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TWO NEW SPECIES OF THE GENUS RAPHIGNATHUS DUGÉS 
(ACARI: RAPHIGNATHIDAE) FROM IRAN

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RAPHIGNATHUS HAMADAN IRAN

SUMMARY: Two new species Raphignathus hecmatanaensis n. sp. and Raphignathus protaspus n. sp. are described from Iran. Raphignathus collegiatus Atyeo et al. is reported for the first time from Iran. A key to all the species of this genus is given.

RAPHIGNATHUS HAMADAN IRAN

RÉSUMÉ: Deux nouveaux Raphignathidae, Raphignathus hecmatanaensis n. sp. et R. protaspus n. sp d'Iran sont décrits Raphignathus collegiatus Atyeo et al'est signalé pour la première fois en Iran. Une clé des espèces du genre est fournie.


Raphignathid mites are recognized by the cervical peritremes not imbedded in dorsal surface of stylophore, confluent coxae and cheliceral bases fused forming a stylophore (Atyeo, 1963, Meyer & Ueckermann, 1989 and Zaher & Gomaa, 1979).

The idiosoma is covered with three prodorsal shields and one opisthosomal shield.

The family Raphignathidae contains only two genera namely: Raphignathus Dugès and Neoraphignathus Smiley & Moser). Two new Iranian species are described and Raphignathus collegiatus Atyeo et al. recorded for the first time from Iran.

MATERIAL AND METHODS

Mites in soil and humus samples taken under beneath shrubs and grass (Hamadan, West of Iran) were extracted with a Berlese funnel using one 40-watt light bulb. Mites were collected in 80 % ethanol. Mites cleared in lactophenol solution (Krantz, 1978) were mounted on microscope slides using Hoyer’s or Heinz PVA medium (Evans, 1992).

Measurements are in micrometer (µm). Legs were measured from the coxal base to pretarsi; body length was taken from the gnathosoma to posterior end of opisthosoma and breadth was measured at level of setae c₁.

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Genus **Raphignathus** Dugès, 1834

_Raphignathus_ Duges, 1834: 53;
Oudemans, 1923:138; Oudemans, 1927: 260;
Meyer (smith) & Ryke, 1960: 228;
Atyeo, 1963: 172-178; Chaudhri, _et al._, 1979:193;
Zaher & Gomaa, 1979: 198;

_Acheles_ Oudemans, 1903:10; Oudemans: 1927: 260;
Meyer (Smith) & Ryke, 1960: 231.

Type species: **Raphignathus ruberrimus** Dugès, 1834.

Small mites, propodosoma mostly with three shields, one median and two lateral, latter shields each with one pair of eyes, median propodosoma with two or three pairs of setae, one pair of small shields may be present posteriorly between median and lateral propodosomal shields. Stylophore conical, movable digits needlelike. Opisthosomal shield varies in shape. Coxae I-IV contiguous. _Raphignathus_ differs from _Neoraphignathus_ in that the dorsum of the idiosoma is covered with shields, whereas that of the latter is without shields.

**KEY TO THE SPECIES OF **Raphignathus **Dugès** (FEMALES)

1. Dorsal setae simple, setose or forked distally ........... 2
   Dorsal body setae long, clavate and serrate ................  
   2. Interscutal membrane dorsomedially with 2, 3, 4 or 5  
   pairs of setae ..................................  3
   3. Femur IV with 2 setae ................................  4
   Femur IV with 3 setae ................................  12
   4. Median prodorsal shield with 2 pairs of setae ...........  
      ..........................  R. evansi Zaher & Gomaa
   Median prodorsal shield with 3 pairs of setae ..........  5
   5. Lateral propodosomal shields reduced and opisthosomal
      shield small, interscutal membrane with 4 pairs of
      setae, setae c₁ on small platelet ..  
      ..........................  R. hsiufui Fan & Yin
   Lateral propodosomal shields not reduced, opisthosomal
   shield larger .................................... 6
   6. Dorsal setae f₁ on interscutal membrane or on anterior
      margin of opisthosomal shield; genital setae finely
      furcated distally  
      ..........................  R. karrooi Meyer & Ueckermann
   Dorsal setae f₁ located caudal of anterior margin of
   opisthosomal shield; genital setae simple .................. 7
   7. Coxae II of female with 1 seta; tibial claw of palp slender
      and spinelike  
      ..........................  R. atyeoi Meyer & Ueckermann
   Coxae II of female with 2 setae, tibial claw more robust and
   uncinate ....................................... 8
   8. Dorsum with a pair of oval platelets posterolateral to
      median prodorsal shield  
   .......................... R. africanus Meyer & Ueckermann
   Small platelets absent ................................ 9
   9. Coxae II with 2 setae ................................ 10
   Coxae II with 1 seta ................................ R. rarus Kuznetzov
   10. Tibiae 6-6-6-5 (including solenidia) ................. 11
   Tibiae 6-5-5-4 .................................. R. scutatus Kuznetzov
   11. Femora 6-5-3-2 .................................. R. tumidus Kuznetzov
   Femora 6-4-3-2 .......................... R. kamienisi Meyer & Ueckermann
   Femora 5-4-3-2 .......................... R. hexeris Chaudhri, Akbar & Rasool
   12. Median prodorsal shield with 3 pairs of setae ....... 13
   Median prodorsal shield with 2 pairs of setae ..........  
   .......................... R. ehari Zaher & Gomaa
   13. Small shields present posterolateral to median prodorsal
      shield ........................................ 14
   Small shield absent ................................ 16
   14. Opisthosomal shield with seta f₁ close to anterior mar-
      gin; endopodal shield present  
   .......................... R. scutatus Kuznetzov
   Opisthosomal shield with seta f₁ well behind anterior mar-
      gin of shield; endopodal shield absent  
   .......................... R. aciculatus Fan & Yin
   15. Seta f₂ seemingly on large platelets not separated from
      opisthosomal shield; legs also longer especially leg IV (270-
      344) .................................. R. hscmatanaensis n. sp.
   Seta f₁ located off, opisthosomal shield on striated integu-
      ment; legs short especially leg IV (180) ...............  
   .......................... R. summersi Robaux
   16. Palpfemur with 2 or 3 setae ....................... 17
   Palpfemur with 1 seta ................................ R. membranus Fan & Yin
   17. Palpfemur with 3 setae .......................... 18
   Palpfemur with 2 setae .......................... 20
   18. Integument between prodorsal and opisthosomal
      shields with 2 pair of setae ............... 
   .......................... R. aethiopicus (Meyer & Ryke)
   Integument with 3 pairs of setae  
   .......................... R. evidus Fan & Yin
   19. Dorsal shields somewhat reduced, seta f₁ close to an-
      terior margin of opisthosomal shield  
   .......................... R. orientalis Fan & Li
   Dorsal shields larger, seta f₁ well behind anterior margin of
   opisthosomal of shield  
   .......................... R. neogracilis Robaux
   20. Dorsal shields not reduced, interscutal membrane with
      2 pairs of setae  
   .......................... R. evidus Fan & Yin
   21. Dorsal shields much reduced, interscutal membrane with 5
      pairs of setae, f₂ on or off opisthosomal shield  
      .......................... R. evidus Fan & Yin

Type species: **Raphignathus ruberrimus** Dugès, 1834.
21. Genital covers with 3 pairs of setae ........................ 22
   Genital covers with 4 pairs of setae ............................
   ..................  R. sceptrum Chaudhri, Akbar & Rasool.
22. Dorsal setae slightly serrated or smooth ............ 23
   Dorsal setae distally serrated, forming forked tips ..........
   ..................  R. faricetosus Meyer & Ueckermann
23. Dorsal setae relatively short (23-34), setae vi and ve on anterior fifth of median prodorsal shield, seta f1 usually just behind anterior margin of opisthosomal shield ....... 24
   Dorsal setae relatively long (34-46), seta vi and ve on anterior three-fifths of median prodorsal shield, seta f1 usually on anterior margin ..................  R. gracilis (Rack)
24. Dorsal shields some what reduced, opisthosomal shield rectangular lateral margin slightly concave ..........................
   ..................  R. gisela Meyer & Ueckermann
   Dorsal shields larger, opisthosomal shield with lateral margin not concave but bend ventrally .................................
   ..................  R. bakeri Zaher & Gomaa
25. Tibia I with 1 solenidion ................................. 26
   Tibia I with 2 solenidion ........................................
   ..................  R. cardinalis (Ewing)
26. Tibia I with 1 solenidion ................................. 27
   27. Geni IV with 4 setae .............................. 28
      — Genii IV with 3 setae ....  R. hirtellus Atius-Henriot
28. Members of seta d far apart almost in line with c2, seta f1 further apart than members of h1, setae f1 and f2 equal in length ..........................  R. conspicus (Berles)
   Members of seta d closer together, distance between these setae twice the distance between members of c1, setae e1 and f1 longitudinally in line, seta f2 much shorter than f1, ..............  R. neocardinatis Atyeo
29. Femur IV with 3 or 4 setae .............................. 31
   Femur IV with 2 pairs setae .................................. 30
30. Genu II with 6 setae ............................. 32
   Genu II with 5 setae ............................. 33
   — Genu II with 4 setae .... R. costatus Chaudhri, Akbar & Rasool
31. Femur IV with 3 setae .............................. 32
   Femur IV with 4 setae .................................. 33
32. Members of setae d close together, almost longitudinally in line with c1, setae c2, ..............  R. cometates Atyeo
   Members of setae d almost longitudinally in line with setae c2, .................................. R. ensipilosus Meyer & Ueckermann
33. Most dorsal setae much longer than the distances between their bases and those of consecutive setae ... 34
   Dorsal setae much longer as long as or almost as long as distances between their bases and those of consecutive setae ...........  R. bathursti Meyer & Ryke
34. Setae e1 close to anterior margin of opisthosomal shield, cupule in on integument 2 small shields on interscutal integument, very small ...............  R. colletigatus Atyeo, Baker & Womersley
   Setae e1 well behind anterior margin on opisthosomal shield, cupule in on shield; 2 shields on interscutal integument much larger ..................  R. protasps n. sp.

**Raphignathus hecmanataensis** n. sp.

**Figs. 1-6**

**Diagnosis.** — This species is closely related to *R. gracilis* (Rack), but differ from it in that the legs are shorter, leg IV is shorter than body, opposed to as long as or longer than the body in *R. gracilis*. In this new species the dorsal setae are shorter varying between 16 -35, opposed to 30-46 in *R. gracilis*; one pair of small shields are usually present posteriorly between median and lateral prodorsal shield, but is absent in *R. gracilis*. Two specimens of the new species apparently are without the two pairs of small shields.

**Female** — Dimensions of holotype (measurements in parenthesis are variation in paratype): Length of body including gnathosoma 356 (293-419), length of body excluding gnathosoma 301 (254-369), width 198 (164-198).

Gnathosoma — Subcapitulum ventrally with two pairs of very long setae (m and n) and two pairs of adoral setae (or1,2); stylophore cone—shaped and striated; peritreme as indicated in Fig. 3; palp (Fig. 4) chaetotaxy as follows: tarsus with four setae + four eupathidia + one solenidion, tibia with one small claw + three setae, genu and femur each with two setae.

Dorsum (Figs. 1-2). — Median prodorsal shield spherical anteriorly and narrow posteriorly, bearing three pairs of setae and suture remnants dsj, which also occur on the two small shields on interscutal membrane. Each lateral prodorsal shield with one pair of eyes and three pairs of setae, interscutal membrane with two pairs of setae, (d and e) situated on small platelets; opisthosomal shield with four pair of setae (setae f1f2 and h1-h2); setae f2 seem to be on small shields not separated from opisthosomal shield; dorsum also with three pairs of cupules, one pair posterior to setae e2, one on integument lateral to e and one pair on anterolateral corner of opisthosomal shield.
shield (Fig. 1). Dorsal setae as depicted in Fig. 2. Dimension of dorsal setae as follows (measurements in parentheses are variations in paratypes) setae vi 32 (22-32), ve 32 (22-32), sce 35 (22-32), sce 28 (22-32), c1 22 (15-22), c2 28 (15-28), d 22 (15-22), e 25 (15-22), f1 28 (19-25), f2 25 (18-25), h1 22 (18-22), h2 25 (18-22).

Venter (Fig. 5) — Endopodal shields small and associated with coxae I-IV; anogenital area with one pair of aggenital setae (ag) and three pairs of genital setae (g1, g2, g3), in one specimen there are three setae on one side and four setae other side of genital opening; anal shield with three pairs of anal setae (ps1, ps2, ps3) (Fig. 5). Cupule lh lateral to genital aperture.

Legs (Fig. 6) — Measurements in parentheses are variations in paratypes: Leg I 287 (239-324), leg II 236 (214-252), leg III 249 (216-271), leg IV 302 (270-334); chaetotaxy of leg segments from coxae to tarsi (solenidia in parentheses) as follows, coxae 2-2-2-1, trochanters 1-1-2-1, femora 6-5-3-3, genu 5 + k-5 + k-4-4, tibia 5(1)-5(1)-5(1)-4(1), tarsus 19(2)-15(1)-13(1)-13; tarsus I figured in figure 6.

MALE: Unknown.

Type Material. — Female holotype collected from grass in Hamadan, College of Agriculture, Bu Ali Sina University, altitude 1923m, 26 August 2001, Ali Azizi; four female paratypes were collected from soil covered with wheat, Kabutarahang, altitude 1905m, 27 October 1994, J. Eslami; one paratype female from Astragalus sp., Kermanshah (altitude 2010m), 23 September 1996, M. Khanjani; one paratype female from Sophora pachycarpa C.A. & May, Saleh-Abad (altitude 1893m), 16 August 1996, M. Khanjani; one paratype female from Glycyrrhiza glabra L, 1 January 1994; Tuiserkan (altitude 1933m), R. Soltani.

Type specimens are deposited in the National Collection of Arachnida of ARC-Plant Protection Research Institute, Pretoria, South Africa and Collection of Department Plant Protection, University of Bu-Ali Sina, Hamadan, Iran.

Etymology: The name “hecmatanaensis” is derived from Hecmatanae, the capital of Mades one of the provinces of the old Mede-Persian Empire about 3000 years ago. The center of Hamden today is where this old city is located.

R. protaspus n. sp.
(Figs. 7-13)

DIAGNOSIS. — R. protaspus resembles R. collegia-Thus Atyeo et al., but can be distinguished from the latter as follows: Setae e well behind anterior margin of opisthosomal shield, with cupule im on the shield and small shields posterolateral to median prodorsal shield and endopodal shields associated with coxae III and IV much larger.

FEMALE — Dimensions of female holotype (measurements in parentheses are variations in paratypes): length of body (including gnathosoma) 507 (491-516), length of body (excluding gnathosoma) 400 (384-412) and width 233 (230-268).

Gnathosoma. — Subcapitulum with two pairs of long setae (n-m) and two pairs of pilose adoral setae (or1-2), equal or subequal in length to setae m; stylophore conical; peritreme as depicted in Fig. 9; palp (Fig. 10) chaetotaxy as follows: tarsus with four eupathidia + four simple setae + one solenidion, tibia with a small claw + three setae, genu with two setae, femur with three setae.

Dorsum (Fig. 7-8) — Body broadly oval, prodorum with median and lateral shields; median shield, with three pairs of setae; each lateral shield ovoid with one pair of eyes and three pairs of setae; a pair of nonsetiferous platelets (with dsj) posterolateral to median prodorsal shield. Setae ds on small platelets on intercostal membrane opisthosomal shield large and bearing five pairs setae (Fig. 7); setae e well behind anterior margin of opisthosomal shield; dorsal body setae smooth (Fig. 8); all dorsal shields punctuate; dorsum with three pairs of cupules, one pair on posterior margins of lateral prodorsal shields and two pairs on opisthosomal shield; im situated on or near anterolateral margin. Anal shield terminal. Lengths of dorsal setae as follows (measurements in parentheses are variations in paratypes) setae vi 22 (22-25), ve 28 (25-28), sce 25 (25-28), sce 25 (25), c1 25 (22-25), c2 25 (22-25), d 25 (22-25), e 22 (22), f1 22 (19-22), f2 19 (19-22), h1 16 (16-19), h2 19 (19-22).

Venter (Fig. 11). — Coxal group I-II and III-IV with endopodal shields with latter much larger, ano-
genital area with one pair of aggenital setae (ag), genital shield with three pairs of setae (g1,3), anal shield with three pairs of setae (ps1,3).

Legs (Fig. 12) — Measurements in parentheses are variations in paratypes: Leg I 343(350-383), leg II 290 (299-328), leg III 312 (302-334), leg IV 384 (365-406); number of setae and solenidia (in parentheses) on leg segments are: coxae 2-2-2-1, trochanters 1-1-2-1, femur 6-6-4-4, genu 5 + k-5 + k -4-4, tibia 5(1)-5(1)-5(1)-4(1), tarsi 19(2)-15(1)-13(1)-13; tarsus I as depicted in Fig. 12.


The tritonymph closely resembles the female in most respects, chaetotaxy of palp segments (tarsus to femur): 8(1)-3 + 1claw-2-3; number of setae on some leg segments (coxae to tarsi) differs from those of female as follows: coxae 2-1-2-0, trochanters 1-1-1-1, femora 6-6-4 -2, genu 5 + k-5 + k-4-2, tibiae 5(2)-5(1)-5(1)-4(1), tarsi 19(2)-15(1) -13(1)-9. It further differs from the female in that the anal opening is located posteroverterally, genital aperture reduced, and bears only one pair of genital setae (Fig. 13).

Type Material. — Female holotype collected from *Medicago sativa* L. Hamadan, 10 October 2000, M. Khanjani; one female paratype from *Sophora pachycarpa* C. A. Mey., Asad-Abad, 14 August 1994, M. Khanjani; one paratype female, from barely, Kabutarahang, 19 December 1994, J. Eslami; two paratype females from *Medicago sativa*, Hamadan, 20 August 200, M. Khanjani; one paratype female from wheat, Kabutarahang, 19 December 1994, J. Eslami; one paratype female from *M. sativa*, Hamadan (Arablo), 16,

Etymology — The name of this species is derived from the Latin word *protectus*, meaning to “cover or protect” and the Greek word *aspis*, meaning “shield”.

*Raphignathus collegiatus* Atyeo, Baker & Crossley

*Raphignathus collegiatus* Atyeo, et al., 1961: 17; Kuznetsov & Petrov, 1984: 100;

This species can be recognized by the following combination of characters: Dorsal body setae short, much shorter than distances to adjacent setae; intercutal membrane with setae *d* and cupules *im*; setae *e* close to anterior margin of opisthosomal shield; platelets posterolateral to median prodorsal shield small; tibia I with two solenidia; femur IV with four setae and palp femur with three setae.

Material Studied -One female, collected from soil underneath *Glycyrrhiza glabra*, 27 July, 1993, Malayer (Marvil), M. Khanjani

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REFERENCES


