

## Observations on the taxonomic status of some cheyletid genera (Acari Cheyletidae)

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### Abstract

A re-appraisal of the taxonomic characters used in the descriptions of the 78 genera of the family Cheyletidae is proposed. Four genera are placed in synonymy, *Bicheyletiella* FAIN, 1972, *Chelachecaropsis* ATTIAH, 1973, *Cheletonata* WOMERSLEY, 1955 and *Polycheyletus* VAIVANIKUL, 1979. Two genera described from their nymphal stages, i.e. *Aegyptocheyla* YOUSEF, 1978 and *Paramicrocheyla* OLIVIER et THERON, 1989, are considered as genera of *incertae sedis* within the family Cheyletidae. The genus *Philippicheyla* CORPUZ-RAROS, 1972 is retained as a subgenus within the genus *Hemicheyletia* VOLGIN, 1969. The generic status of *Zachvatkiniola* VOLGIN, 1969 is restored. Two species of the genus *Chelacaropsis* BAKER, 1949, i.e. *C. rwandana* FAIN, 1972 and *C. apus* FAIN, 1972, are redescribed and depicted for the first time.

**Keywords** : Acari, Cheyletidae, systematics

### Résumé

Une réévaluation des caractères morphologiques d'importance taxonomique chez les 78 genres de la famille Cheyletidae est proposée. Quatre genres sont considérés comme non valides et placés en synonymie, il s'agit des genres suivants : *Bicheyletiella* FAIN, 1972, *Chelachecaropsis* ATTIAH, 1973, *Cheletonata* WOMERSLEY, 1955 et *Polycheyletus* VAIVANIKUL, 1979. Deux genres décrits d'après des stades nymphaux (*Aegyptocheyla* YOUSEF, 1978 et *Paramicrocheyla* OLIVIER et THERON, 1989) sont considérés comme *incertae sedis*. Le genre *Philippicheyla* CORPUZ-RAROS, 1972 est retenu comme un sous-genre du genre *Hemicheyletia* Volgin, 1969. Le genre *Zachvatkiniola* VOLGIN, 1969 est revalidé. Deux espèces du genre *Chelacaropsis* BAKER, 1949 (*C. rwandana* FAIN, 1972 et *C. apus* FAIN, 1972), sont redécrites et figurées pour la première fois.

### Introduction

An extended review of the family Cheyletidae (Acari : Prostigmata) has been carried out by FAIN *et al.* (1997) and GERSON *et al.* (1999). These authors provided new definitions, keys and figures of all the known cheyletid genera and a list of all the described species. A total of 77 genera and more than 400 species, either predaceous or parasitic, were recorded in these papers. More recently, the genus *Bothrocheyla* VOLGIN, 1969, not retained in these papers, was restored and should be added to these lists (BOCHKOV & MIRONOV, 1997; FAIN & ARDESHIR, 2000). In their monographs of the cheyletid genera these authors abstained from making any formal change in taxonomic status of the described genera.

The aim of the present study is to precise the generic composition of the family Cheyletidae and to re-evaluate the exact status of the genera. In addition we give a more complete description and the first figures of *Chelacaropsis rwandana* FAIN, 1972 and *C. apus* FAIN, 1972.

### Material examined

For this study we have re-examined the collections of Cheyletidae deposited in the three following Institutions : Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia), Institut royal des Sciences naturelles de Belgique (Bruxelles, Belgium) and Musée royal de l'Afrique Centrale (Tervuren, Belgium). The species deposited in these Institutions belong to 56 genera of Cheyletidae. In addition, typical material of three other genera was borrowed from other Museums and examined, i.e. the genera *Alliea* YUNKER, 1960 and *Thewkachela* IDE et KETHLEY, 1977, both studied by A.F. and the genus *Paracheyletiella* KUZNETZOV, 1977 examined by A.B.

Another genus, inadequately described, is *Sciurocheyla* VOLGIN, 1969. It is represented by a single species *Nihelia squamosa* DOMROW et BAKER, 1963, that had been collected from a squirrel of the genus *Menetes* (Sciuridae) from Thailand (DOMROW & BAKER, 1963). This species was, unfortunately, not available for our study. From the original figures this species resembles the genus *Smileycheles* FAIN, 1979, represented by a single species *S. camerounensis* FAIN, 1979 parasitic on an African rodent *Zenkerella insignis* (Anomaluridae). Only a re-study of the genus of VOLGIN (1969) will confirm the status of the genus *Smileycheles*.

### Systematic part

As a result of the present study it appears that four genera, i.e. *Bicheyletiella* FAIN, 1972, *Chelachecaropsis* ATTIAH, 1973, *Cheletonata* WOMERSLEY, 1955 and *Polycheyletus* VAIVANIJKUL, 1979 have no valid status and should be placed in synonymy. The taxonomic status of the genus *Philippicheyla* CORPUZ-RAROS, 1972 is lowered to the subgenus rank and included in the genus *Hemicheyletia* VOLGIN, 1969. The generic status of *Zachvatkiniola*

VOLGIN, 1969 is restored. Two genera, *Aegyptocheyla* YOUSEF, 1978 and *Paramicrocheyla* OLIVIER et THERON, 1989 were described from their nymphal stages and should therefore be considered as genera of *incertae sedis*, within the family Cheyletidae.

After these modifications the family Cheyletidae includes now 73 valid genera and two genera of *incertae sedis*.

#### Genus *Aegyptocheyla* YOUSEF, 1978

This genus is represented by single species, *A. summersi* YOUSEF, 1978, described from two "females" collected from plants in Egypt (YOUSEF, 1978). Actually, the original figure given by this author (p. 366, fig. 1) shows only one pair of genital setae, which is a nymphal character. We note also the presence of two lateral shields on the hysteronotum, which is another character frequently observed in teleonymphs. The description of this species confirms this opinion. The validity of the genus *Aegyptocheyla* is therefore questionable and we propose to consider it as a genus *incertae sedis* within the family Cheyletidae.

#### Genus *Bicheyletiella* FAIN, 1972

This genus was established for the single species *B. romerolagi* FAIN, 1972, represented by females collected from *Romerolagus diazi* (Leporidae) from Mexico (FAIN, 1972). This genus differed from *Cheyletiella* CANESTRINI, 1886 by the presence of a small median hysterosomal shield not bearing setae. Such a shield is absent in *Cheyletiella*. UCHIKAWA & SUZUKI (1979) overlooking our paper, redescribed the same species from the same host and locality under the name *Cheyletiella mexicana* spec. nov. The description included females, males and nymphs. As all these stages correspond closely (except for the median hysteronotal shield) to those of the other species of *Cheyletiella* we think now that *Bicheyletiella* is a junior synonym of *Cheyletiella* and we propose the new combination *Cheyletiella romerolagi* (FAIN, 1972) **comb. nov.**

It is worthy of note that in *Cheyletiella yasguri* SMILEY, 1965 the female bears 2 lateral shields on the hysteronotum and this species is therefore intermediate between *C. romerolagi* and the other species of *Cheyletiella*.

#### Genus *Cheletonata* WOMERSLEY, 1955

The genus *Cheletonata* was created by WOMERSLEY (1955) for the single species *C. milesi* WOMERSLEY, 1955. This genus still remained monotypical. The female of this species has a striated weakly sclerotized propodosomal shield and a much smaller hysteronotal shield. The latter is median, oval in shape, it is devoid of setae but bears irregular striations (SUMMERS & PRICE, 1970). Previously, BAKER (1949) had described the monotypical genus *Chelacaropsis* with *C. moorei* BAKER, 1949 as type species. According to BAKER,

this species is devoid of dorsal shields. Subsequently, four new species have been described in this genus (FAIN, 1972; SOLIMAN, 1975; CORPUZ-RAROS & SOTTO, 1977). Some of these species were described with a distinct striated propodosomal shield (*C. rwandana* FAIN, 1972). In another species (*C. apus* FAIN, 1972), two shields were observed, the hysteronotal being small and striated. More recently, LEKPRAYOON & SMILEY (1986) re-examined the type species of *C. moorei* and observed that the female of that species bears a poorly sclerotized and striated shield on the propodosoma as in *C. rwandana* and *C. apus*. In the female of *C. apus* the hysterosoma bears in addition a small oval shield as in *Cheletonata milesi*. It appears, therefore that the only important difference existing between the pair *C. milesi* / *C. apus* and the four species of the genus *Chelacaropsis* is the presence in the first group of a very small hysteronotal shield and the complete absence of this shield in the four species of the genus *Chelacaropsis*. We think that this difference is insufficient to separate these species in distinct genera and we consider *Cheletonata* as a junior synonym of *Chelacaropsis*.

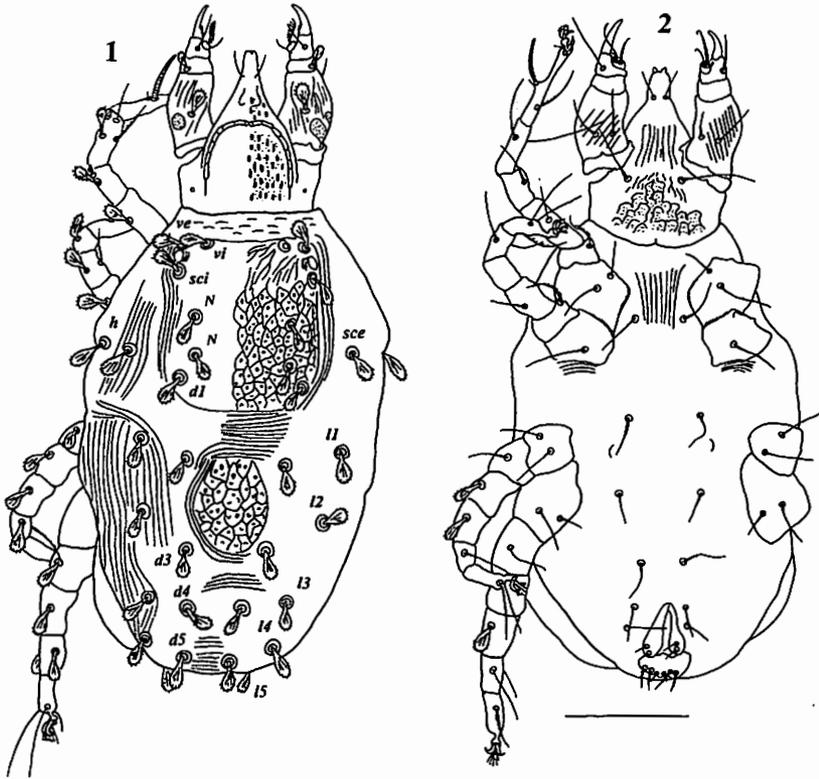
We give here a new description of the species *C. apus* and *C. rwandana*.

### Genus *Chelacaropsis* BAKER, 1949

#### *Chelacaropsis apus* FAIN, 1972

*Female*, holotype (Figs 1-3) : Idiosoma 350  $\mu\text{m}$  long, 210  $\mu\text{m}$  wide. Gnathosoma 140  $\mu\text{m}$  long, 110  $\mu\text{m}$  wide. Palpal femur 58  $\mu\text{m}$  long, 43  $\mu\text{m}$  wide. Dorsal setae of palpal tibia and palpal femur fan-like. Palpal claws with 3 teeth. Palpal tarsus bearing dorsally an outer comb-like seta with 10 tines and an inner seta slightly serrate; ventrally it bears 2 sickle-shaped setae and one short solenidion. Peritremes in an inverted U, with 7 links per side, the most posterior link is straight and only slightly elongate. Rostral shield covered by small granules. All dorsal setae, including *h*, fan-like, similar in shape, 23  $\mu\text{m}$  long and 13  $\mu\text{m}$  wide. Propodosomal shield 135  $\mu\text{m}$  long and 120  $\mu\text{m}$  wide, bearing a well developed network pattern and granules. Margins of the shield not clearly separated from striated cuticle. Hysterosomal shield oval 58  $\mu\text{m}$  long and 55  $\mu\text{m}$  wide, without setae, covered with the same pattern as propodosomal shield. Distance between both shields 40  $\mu\text{m}$ . The dorsum bears 17 pairs of fan-like setae of which 15 pairs represent the basic number of setae and 2 pairs the neotrichials (setae *N*), the latter situated on propodosomal shield. Cuticular striations as in the Fig. 1. Setae *11* situated slightly anterior to *d2*, setae *12* situated 33  $\mu\text{m}$  anterior to *d3*, setae *13* and *d4* situated almost at the same level; in some paratypes setae *13* are situated slightly anterior. Solenidion  $\omega/1$  33  $\mu\text{m}$  long, guard seta very short. Legs I-IV 225  $\mu\text{m}$ , 180  $\mu\text{m}$ , 170  $\mu\text{m}$  and 200  $\mu\text{m}$  long respectively.

*Male* heteromorphic (Fig. 6) : Body, including gnathosoma, in midline 435  $\mu\text{m}$  long, 185  $\mu\text{m}$  wide. Gnathosoma 200  $\mu\text{m}$  long, 160  $\mu\text{m}$  wide. Rostrum 110  $\mu\text{m}$  long. Palpal femur 135  $\mu\text{m}$  long and 40  $\mu\text{m}$  wide, inner ventral seta of palpal femur situated on a small protrusion, dorsal seta fan-like. Outer dorsal



Figs 1-2. *Chelacaropsis apus* FAIN, 1972, holotype female. 1 : dorsally. 2 : ventrally. Scale line 100  $\mu$ m.

seta of palpal tarsus with 6 short tines, inner dorsal seta smooth. Palpal claws with 4 teeth. All dorsal setae, including *h*, are fan-like, similar in size, 25  $\mu$ m long, 7  $\mu$ m wide. Setae *sce* situated on propodosomal shield. Hysterosomal shield 200  $\mu$ m long and 55  $\mu$ m wide, bearing setae *d2* and *l3*, the setae *l4* situated on border of hysterosomal shield on striated cuticle. Both shields with a pattern similar to that of the female. Penis 33  $\mu$ m long. Solenidion  $\omega 1$  40  $\mu$ m long. Tibia III and IV each with one small dorsal solenidion. Legs I-IV 300  $\mu$ m; 185  $\mu$ m, 180  $\mu$ m and 200  $\mu$ m long respectively.

**Host and locality :** Female holotype, 27 females and 20 males paratypes from a nest of *Apus affinis*, (Apodidae) Butare, Rwanda, 16.IV.1968. (Coll. F. AURELIEN). Other specimens : 6 females and 3 males of this species were found in guano of *Tadarida* sp. (Molossidae) Rwanda, 14.VI.1968. (Coll. BIEMANS). Holotype is deposited in the Institut royal des Sciences naturelles de Belgique (Bruxelles, Belgium).

**Remarks :** *Chelacaropsis apus* is closely related to *C. milesi* but it is distin-

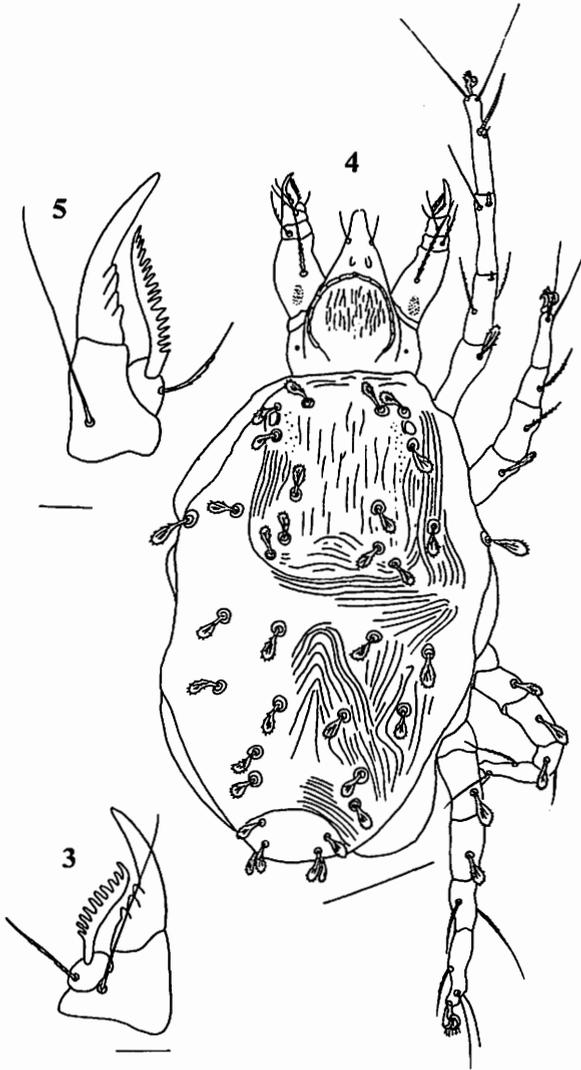
guished from it by the following characters : body size much smaller, peritremes in an inverted U with last link straight and not curved inside, setae *l1* more anterior than setae *d2*, setae *l2* more anterior than setae *d3*, dorsal seta of palpal femur fan-like and about twice as long as wide. In *C. milesi*, the idiosoma is much longer (656  $\mu\text{m}$  long), the peritremes M-shaped with the last link curved inside, setae *l1* and *l2* are situated at the level of setae *d2* and *d3* respectively, dorsal seta of palpal femur is spatulate and about 6 times as long as its maximum width. *C. apus* (female) clearly differs from *C. moorei* by the presence of a small hysterosomal shield.

*Chelacaropsis rwandana* FAIN, 1972

*Female*, holotype (Figs 4-5). Idiosoma 426  $\mu\text{m}$  long, 270  $\mu\text{m}$  wide. Gnathosoma 150  $\mu\text{m}$  long, 115  $\mu\text{m}$  wide. Palpal femur 65  $\mu\text{m}$  long, 36  $\mu\text{m}$  wide. Dorsal setae of palpal tibia and femur thin and shortly barbed. Palpal claws with 4 teeth. Outer comb-like seta of palpal tarsus with 16 tines, inner dorsal seta slightly serrate. Peritremes in an inverted U with 7 links, the last posterior link longer than the other and curved inside. Rostral shield weakly ornamented. All dorsal setae, including *h*, fan-like, similar in shape, 30  $\mu\text{m}$  long and 12  $\mu\text{m}$  wide. Setae *h* 45  $\mu\text{m}$  long and 14  $\mu\text{m}$  wide. Propodosomal shield 174  $\mu\text{m}$  long and 120  $\mu\text{m}$  wide covered with a pattern of thin interrupted lines. Margins of the shield not clearly separated from striated cuticle. Hysterosomal shield absent. The dorsum bears 17 pairs of setae (15 pairs of basic and 2 pairs of neotrichials). Setae *l1* at the same level as *d2* and setae *l2* at the same level as *d3*; setae *l3* situated in front of *d4*, distances between *d4-d4* and *l3-l3* subequal. Small pygidial plate present, 58  $\mu\text{m}$  long and 66  $\mu\text{m}$  wide, it bears setae *l4* and *l5*. Cuticular striation as in Fig. 4. Solenidion  $\omega 1$  58  $\mu\text{m}$  long, guard seta very short. Legs I-IV 315  $\mu\text{m}$ , 215  $\mu\text{m}$ , 250  $\mu\text{m}$  and 260  $\mu\text{m}$  long respectively.

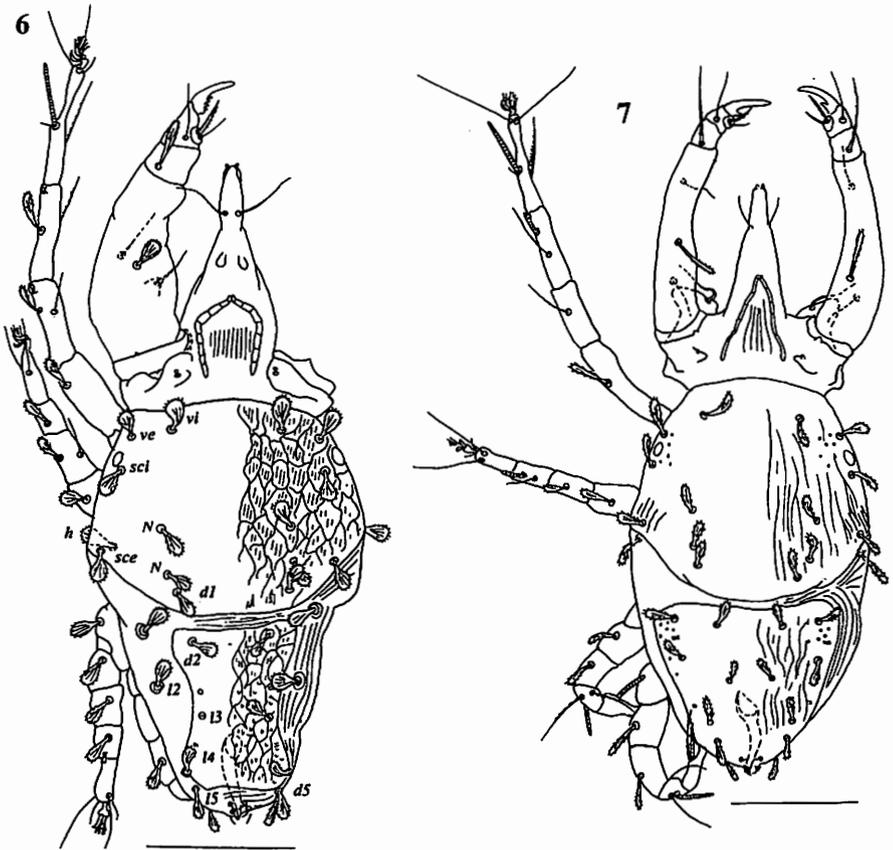
*Male*, heteromorphic (Fig. 7). Body, including gnathosoma, in midline 485  $\mu\text{m}$  long, 200  $\mu\text{m}$  wide. Gnathosoma with well developed lobes at base of palp ventrally. Rostrum 115  $\mu\text{m}$  long. Palpal femur 166  $\mu\text{m}$  long and 35  $\mu\text{m}$  wide, without protrusions, dorsal seta lanceolate. Outer dorsal comb-like seta of palpal tarsus with short tines, inner dorsal seta smooth. Palpal claws with one basal tooth. Propodosomal shield 250  $\mu\text{m}$  long. All dorsal setae fan-like, propodosomal setae and setae *d2*, *l1* and *l2* 33  $\mu\text{m}$  long and 11  $\mu\text{m}$  wide, setae *h* 36  $\mu\text{m}$  long and 12  $\mu\text{m}$  wide, setae *d2*, *d3* and all lateral setae 26  $\mu\text{m}$  long and 7  $\mu\text{m}$  wide. Setae *sce* situated on propodosomal shield. Hysterosomal shield 132  $\mu\text{m}$  long, bearing all the dorsal hysterosomal setae. Both shields bearing a pattern similar to that of the female. Penis 66  $\mu\text{m}$  long. Solenidion  $\omega 1$  50  $\mu\text{m}$  long. Tibia and tarsi III-IV each with a well developed dorsal solenidion about 18  $\mu\text{m}$  long. Legs I-IV 325  $\mu\text{m}$ ; 215  $\mu\text{m}$ , 250  $\mu\text{m}$  and 265  $\mu\text{m}$  long respectively.

**Host and locality** : Female holotype and female paratype from a nest of *Ploceus cucullatus* (Ploceidae), Butare (Astrida), Rwanda, 27.I.1970. (Coll. F. AURELIEN). Other specimens : 6 females and 2 males from a nest of *Textor xanthopus* (Ploceidae), Rwanda, Gisagara, 9.III.1968. (Coll. A. FAIN), 19



Figs 3-5. *Chelacaropsis apus* FAIN, 1972, holotype female. 3 : palpal tarsus and palpal tibia in dorsal view. *Chelacaropsis rwandana* FAIN, 1972, holotype female. 4 : dorsally. 5 : palpal tarsus and palpal tibia in dorsal view. Scale line 100  $\mu$ m (fig. 4) and 10  $\mu$ m (figs 3 and 5).

females and 10 males from nests of *Grammomys surdaster* (Muridae), Rwanda, Rubona, 10.IV.1968. (Coll. A. FAIN), 2 females and 2 males from a nest of *Aethomys* sp. (Muridae), Rwanda, Musha, 30.III.1968. (Coll. A. FAIN). Holotype is deposited in the Institut royal des Sciences naturelles de Belgique (Bruxelles, Belgium).



Figs 6-7. 6 : *Chelacaropsis apus* FAIN, 1972, male in dorsal view. 7 : *Chelacaropsis rwandana* FAIN, male in dorsal view, 1972. 7. Scale line 100  $\mu$ .

**Remarks :** (i) The female of *Chelacaropsis rwandana* resembles the female of *C. moorei* by the absence of an hysterosomal shield. It, however, differs from this species by the following characters : setae *h* are fan-like, palpal claw with 4 basal teeth, presence of a pygidial shield, posterior link of peritreme elongate and curved inside. In *C. moorei* the setae *h* are thin and shortly barbed, the palpal claw has 3 teeth, there is no pygidial shield, the last link of peritreme is straight and not elongate.

(ii) *C. rwandana* has been commonly found in nests of small birds and also in the nests of arboricolous rats of the genus *Grammomys*, which build their nests in hedges of *Euphorbia*, that the native plant around their houses. These hedges may reach 3 to 4 m in height. The nest of these rats occupy the higher parts of the hedge. The curious biology of these rats explain the presence of this mite species in the nests of both rats and birds.

**Genus *Chelachecaropsis* ATTIAH, 1973**

This genus is represented by a single species, *C. bakeri* ATTIAH, 1973 and only one female specimen collected from a rice plantation in Egypt (ATTIAH, 1973). It differs from the closely related genus *Chelacheles* BAKER, 1958 by the following characters : presence of only one comb-like seta on the palpal tarsus and distance between coxae II and III smaller than body width. We have examined several species of the genus *Chelacheles* BAKER, 1958 and noted that in that genus the inner comb-like seta is poorly developed with very short teeth, only visible in phase contrast light. SUMMERS & PRICE (1970) and TSENG (1977) have suggested that these setae are completely smooth in some species. The second differential character (the distance between coxae II and III) is variable from species to species in the genus *Chelacheles* and in some species (e.g. *C. bacchusi* BOCHKOV *et al.*, 1999) it is smaller than the body width. Owing to the variability of the characters that has been used in the separation of these two genera it seems that is not possible to maintain *Chelachecaropsis* as a valid genus and we consider it as a junior synonym of the genus *Chelacheles*.

**Genus *Zachvatkiniola* VOLGIN, 1969**

This genus has been created for a single species *Eucheyletia reticulata* CUNLIFFE, 1962 (VOLGIN, 1969). This genus differs from *Eucheyletia* BAKER, 1949 by the strong reticulation of the dorsal surface of the idiosoma and the gnathosoma, the presence on the dorsum of only fan-like setae and the chaetotaxy of the legs (tibia I and femora IV with 4 and 1 setae respectively). SUMMERS & PRICE (1970) have synonymized this genus with *Eucheyletia* without pertinent arguments.

**Genus *Paramicrocheyla* OLIVIER & THERON, 1989**

This genus has been described from nymphs and not from adults mites (GERSON *et al.*, 1999). It includes two species collected from soil in South Africa (OLIVIER & THERON, 1989). As for the genus *Aegyptocheyla*, the genus *Paramicrocheyla* should be considered as a genus of *incertae sedis* within the family Cheyletidae.

**Genus *Philippicheyla* CORPUZ-RAROS, 1972**

This genus includes 2 species : *P. filipina* CORPUZ-RAROS, 1972 (type species) and *P. notelaeae* GERSON, 1994. Both species were collected from plants (Philippines and Australia) (CORPUZ-RAROS, 1977; GERSON, 1994). This genus is closely related to *Hemicheyletia* VOLGIN, 1969. It has been separated from the latter by the absence of a hysterosomal shield and the narrower shape of the dorsal setae of the palpal femur in the female. It should be noted, however, that some species of *Hemicheyletia* have a strongly reduced hysterosomal

shield (e.g. *H. kysenyiensis* THEWKE et ENNS, 1979 and *H. scutellata* (DE LEON, 1962)). The absence of the hysterosomal shield is therefore insufficient for separating this species from the genus *Hemicheyletia*. The narrow shape of the palpal femur setae in the female of this genus is a second character that should be taken into consideration and therefore we think that the taxon *Philippicheyla* should be retained but as a subgenus of *Hemicheyletia*.

### Genus *Polycheyletus* VAIVANIKUL, 1979

This genus includes two species, described from soil : *P. boonkongae* VAIVANIKUL, 1979 from Thailand and *P. batangenius* (CORPUZ-RAROS & SOTTO, 1977) from the Philippines (VAIVANIKUL, 1979; CORPUZ-RAROS & SOTTO, 1977). FAIN (in FAIN *et al.*, 1997; GERSON *et al.*, 1999) redescribed and depicted the holotype *Dubininiola polylepis* VOLGIN, 1969, the only representative of this genus. The synonymy of these two genera is obvious. The species of both genera have branched seta on tarsi I to II, four setae on tibia I, one seta on femur I, three and two setae on palpal femur and palpal genu respectively, two comb-like setae on palpal tarsi, four segments on peritremal branch, palpal tibia claw with two basal teeth, two well developed dorsal shields bearing numerous squamiform setae etc. We consider, therefore that the genus *Polycheyletus* is a junior synonym of the genus *Dubininiola* VOLGIN, 1969.

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