphignathus zhaoui* in all respects, namely: dorsal body shields fused, only striated near lateral margin of body; one pair of eyes located between *ve* and *sce* setae; three pairs of lyrifissures (*ia*, *im*, *ip*) on idiosoma and femur IV with two setae.

Distribution: China [9,11].

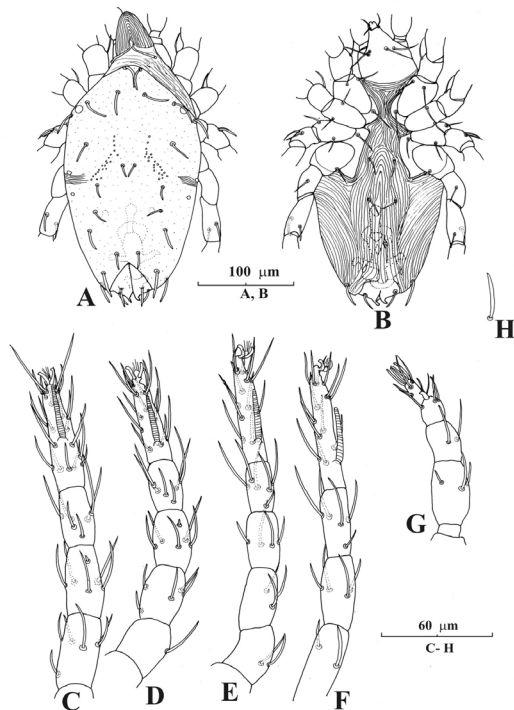


Figure 4. *Raphignathus zhaoui* (male). A. dorsal view, B. ventral view, C. leg I, D. leg II, E. leg III, F. leg IV, G. palpus, H. seta d_1 .

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