

Descriptions of three new species and two new records of *Raphignathus dugés* (Acari: Raphignathidae) from Turkey

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DESCRIPTIONS OF THREE NEW SPECIES AND TWO NEW RECORDS OF *RAPHIGNATHUS* DUGÉS (ACARI: RAPHIGNATHIDAE) FROM TURKEY

BY

Salih DOĞAN

(Ms. received the 20.11.2003, accepted 19.12.2003)

ABSTRACT

Seven *Raphignathus* species are reported from Bursa, Çorum, Denizli, Erzincan, Erzurum, Giresun and Kırıkkale, Turkey. *Raphignathus erzincanica*, *R. giresuniensis* and *R. vahiti* are described and illustrated as new species. *Raphignathus atyeoi* Meyer and Ueckermann, previously known only from southern Africa and *R. hecmatanaensis* Khanjani and Ueckermann known only from Iran, are now also recorded from Turkey. New localities for *Raphignathus collegiatus* Atyeo, Baker and Crossley and *R. gracilis* (Rack), from Turkey are given. A key to the species of Turkey is provided.

Key-words: Acari, Raphignathidae, *Raphignathus*, new species, new records, Turkey.

INTRODUCTION

The genus *Raphignathus* has a worldwide distribution containing more than 50 described species to date. They are found on tree barks, litter, moss, lichens, soil, in stored products, house dust, bird's nests, intestine of a wedded seal and the urine of a human (FAN & YIN, 2000; KHANJANI & UECKERMANN, 2003). This genus in Turkey is represented by four species: *Raphignathus collegiatus* Atyeo, Baker and Crossley, *R. gracilis* (Rack), *R. fani* Doğan and Ayyıldız and *R. kuznetzovi* Doğan and Ayyıldız (KOÇ & AYYILDIZ, 1996; DOĞAN & AYYILDIZ, 2003). Seven species are dealt with here, including three new species: *Raphignathus atyeoi* Meyer and Ueckermann, *R. hecmatanaensis* Khanjani and Ueckermann, *R. collegiatus*, *R. gracilis*, *R. erzincanica* n. sp., *R. giresuniensis* n. sp. and *R. vahiti* n. sp. Of these; *Raphignathus atyeoi* and *R. hecmatanaensis*, are new for Turkey, *Raphignathus collegiatus* and *R. gracilis* are recorded from new localities.

Dorsal and leg setal designations follow KETHLEY (1990), MEYER & UECKERMANN (1989) and GRANDJEAN (1944). All measurements are given in micrometers (μm). Length of idiosoma excluding gnathosoma and width of idiosoma are measured at the widest breadth of idiosoma. Length of legs is measured from tip of claw to base of coxae. Length of palpi is measured from tarsi to base of trochanters. Known and type materials are deposited in the Zoological Museum of Atatürk University, Erzurum, Turkey.

Raphignathus Dugés

Type species – *Raphignathus ruberrimus* Dugés, 1834.

Cheliceral bases fused to form a conical stylophore; peritremes arising from mid-basal part of stylophore, projecting to anterior margin of idiosoma; palptibial claw small; subcapitulum with 2 pairs of subcapitular setae and 2 pairs of adoral setae; podosoma with 3 shields, opisthosoma with a large shield; dorsum with 11-12 pairs of setae; one pair of eyes on lateral propodosomal shields; 2 pairs of aggenital setae, genital and anal shields each with 3 pairs of setae.

Key to the Turkish species of *Raphignathus*

- 1 Interscutal membrane dorsomedially with 1 pair of setae 2
- Interscutal membrane dorsomedially with 2 pairs of setae 4
- 2 Dorsum without small shields behind median prodorsal shield
. *R. fani* Doğan & Ayyıldız, 2003
- Dorsum with small shields behind median prodorsal shield 3
- 3 Setal formula of femora 6-5-3-2 *R. kuznetzovi* Doğan & Ayyıldız, 2003
- Setal formula of femora 6-6-4-4 *R. collegiatus* Atyeo, Baker & Crossley, 1961
- 4 Femur IV with 2 setae 5
- Femur IV with 3 setae 6
- 5 Palpfemur with 2 setae, coxa II with 2 setae *R. erzincanica* n. sp.
- Palpfemur with 3 setae, coxa II with 1 seta
. *R. atyeoi* Meyer & Ueckermann, 1989
- 6 Palpfemur with 2 setae 7
- Palpfemur with 3 setae *R. giresuniensis* n. sp.
- 7 Dorsum without small shields behind median prodorsal shield 8
- Dorsum with small shields behind median prodorsal shield
. *R. hecmatanaensis* Khanjani & Ueckermann, 2003
- 8 Setae e_1 reach to opisthosomal shield, $d_1-d_1 < e_1-e_1$ *R. gracilis* (Rack, 1962)
- Setae e_1 not reaching opisthosomal shield, the distances between d_1-d_1 and e_1-e_1 subequal *R. vahiti* n. sp.

Raphignathus collegiatus Atyeo, Baker & Crossley

Raphignathus collegiatus Atyeo, Baker & Crossley, 1961: 17; Atyeo, 1963: 185; Kuznetzov, 1976: 44; Zaher & Gomaa, 1979: 198; Vainstein & Kuznetzov, 1978: 150; Kuznetzov & Petrov, 1984: 100; Meyer & Ueckermann, 1989: 42; Fan & Yin, 2000: 91; Doğan & Ayyıldız, 2003: 146; Khanjani & Ueckermann, 2003: 305.

Raphignathus guiyuanensis Hu, Jing & Liang, 1995: 21.

Material examined – One female from moss, Güney, Denizli, 05 March 2002.

Distribution – China, Egypt, Iran, former USSR, Turkey and USA (ATYEO *et al.*, 1961; ATYEO, 1963; KUZNETZOV, 1976; VAINSTEIN & KUZNETZOV, 1978; ZAHER & GOMAA, 1979; KUZNETZOV & PETROV, 1984; MEYER & UECKERMANN, 1989; HU *et al.*, 1995; FAN & YIN, 2000; DOĞAN & AYYILDIZ, 2003; KHANJANI & UECKERMANN, 2003).

***Raphignathus gracilis* (Rack)**

Acheles gracilis Rack, 1962: 281

Raphignathus gracilis (Rack) Atyeo, 1963: 181; Gerson, 1968: 434; Vainstein & Kuznetzov, 1978: 150; Zaher & Gomaa, 1979: 198; Ehara, 1980: 248; Kuznetzov, 1976: 43; Charlet & McMurtry, 1977: 200; Kuznetzov & Petrov, 1984: 99; Meyer & Ueckermann, 1989: 39; Koç & Ayyıldız, 1996: 210; Khaustov & Kuznetzov, 1997: 80; Fan & Yin, 2000: 90; Kazmierski, 2000: 324; Mehrnejad & Ueckermann, 2001:6.

Materials examined – Two females from soil under *Astragalus* sp., Akveren Village, Hınıs, Erzurum, 19 March 2000; twelve females from moss, Ahmediye, Erzincan, 26 May 2001; one female from moss, Güney, Denizli, 05 March 2002; six females from moss, Âskale, Erzurum, 05. VIII. 2002.

Distribution – China, Egypt, former USSR, Germany, Iran, Israel, Japan, Poland, South Africa, Turkey and USA (RACK, 1962; ATYEO, 1963; GERSON, 1968; KUZNETZOV, 1976; CHARLET & MCMURTRY, 1977; VAINSTEIN & KUZNETZOV, 1978; ZAHER & GOMAA, 1979; EHARA, 1980; KUZNETZOV & PETROV, 1984; MEYER & UECKERMANN, 1989; KOÇ & AYYILDIZ, 1996; KHAUSTOV & KUZNETZOV, 1997; FAN & YIN, 2000; KAZMIERSKI, 2000; MEHRNEJAD & UECKERMANN, 2001).

***Raphignathus atyeoi* Meyer & Ueckermann**

(Figs 1-4)

Raphignathus atyeoi Meyer & Ueckermann, 1989: 32.

Materials examined – Five females from soil under *Astragalus* sp., Akveren Village, Hınıs, Erzurum, 19 May 2000; one female from soil, Akbayır Village, Hınıs, Erzurum, 19 May 2000.

Differential diagnosis – This species can be readily distinguished from other known species in this genus in that median shield bearing or not bearing c_1 , coxisternal shields absent, coxa II with one seta, legfemur IV with two setae and palpfemur with three setae. In all Turkish specimens dorsum without small shields behind median prodorsal shield.

Distribution – South Africa (MEYER & UECKERMANN, 1989) and Turkey (current paper).

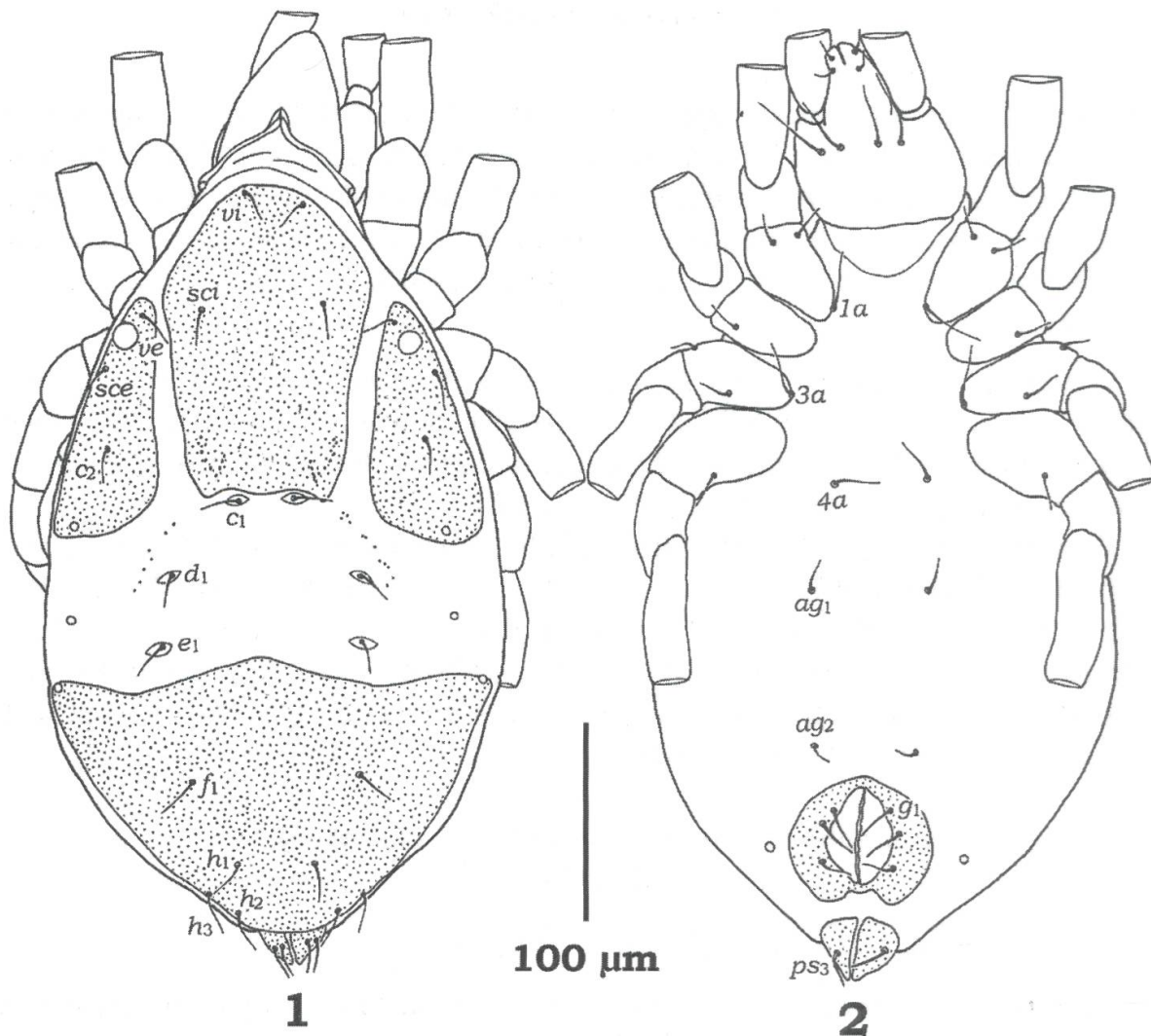
***Raphignathus hecmatanaensis* Khanjani & Ueckermann**

(Figs 5-6)

Raphignathus hecmatanaensis Khanjani & Ueckermann, 2003: 301.

Materials examined – Fifty-one females from soil in the nut grove, Delice, Kırıkkale, 16 May 2002; one female from moss, Güney, Denizli, 05 March 2002.

Differential diagnosis – This species closely resembles *R. summersi* Robaux, 1976 but differs in that (1) the setae h_3 on opisthosomal shield, (2) e_1 not reaching opistho-



FIGS 1-2.

Raphignathus atyeoi Meyer & Ueckermann (female) – 1. Dorsal view, 2. Ventral view.

somal shield and (3) only median shields partly striated. This species also resembles *R. aciculatus* Fan, 2000 but differs in that the palpfemur bears two setae. General features of Turkish specimens like that given by KHANJANI & UECKERMANN (2003) but setae c_1 not reaching bases of setae d_1 .

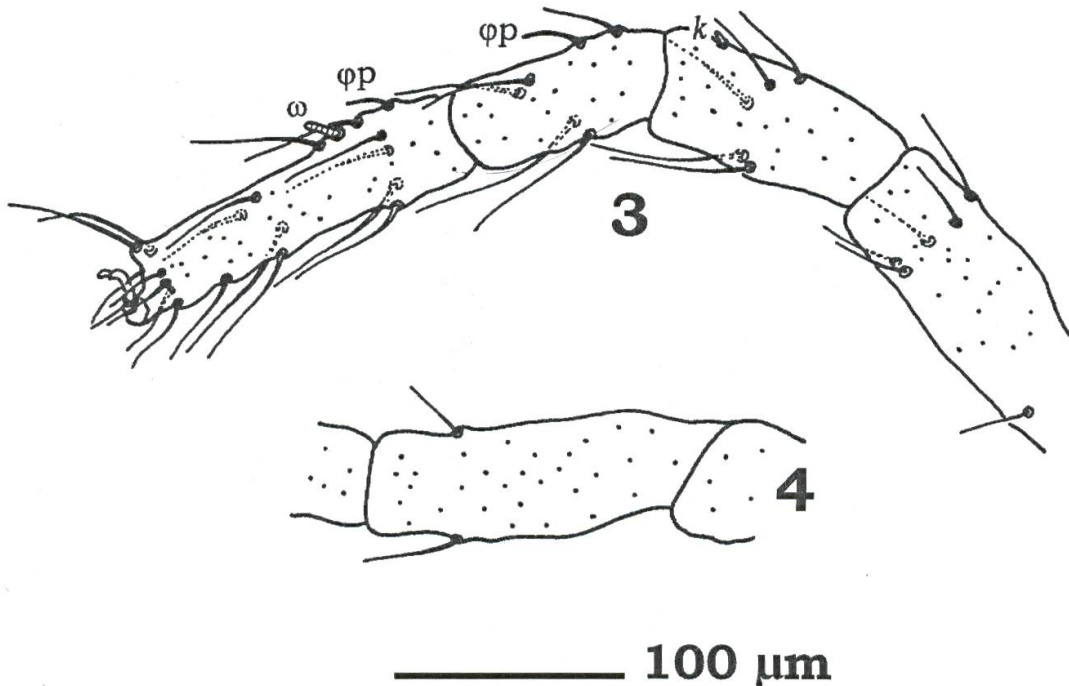
Distribution – Iran (KHANJANI & UECKERMANN, 2003) and Turkey (current paper).

***Raphignathus erzincanica* n. sp.**

(Figs 7-8)

FEMALE – Length of body 360, width 180.

Gnathosoma – Length of gnathosoma 60. Ventral with two pairs of adoral setae and two pairs of subcapitular setae, about equal in length, 34. Distances between $n-n$ 37, $m-m$ 16, $n-m$ 10. Dorsal stylophore with striae, 54 long, movable digits 33 long. Palpi 110, number of setae and solenidion on palpi (femur to tarsus): 2, 2, 3 + 1 claw, 4 + 1 ω + 4 eupathidia.



FIGS 3-4.

Raphignathus atyeoi Meyer & Ueckermann (female) – 3. Leg I, 4. Leg femur IV.

Dorsum – With one median and two lateral shields, without small shields behind median prodorsal shield. Opisthosoma with one opisthosomal shield. Median shield bearing three pairs of setae. Lateral shields each bearing three pairs of setae, one pair of eyes and one pair of cupules. Four pairs of setae and one pair of cupules on opisthosomal shield. Two pairs of setae, d_1 and e_1 , and one pair of cupules, located on interscutal membrane. All dorsal shields punctuated and only median shield finely and partly striated. Body surface striated between propodosomal and opisthosomal shields. Dorsal setae simple. Dimensions of setae as follows: $vi=ve=sce$ 30, $sci=c_2=f_1=h_1=h_2=h_3$ 27, $c_1=d_1=e_1$ 23. Distance between setae: $vi-vi$ 17, $sci-sci$ 38, $vi-sci$ 36, $ve-sce$ 20, $ve-c_2$ 57, $sce-c_2$ 45, c_1-c_1 17, $sci-c_1$ 80, d_1-d_1 64, e_1-e_1 70, d_1-e_1 63, f_1-f_1 40, f_1-h_1 50, h_1-h_1 16, h_2-h_2 44, h_1-h_2 17, h_3-h_3 67 and h_2-h_3 10.

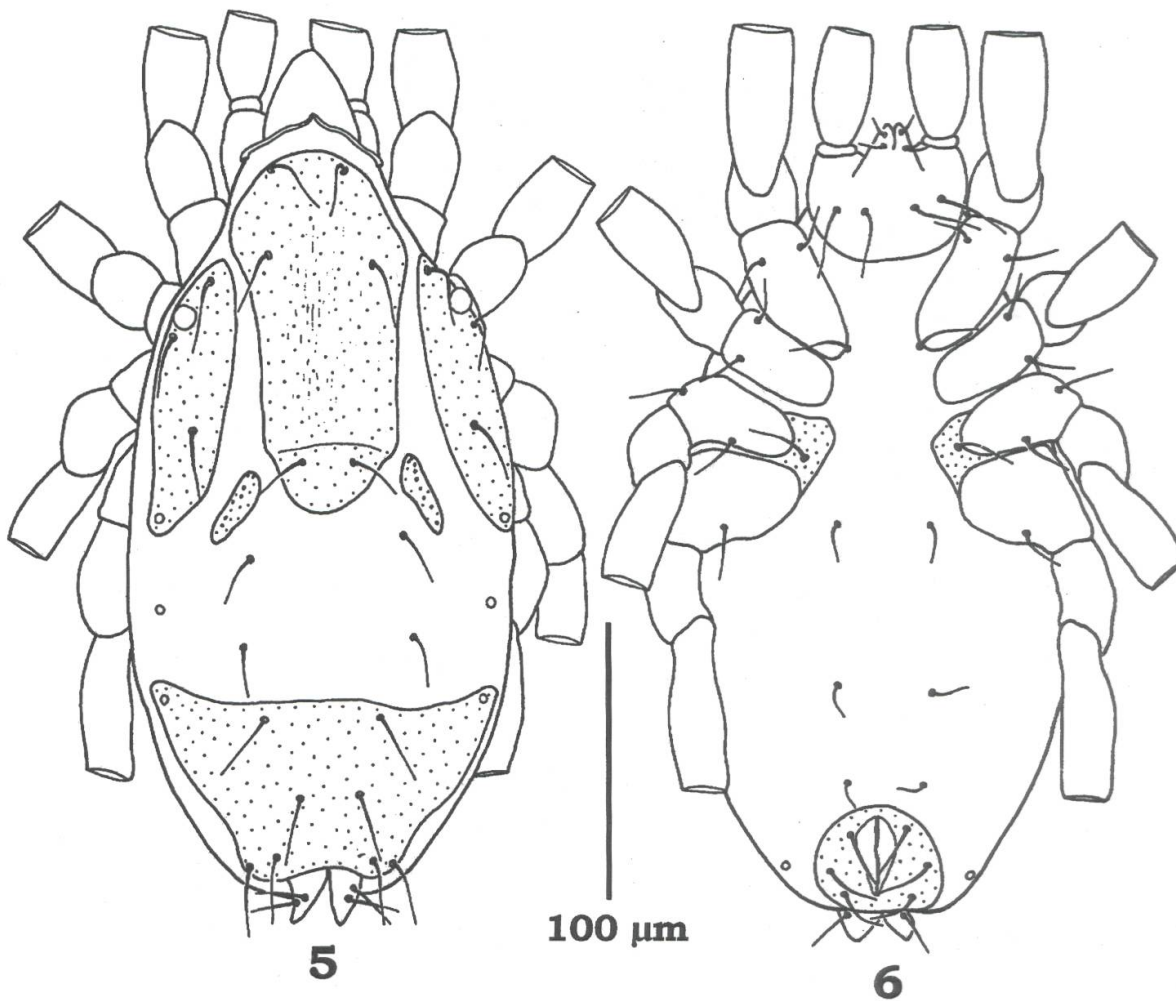
Venter – Venter striated, with coxisternal shield adjacent to coxae III and IV. Genital and anal shields each are bearing three pairs of setae. A pair of cupules located laterally on genital shields.

Legs – Leg I 323, leg II 267, leg III 277, leg IV 353. Number of setae (solenidia in parentheses) on leg segments as follows: tarsi 21($\phi p, \omega$)-16(ω)-14(ω)-13, tibiae 6(ϕp)-6(ϕp)-6(ϕp)-5(ϕp), genua 6(k)-6(k)-4-4, femora 6-5-3-2, trochanters 1-1-2-1, coxae 2-2-2-1.

MALE – Unknown.

Type material – Holotype female from moss, Ahmediye, Erzincan, 26 May 2001.

Etymology – The species name refers to the type locality, Erzincan.



FIGS 5-6.

Raphignathus hecmatanaensis Khanjani & Ueckermann (female) – 5. Dorsal view, 6. Ventral view.

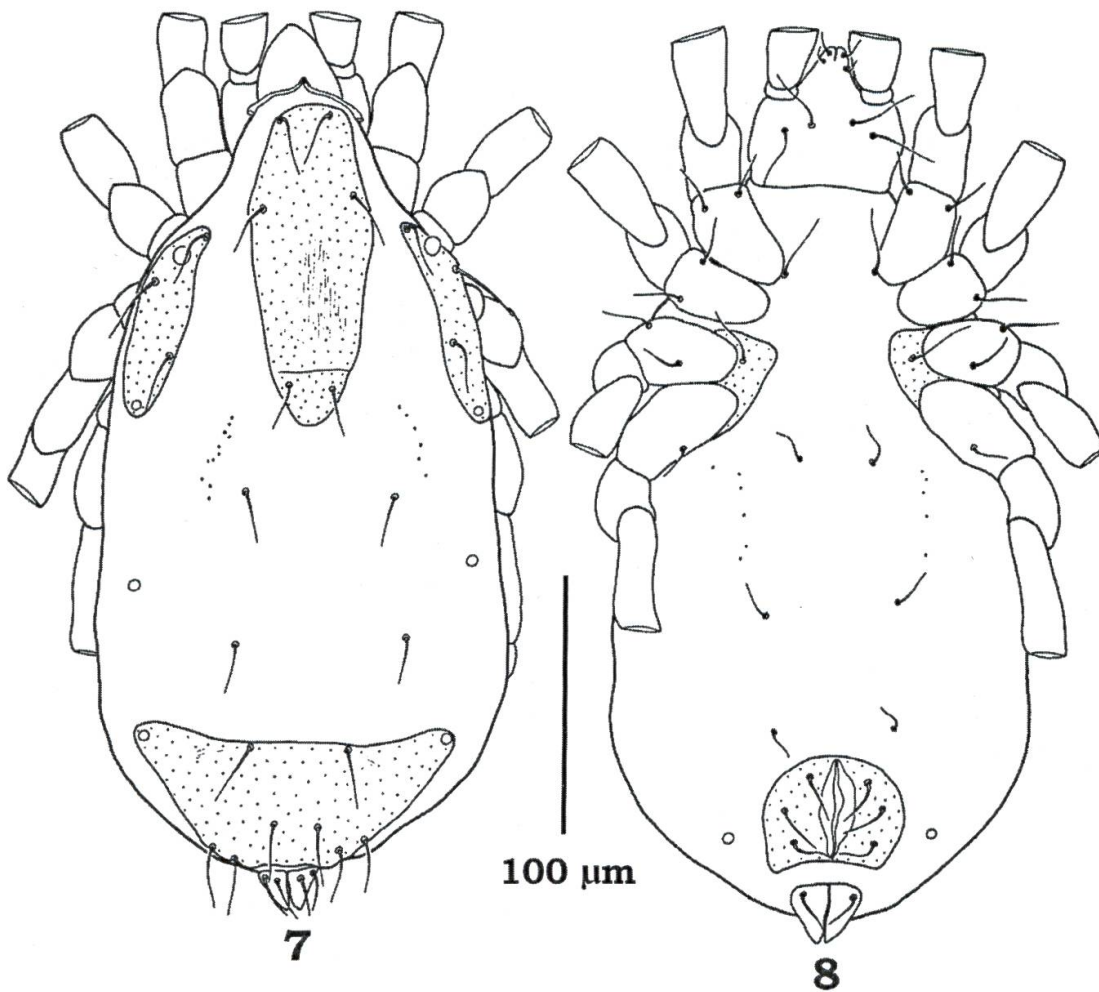
Differential diagnosis – This new species is similar to *R. hexeris* Chaudhri, Akbar and Rasool, 1979, *R. scutatus* Kuznetzov, 1976, *R. rarus* Kuznetzov, 1976, *R. tumidus* Kuznetzov, 1976, *R. atyeoi* Meyer and Ueckermann, 1989, *R. africanus* Meyer and Ueckermann, 1989 and *R. kamiensis* Meyer and Ueckermann, 1989 in that leg femur IV bears two setae and two pairs setae on interscutal membrane but can be distinguished from affine species by the following combination of characters: (1) dorsum without small shields near podosomal shields, (2) only median shield finely and partly striated, (3) palp-femur with two setae, (4) leg femur I with six setae and (5) leg femur II with five setae.

***Raphignathus giresuniensis* n. sp.**

(Figs 9-10)

FEMALE (Holotype) – Length of body 340, width 170.

Gnathosoma – Length of gnathosoma 60. Ventral with two pairs of adoral setae, two pairs of subcapitular setae, about equal in length 37, distances between *n-n* 37, *m-m*



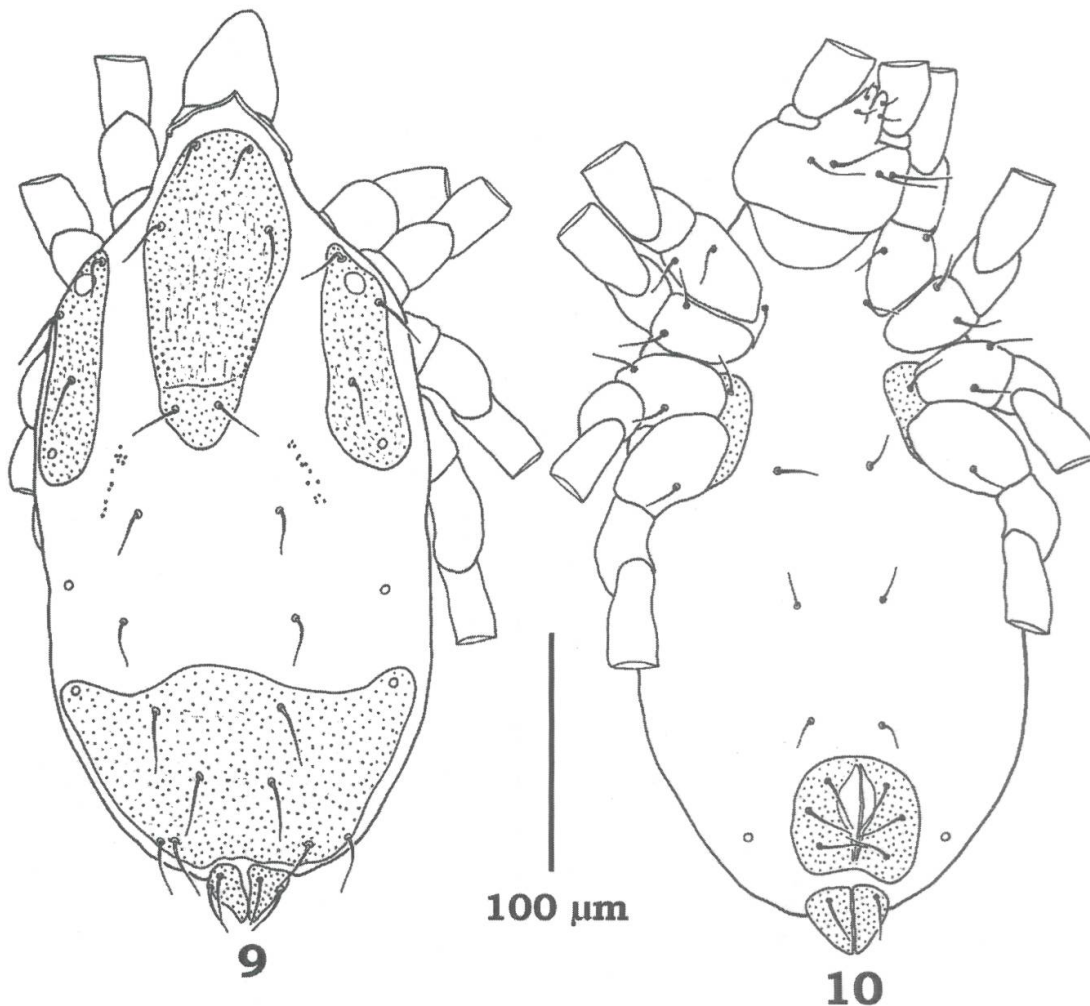
FIGS 7-8.

Raphignathus erzincanica n. sp. (female) – 7. Dorsal view, 8. Ventral view.

17, *n-m* 9. Dorsal stylophore with striae, 57 long, movable digits 37 long. Palpi 107, of setae and solenidion on palpi (femur to tarsus): 3, 2, 3 + 1 claw, 4 + 1 ω + 4 eupathidia.

Dorsum – Propodosoma with one median and two lateral shields separated by striae, without small shields behind median prodorsal shield. Opisthosoma with a large opisthosomal shield. Median shield bearing three pairs of setae. Lateral shields bearing three pairs of setae, one pair of eyes and one pair of cupules. Four pairs of setae and one pair of cupules on opisthosomal shield. Two pairs of setae, d_1 and e_1 , and one pair of cupules located on interscutal membrane. All dorsal shields punctuated and finely striated. Body surface striated between propodosomal and opisthosomal shields. Dorsal setae simple. Dimensions of setae as follows: $vi=ve=sci=sce=f_1=h_1=h_2=h_3$ 27, $c_1=c_2=d_1=e_1$ 24. Distance between setae: $vi-vi$ 20, $sci-sci$ 43, $vi-sci$ 33, $ve-sce$ 23, $ve-c_2$ 53, $sce-c_2$ 33, c_1-c_1 17, $sci-c_1$ 76, d_1-d_1 63, e_1-e_1 75, d_1-e_1 47, f_1-f_1 53, f_1-h_1 31, h_1-h_1 30, h_2-h_2 56, h_1-h_2 30, h_3-h_3 77 and h_2-h_3 13.

Venter – Setae *la* near coxa I. Coxae III and IV flanked by coxisternal shields with *3a*. Venter striated and with three pairs of setae. Three pairs of setae on genital and anal shields. One pair of cupules located lateral to genital shields.



FIGS 9-10.

Raphignathus giresuniensis n. sp. (female) – 9. Dorsal view, 10. Ventral view.

Legs – Leg I 313, leg II 240, leg III 257, leg IV 303. Number of setae (solenidia in parentheses) on leg segments as follows: tarsi 21($\varphi p, \omega$)-16(ω)-14(ω)-13, tibiae 6(φp)-6(φp)-6(φp)-5(φp), genua 6(k)-6(k)-4-4, femora 6-5-3-3, trochanters 1-1-2-1, coxae 2-2-2-1.

MALE – Unknown.

Type materials – Holotype female and one paratype female from moss, Gülburnu Village, Espiye, Giresun, 30 August 2002.

Etymology – The species name refers to the type locality, Giresun.

Differential diagnosis – This species resembles *R. scutatus* Kuznetsov, 1976 in having two pairs of setae on interscutal membrane, the same setation on palpfemur and on leg femur IV, but can be recognized by (1) tibiae III and IV bearing 6 and 5 setae, respectively, (2) tarsus II bearing 16 setae, (3) *ia* on lateral shields, (4) *im* on interscutal membrane, (5) setae e_1 not reaching opisthosomal shield and (6) dorsal shields with striae. This species also resembles *R. orientalis* Fan and Li, 1993 and *R. aciculatus* Fan, 2000 but can be distinguished by the following characters: (1) the distance between f_1 - f_1

clearly shorter than the distance between e_1 - e_1 , (2) setae e_1 not reaching opisthosomal shield, (3) dorsum not bearing small shields behind median propodosomal shields and (4) venter with coxisternal shields. This species further resembles *R. neogracilis* Robaux, 1976 but can be distinguished by the following characters: (1) dorsal shields with striae, (2) setae e_1 not reaching opisthosomal shield, (3) coxa I without coxisternal shields, (4) opisthosomal shield without lateral extensions and (5) tarsus III with solenidion ω .

***Raphignathus vahiti* n. sp.**
(Figs 11-12)

FEMALE (Holotype) – Length of body 393, width 217.

Gnathosoma – Length of gnathosoma 53. Ventral with two pairs of adoral setae, two pairs of subcapitular setae, about equal in length 31, distances between n - n 36, m - m 17, n - m 10. Dorsal stylophore with striae, 53 long, movable digits 33 long. Palpi 107, numbers of setae and solenidion on palpi (femur to tarsus): 2, 2, 3 + 1 claw, 4 + 1 ω + 4 eupathidia.

Dorsum – Covered by one median, a pair of lateral and one opisthosomal shield. No small shields behind median prodorsal shield. Median shield bearing three pairs of setae. Lateral shields reduced, bearing three pairs of setae, one pair of eyes and one pair of cupules. Four pairs of setae on reduced opisthosomal shield. Two pairs of setae and two pairs of cupules located on the interscutal membrane. Dorsal shields finely punctuated and striated. Body surface striated between podosomal and opisthosomal shields. Dorsal setae simple. Dimensions of setae as follows: $vi=ve=sci=sce=c_2=f_1=h_1=h_2=h_3$ 27, $c_1=d_1$ 20, e_1 23. Distance between setae: $vi-vi$ 20, $sci-sci$ 37, $vi-sci$ 40, $ve-sce$ 23, $ve-c_2$ 60, $sce-c_2$ 43, c_1-c_1 13, $sci-c_1$ 83, $d_1-d_1=e_1-e_1$ 73, d_1-e_1 70, f_1-f_1 39, f_1-h_1 24, h_1-h_1 23, h_2-h_2 50 and h_3-h_3 80.

Venter – Setae $1a$ near coxa I. Coxae III and IV flanked by coxisternal shields, with $3a$. Venter striated and with three pairs of setae. Three pairs of setae on genital and anal shields. One pair of cupules located lateral to genital shields.

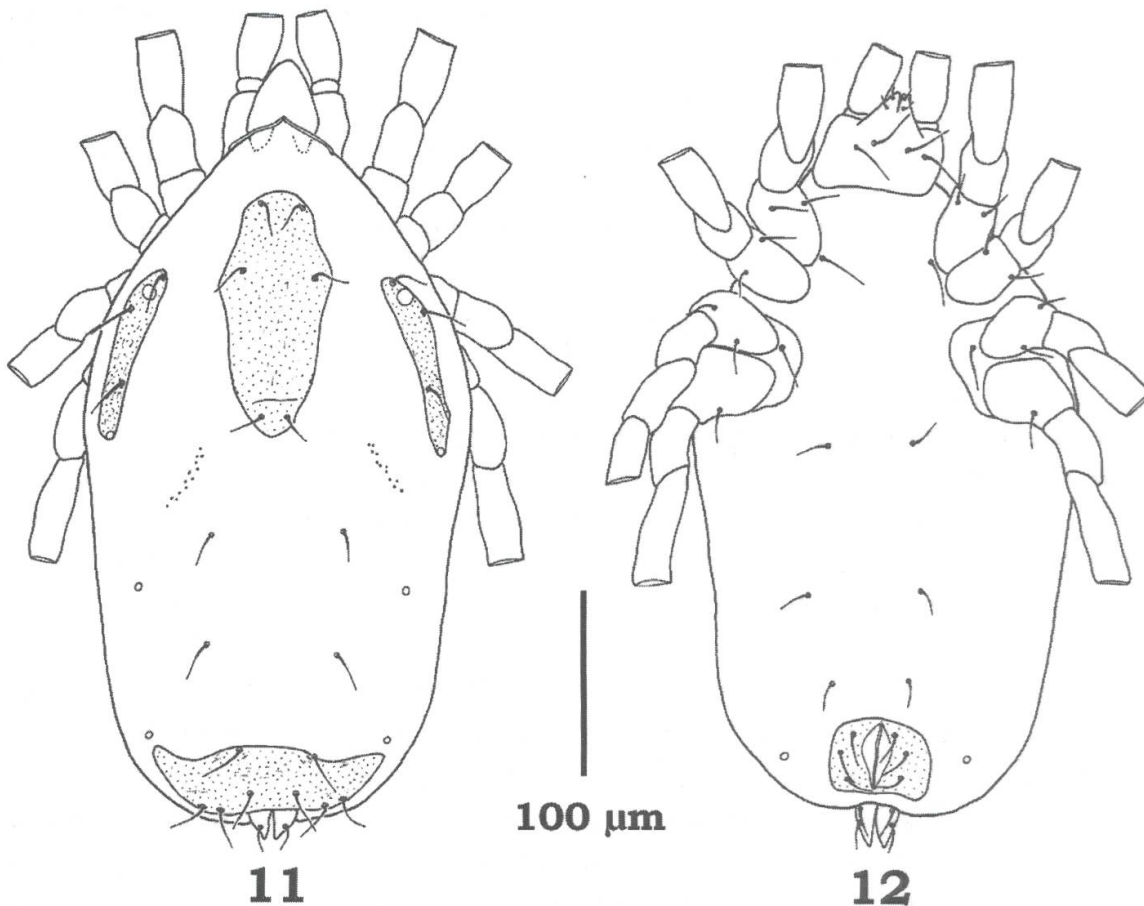
Legs – Leg I 317, leg II 263, leg III 270, leg IV 343. Number of setae (solenidia in parentheses) on leg segments as follows: tarsi 21($\varphi p, \omega$)-16(ω)-14(ω)-13, tibiae 6(φp)-6(φp)-6(φp)-5(φp), genua 6(k)-6(k)-4-4, femora 6-5-3-3, trochanters 1-1-2-1, coxae 2-2-2-1.

MALE – Unknown.

Type materials – Holotype female and one paratype female from the hollow of *Quercus* sp., Sungurlu, Çorum, 16 May 2002; one paratype female from moss, Ahmediye, Erzincan, 26 May 2001; two paratype females from litter under *Cupressus* sp., in the campus of Uludağ University, Görükle, Bursa, 10 September 2003.

Etymology – The species is named in honour of Dr. Vahit Bilaloglu, Atatürk University, Erzurum.

Differential diagnosis – This species resembles *R. gracilis* (Rack, 1962) and *R. giselae* Meyer and Ueckermann, 1989, in having two pairs of setae on interscutal membrane, the same setation on the palpi and legs, but can be distinguished by the



FIGS 11-12.

Raphignathus vahiti n. sp. (female) – 11. Dorsal view, 12. Ventral view.

following combination of features: (1) lateral and opisthosomal shields clearly smaller, (2) setae e_1 not reaching opisthosomal shield and (3) distances between d_1-d_1 and e_1-e_1 subequal.

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