

## A review of the Iranian Cheyletidae (Acari: Prostigmata)

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### Abstract

Two species of the family Cheyletidae (Acari: Prostigmata), *Lepidocheyla gracilis* VOLGIN, 1963 and *Cheletomimus vescus* (QAYYUM & CHAUDHRI, 1979), are recorded from Iran for the first time. Both sexes of the latter species are re-described. A key to the 18 genera and 28 species known from Iran is provided.

**Keywords:** mites, Cheyletidae, Iran, fauna

### Introduction

The cosmopolitan family Cheyletidae (Acari: Prostigmata) includes more than 360 predacious and parasitic species arranged in 73 genera (BOCHKOV & FAIN, 2001). About 78% of these species are predators, while the remaining taxa are permanent parasites of mammals and birds (BOCHKOV, 2004).

Up to now, the list of these mites from Iran included 26 species in 17 genera (VERCAMMEN-GRANDJEAN & RACK, 1968; BOCHKOV & MALIKOV, 1996; FATHIPOUR *et al.*, 1999; ARDESHIR *et al.*, 2000; FAIN & ARDESHIR, 2000; MEHRNEJAD & UECKERMANN, 2001; BOCHKOV *et al.*, 2001; for a complete bibliography of Iranian authors see KAMALI *et al.*, 2001; AHADIYAT *et al.*, 2004). As most cheyletid genera are distributed worldwide (BOCHKOV, 2004), more records could be expected from Iran, and herein we add two more species that are new for Iran, *Lepidocheyla gracilis* VOLGIN, 1963 and *Cheletomimus vescus* (QAYYUM & CHAUDHRI, 1979). The latter was poorly described and is known only from the type specimens (FAIN *et al.*, 2003). Therefore we re-describe both sexes of *C. vescus* and provide a key to all known Iranian cheyletids, along with their recently recognized synonymies, to avoid possible confusion in the future.

## Methods

In the descriptions the leg and idiosomal chaetotaxy follows GRANDJEAN (1939, 1944) as interpreted by KETHLEY (1990), with a single exclusion. In our opinion, setae *4c sensu* KETHLEY (setae of coxae IV) are actually agenital setae, as was suggested by GRANDJEAN for the family Stigmaeidae (1944). All measurements are in micrometers ( $\mu\text{m}$ ). The family system follows BOCHKOV & FAIN (2001).

## Systematics

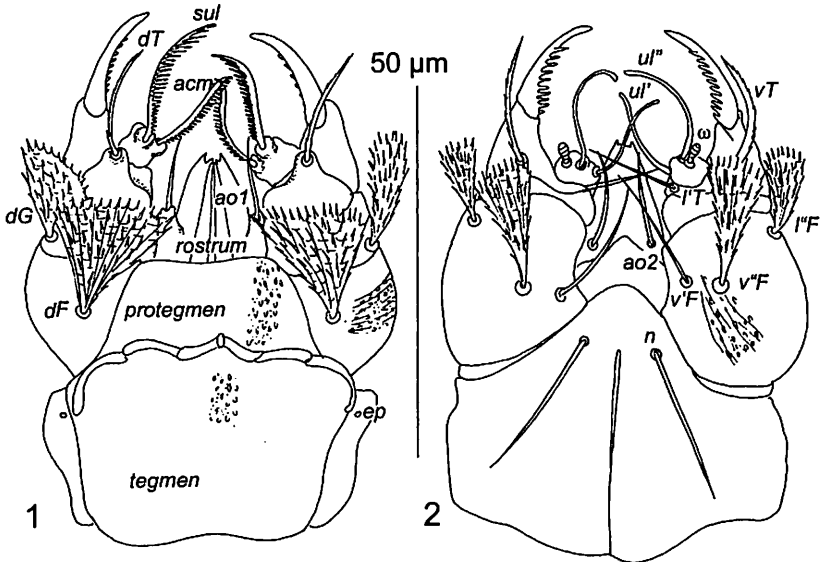
### *Cheletomimus (H.) vescus* (QAYYUM & CHAUDHRI, 1979)

*Hemicheyletia vescus* QAYYUM & CHAUDHRI, 1979: 167-169.

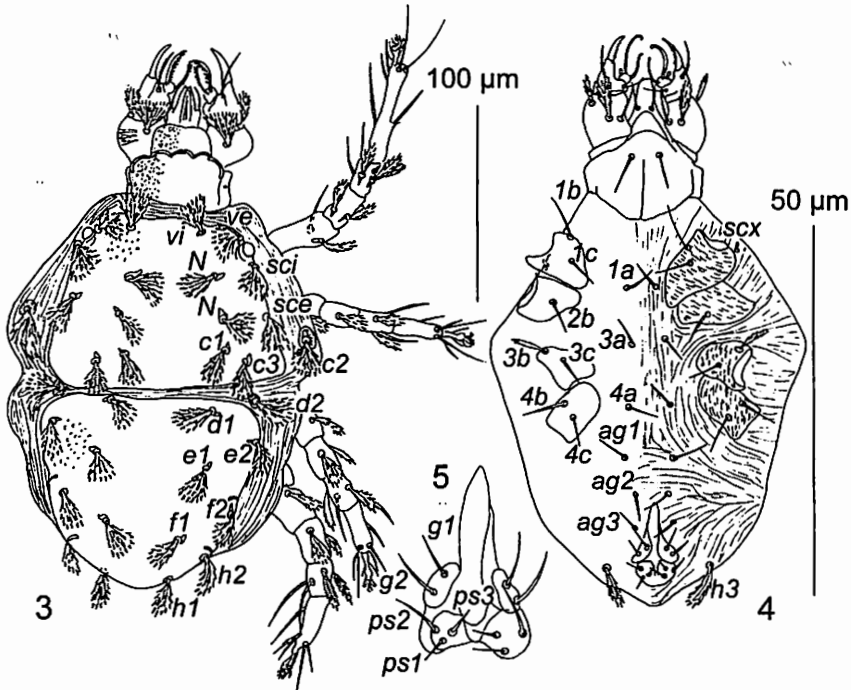
*Hemicheyletia laguncula* RASOOL & CHAUDHRI, 1979: 4-5.

*Cheletomimus (Hemicheyletia) vescus*, FAIN *et al.*, 2003: 38.

*Female* (3 specimens, Figs 1-9). Gnathosoma 56-65 long and 65-70 wide (Figs 1, 2). Palpal claw with 9-10 teeth. Setae *d* and *v* of palpal tibia thickened, serrate. Palpal femur 35-40 long and 25-27 wide. Setae *v'* and *l''* of palpal femur fan-like, *v'* filiform. Peritremes with 3 pairs of links. Tegmen and protegmen distinctly granulated. Rostrum conical, about 15 long and 20 wide. Idiosoma 220-230 long and 170-180 wide (Figs 3, 4). All dorsal setae fan-like, subequal in length, about 17 long and 15 wide. Dorsal shields distinctly granulated, covering almost all dorsal surface of idiosoma. Median setae of dorsal shields the same shape as lateral setae. Propodonotal shield 105-110



Figs 1-2. *Cheletomimus vescus* QAYYUM & CHAUDHRI, 1979, female. 1: gnathosoma dorsally. 2: same, ventrally.

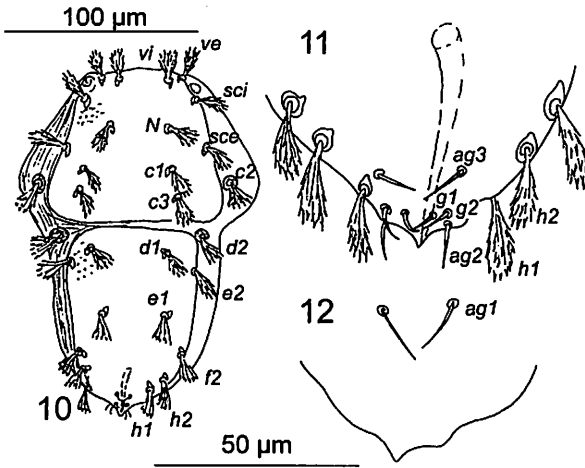


Figs 3-5. *Cheletomimus vescus* QAYYUM & CHAUDHRI, 1979, female. 3: dorsally. 4: ventrally. 5: vulva. Scale lines 100  $\mu\text{m}$  (Figs 3, 4) and 50  $\mu\text{m}$  (Fig. 5).

long and 130-140 wide, bearing 4 pairs of lateral setae (*vi*, *ve*, *sci*, *sce*), and 4 pairs of median setae (*c1*, *c3*, two neutrichial). Setae *c2* situated on small separate plates. Setae *d2* situated off hysteronotal shield. Hysteronotal shield unbroken, 105-110 long and 120-125 wide, bearing 3 pairs of lateral (*e2*, *f2*, *h2*) and 4 pairs of median (*d1*, *e1*, *f1*, *h1*) setae. Dorsal interscutal areas striate-granulate. Setae *h3* fan-like, situated ventrally. Setae *3b* lanceolate, other ventral setae, including *ps3*, filiform. Leg chaetotaxy depicted in Figs 6-9. Tibia I with 5 setae (*d*, *l'* and *l''* lanceolate and *v'*, *v''* serrate, filiform). Solenidion of tarsus II situated ventrally. Tibiae II-IV with 4 setae (*d*, *l''* - lanceolate, *v'*, *v''* filiform serrate). Genu IV with 2 lanceolate setae (*d*, *l'*). Seta *v* filiform on femora I-II and lanceolate on femur III.

*Homeomorphic male* (1 specimen, Figs 10-12). Gnathosoma 60 long and 55 wide, the same structure as in female. Idiosoma 175 long and 115 wide. Propodonotal shield 70 long and 70 wide, bearing 4 pairs of lateral setae (*vi*, *ve*, *sci*, *sce*) and 3 pairs of median setae (*c1*, *c3*, neutrichial). Setae *c2* situated on small separate plates. Setae *d2* situated off hysteronotal shield. Hysteronotal shield 80 long and 60 wide, bearing 3 pairs of median setae (*d1*, *e1*, *h1*) and 3 pairs of lateral setae (*e2*, *f2*, *h2*). Two pairs of genital (*g1-2*), 3 pairs of agenital (*ag1-3*) filiform setae present.





Figs 10-12. *Cheletomimus vescus* QAYYUM & CHAUDHRI, 1979, male. 10: idiosoma dorsally. 11: opisthosoma dorsally. 12: same, ventrally. Scale lines 100 µm (Fig. 10) and 50 µm (Figs 11, 12).

### *Lepidocheyla gracilis* VOLGIN, 1963

*Lepidocheyla gracilis* VOLGIN, 1963: 940-944.

**Material examined:** One female, IRAN: Tehran Prov., Karaj, Eshtehard, 35° 43' 15" N, 050° 22' 20" E, cotton field, manure (extracted with BERLESE's funnel), 26. VII. 2004 (Coll. M. HAKIMITABAR).

**Distribution:** Ukraine, Tajikistan, Turkmenia, Israel (VOLGIN, 1978; FAIN & BOCHKOV, 2001), Iran (new record).

### Key to the Cheyletidae of Iran (females)

**Remarks:** (i) *Cheletomimus binus* TSENG, 1973, recorded by FATHIPOUR *et al.* (1999) is actually *inquirendae* (FAIN *et al.*, 2003), as it was described from nymphs, probably of *Cheletomimus berlesei* (OUDEMANS, 1904).

(ii) *Psorergates simplex* (TYRRELL, 1883) listed among the Cheyletidae by KAMALI *et al.* (2001) belongs to the family Psorergatidae (Acari: Cheyletoidea).

(iii) *Acaropsellina sollers* (KUZIN, 1940) was incorrectly identified by FATHIPOUR *et al.* (1999) as *A. docta* (BERLESE, 1906). The genus *Acaropsellina* is represented in Iran by the widely distributed *A. sollers* (ARDESHIR *et al.*, 2000).

1. Eupathidia of palpal tarsus *sul* and *acm* (or only *sul*) comb-like. Palpal

- claws curved laterally. Claws of tarsi II-IV present. Setae *h2* subequal in length to other lateral hysteronotal setae. Free-living mites ..... 4
- Eupathidia *sul* and *acm* of palpal tarsi without comb-like teeth. Palpal claws curved dorso-ventrally. Tarsal claws of all legs absent. Setae *h2* distinctly longer than other lateral hysteronotal setae. Parasites of Lagomorpha or Carnivora ..... 2  
*Cheyletiellini* VOLGIN, 1961
2. Peritremes with 14-15 pairs of segments. Lateral segments with inner projections. Propodonotal shield with 2 pairs of median setae, *c1* and *c3*. Parasites of Leporidae and Carnivora ..... 3  
*Cheyletiella* CANESTRINI, 1886
- Peritremes with 6-10 pairs of segments. Lateral segments without projections. Setae *c1* and *c3* absent. Parasites of Ochotonidae .....  
*E. faini* BOCHKOV et MALIKOV, 1996  
*Eucheyletiella* VOLGIN, 1969
3. Setae *d1* and *d2* subequal in length. Solenidion of genu I globosely inflated. Parasites of rabbits .. *Cheyletiella parasitivorax* MÉGNIN, 1878
- Setae *d2* 1.5-2 times longer than *d1*. Solenidion of genu I bifurcate. Parasites of dogs ..... *Cheyletiella yasguri* SMILEY, 1965
4. Pretarsus of tarsus I present, bearing claws and empodium ..... 6
- Pretarsus of tarsus I absent ..... 5  
*Cheletogenini* VOLGIN, 1969
5. Palpal claws with projections. Eyes present .....  
*C. ornatus* (CANESTRINI & FANZAGO, 1876)  
*Cheletogenes* OUDEMANS, 1905
- Palpal claws smooth. Eyes absent ..... *E. frater* VOLGIN, 1958  
(= *E. africanus* Wafa & SOLIMAN, 1968)  
*Eutogenes* Baker, 1949
6. Guard seta (*ft*) of solenidion  $\omega_1$  on tarsi I filiform ..... 10
- Guard seta (*ft*) of solenidion  $\omega_1$  on tarsi I lanceolate or fan-like ..... 7
7. Solenidion  $\omega_1$  situated in basal or median part of tarsus I. Guard seta (*ft*) situated immediately behind solenidion  $\omega_1$  ..... 8  
*Cheyletiini* VOLGIN, 1969
- Solenidion  $\omega_1$  situated in apical part of tarsus I. Guard seta (*ft*) situated far behind solenidion  $\omega_1$  ..... *C. lieni* TSENG, 1977  
*Caudacheles* GERSON, 1968
8. Palpal femur with five setae. Eupathidium *ul'* of palpal tarsus not inflated. Median area of dorsal shields completely covered by setae looking like flattened and granulated plates. Tibia I with four setae and short solenidion ..... *H. mirabilis* VOLGIN, 1955  
*Hypopicheyla* VOLGIN, 1969
- Palpal femur with four setae. Eupathidium *ul'* of palpal tarsus globosely inflated. Dorsal shields in median parts covered by fan-like or cloud-like

- setae. Tibia I with five setae and short solenidion . . . . . 9
9. Rostrum slightly narrower than rostral shield. Rostral shield with straight anterior margin. Peritremes arc-like . . . . .  
*N. iranica* FAIN & ARDESHIR, 2000  
*Neoeucheyla* RADFORD, 1950
- Rostrum about 2 times narrower than rostral shield. Rostral shield with widely rounded anterior margin. Peritremes arch-like with concave apex . . . . .  
*C. bulgarica* (VOLGIN, 1955)  
*Cunliffella* VOLGIN, 1969
10. Palpal tarsi with two comb-like eupathidia, *acm* and *sul* . . . . . 13
- Palpal tarsi with one comb-like eupathidium, *sul* . . . . . 11  
*Acaropsellini* BOCHKOV & FAIN, 2001
11. Dorsal shields of idiosoma distinctly sclerotized. Coxae I-II and III-IV situated close to each other. Opisthosoma longer than distance between coxae II and III. Tarsus I without dorso-apical knob . . . . . 12
- Propodonal shield indistinct, hysteronotal shield absent. Coxae I-II and III-IV situated far from each other. Opisthosoma shorter than distance between coxae II and III. Tarsus I with dorso-apical knob . . . . .  
*C. michalskii* SAMSINAK, 1962  
*Chelacheles* BAKER, 1958
12. Setae *c2* filiform. Hysteronotal shield with five-six pairs of setae . . . . .  
*A. sollers* (KUZIN, 1940)  
*Acaropsellina* SUMMERS, 1976
- Setae *c2* lanceolate. Hysteronotal shield with eight pairs of setae . . . . .  
*A. kulagini* (ROHDENDORF, 1940)  
*Acaropsella* VOLGIN, 1969
13. Palpal femur with three-four setae. Legs I moderately elongated. Tibia I distinctly shorter than tarsus I. Setae *vs* of tarsus I situated almost at the same level as solenidion  $\omega 1$  . . . . . 14  
*Cheyletini* LEACH, 1815
- Palpal femur with five setae. Legs I extremely long, about 1.5 times longer than legs IV. Tarsus and tibia I subequal in length. Setae *vs* of tarsus I situated distinctly anterior to solenidion  $\omega 1$  . . . . .  
*C. lepideptorum* (SHAW, 1794)  
*Cheletomorphini* BOCHKOV & FAIN, 2001  
*Cheletomorpha* OUDEMANS, 1904
14. Eyes present . . . . . 21
- Eyes absent . . . . . 15
15. Tibia I with five setae and short solenidion. Hysteronotal shield bearing one-three pairs of median setae or none. In the Iranian species, median setae of dorsal shields distinctly shorter than lateral setae. Dorsal shields without reticulated ornamentation . . . . . 16  
*Cheyletus* LATREILLE, 1796

- Tibia I with four setae and short solenidion. Hysteronotal shield bearing four pairs of median setae. Median setae fan-like, subequal in length to lateral setae. Dorsal shields with distinct reticulate ornamentation .....  
..... *Z. reticulata* (CUNLIFFE, 1962)  
..... *Zachvatkiniola* VOLGIN, 1969
- 16. Dorsal shields without median setae. Guard seta (*ft*) of solenidion  $\omega 1$  on tarsus I rudimentary ..... 19
- Dorsal shields with transparent flag-like or cloud-like median setae (sometimes indistinct or broken). Guard seta (*ft*) on tarsus I longer than solenidion  $\omega 1$  ..... 17
- 17. Setae *d2* situated off hysteronotal shield ..... 18
- Setae *d2* situated on hysteronotal shield .....  
..... *Cheyletus cacahuampensis* BAKER, 1949  
..... (= *C. baloghi* VOLGIN, 1969)
- 18. Peritremes M-shaped. Hysteronotal shield with three pairs of median setae .....  
..... *Cheyletus trouessarti* OUDEMANS, 1902  
..... (= *C. furibundus* ROHDENDORF, 1940, *C. praedabundus* KUZIN, 1940, *C. truculentus* VOLGIN, 1949, *C. woodroffei* JEFFREY, 1979)
- Peritremes M-shaped. Hysteronotal shield with one pair of median setae .....  
..... *Cheyletus carnifex* ZACHVATKIN, 1935  
..... (= *C. aversor* ROHDENDORF, 1940,  
*C. acarophagus* ZAHER et SOLIMAN, 1967,  
*C. allactaga* FAIN & LUKOSCHUS, 1981,  
*C. zaheri* HASSAN & RAKHA, 1982)
- 19. Femur IV with one seta ..... 20
- Femur IV with two setae ..... *Cheyletus eruditus* (SCHRANK, 1781)  
..... (= *C. strenuus* OUDEMANS, 1904, *C. mortelmansi* FAIN, 1972,  
*C. desitus* QAYYUM & CHAUDHRI, 1977)
- 20. Propodonotal and hysteronotal shields subequal in length. Distance between these shields less than 1/2 length of *d2*. Setae *e2* situated far behind the anterior margin of hysteronotal shield .....  
..... *Cheyletus malayensis* CUNLIFFE, 1962
- Propodonotal shield 1.5 times or longer than hysteronotal shield. Distance between these shields and length of setae *d2* almost subequal. Setae *e2* situated almost on anterior margin of hysteronotal shield .....  
..... *Cheyletus malaccensis* Oudemans, 1903  
..... (= *C. vorax* OUDEMANS, 1903, *C. fortis* OUDEMANS, 1904,  
*C. polymorphus* VOLGIN, 1949, *C. rohdendorfi* ZACHVATKIN, 1949,  
*C. egypticus* ELBADRY, 1969, *C. avidus* QAYYUM & CHAUDHRI, 1977,  
*C. baridos* AKBAR, RAHI & CHAUDHRI, 1988, *C. ayyazi* AKBAR, AHEER &  
CHAUDHRI, 1993, *C. infensus* AKBAR, AHEER & CHAUDHRI, 1993,  
*C. phantosis* AKBAR & AHEER, 1994, *C. wahndoensis* AKBAR &  
AHEER, 1994, *C. mianiensis* FAROOQ, AKBAR & QURESHI, 2000,  
*C. rafiquiensis* FAROOQ, AKBAR & QURESHI, 2000)



21. Palpal femur with four setae, genu with one seta. Legs I shorter than idiosoma ..... 23  
 - Palpal femur with three setae, genu with two setae. Legs I subequal or longer than idiosoma ..... 22
22. Palpal claws with numerous projections. Lateral setae of dorsal shields fan-like, median setae dendrite-like. Guard seta (*ft*) of tarsus I rudimentary ..... *P. pyriformes* (BANKS, 1904)  
*Paracheyletia* VOLGIN, 1955  
 - Palpal claws with single basal projection. Lateral and median setae of dorsal shields thickened, rod-like. Guard seta (*ft*) of tarsus I distinctly developed ..... *N. calamondin* MUMA, 1964  
*Nodele* MUMA, 1964
23. Hysteronotal shield paired or unpaired (absent in some species), but without deep lateral incisions. Posterior margin of opisthosoma widely rounded. Pseudoanal setae *ps3* situated ventrally or terminally, behind level of posterior margin of hysteronotal shield ..... 24  
*Cheletomimus* OUDEMANS, 1904  
 - Hysteronotal shield unpaired, with pair of deep lateral incisions between metapodosoma and opisthosoma. Opisthosoma bluntly pointed posteriorly. Pseudoanal setae *ps3* situated dorso-laterally, above level of posterior margin of hysteronotal shield ..... *L. gracilis* VOLGIN, 1963  
*Lepidocheylea* VOLGIN, 1963
24. Hysteronotal shield unpaired ..... 25  
 - Hysteronotal shield paired ... *Cheletomimus berlessei* (OUDEMANS, 1904)
25. Median setae of dorsal shields fan-like, similar in shape to lateral setae ..  
 ..... 26  
 - Median setae of dorsal shields staghorn-like .....  
 ..... *Cheletomimus wellsii* (BAKER, 1949)
26. Tibia I with four setae and short solenidion ..... 27  
 - Tibia I with five setae and short solenidion .....  
 ..... *Cheletomimus vescus* QUAYYUM et CHAUDHRI, 1979  
 (= *Hemicheyletia laguncula* RASOOL & CHAUDHRI, 1979)
27. Dorsal shields with indistinct punctuation. Propodonotal shield with three pairs of median setae. Median setae of hysteronotum always situated on hysteronotal shield. Ratio of length/width of hysteronotal shield 1.4/1 ...  
 ..... *Cheletomimus congensis* (CUNLIFFE, 1962)  
 (= *Hemicheyletia lacinia* RASOOL & CHAUDHRI, 1979)  
 - Dorsal shields with distinct punctuation. Propodonotal shield with two pairs of median setae. Median setae of hysteronotum situated off or on hysteronotal shield. Ratio of length/width of hysteronotal shield 1/1.2 ...  
 ..... *Cheletomimus bakeri* (EHARA, 1962)  
 (= *Hemicheyletia tumidus* QUAYYUM & CHAUDHRI, 1979)

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