

New Genera and Species of Quill Mites of the Family SYRINGOPHILIDAE (Acari: Prostigmata)

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Summary

Three new genera and 18 new species of Syringophilidae (Acari: Prostigmata) are described. All these mites were collected from the quills of birds belonging to seven different orders and 11 families of birds. The following new taxa are described: *Megasyringophilus kethleyi* nov. gen., nov. spec. (type species) ex *Aratinga jandaya* from Brazil; *M. trichoglossus* nov. spec. ex *Trichoglossus* sp. from New Guinea; *M. cyanocephala* nov. spec. ex *Psittacula cyanocephala* from India; *Neoaulobia aratingae* nov. gen., nov. spec. (type species) ex *Aratinga jandaya* from Brazil; *N. agapornis* nov. spec. ex *Agapornis nigrigenis* from Zambia; *N. psittaculae* nov. spec. ex *Psittacula cyanocephala* from India; *Psittaciphilus amazonae* nov. gen., nov. spec. (type species) ex *Amazona amazonica* from Colombia; *P. fritschi* nov. spec. ex a parrot from the Zoo of Antwerp; *Syringophiloides cypsiuri* nov. spec. ex *Cypsiurus parvus* from Congo; *S. graculae* nov. spec. ex *Gracula religiosa intermedia* from S.E. Asia; *S. dendrocittae* nov. spec. ex *Dendrocitta rufa rufa* from E. Asia; *Syringophilopsis emberizae* nov. spec. ex *Emberiza luteola* from Rwanda; *S. sylviettae* nov. spec. ex *Sylvietta whytti johnstoni* from Rwanda; *Niglarobia rhinoptili* nov. spec. ex *Rhinoptilus africanus* from South Africa; *Picobia brotogeris* nov. spec. ex *Brotogeris jugularis cyanopterus* from Brazil; *P. ramphastos* nov. spec. ex *Ramphastos sulfuratus* from Guatemala; *P. alectoris* nov. spec. ex *Alectoris* sp. from Rwanda; *P. phoeniculi* nov. spec. ex *Phoeniculus purpureus ruwenzoriae* from Rwanda. Keys to the family and all the genera represented in this material are provided.

Key-words: Systematic. Syringophilidae. Acari. Parasites. Birds.

Resumé

Les auteurs décrivent 3 nouveaux genres et 18 nouvelles espèces de Syringophilidae (Acari: Prostigmata). Ces espèces avaient été récoltées dans les tuyaux des plumes d'oiseaux faisant partie de 7 ordres et de 11 familles différents. En voici la liste: *Megasyringophilus kethleyi* nov. gen., nov. spec. (espèce type), ex *Aratinga jandaya*, du Brésil; *M. trichoglossus* nov. spec., ex *Trichoglossus* sp., de Nouvelle-Guinée; *M. cyanocephala* nov. spec., ex *Psittacula cyanocephala* de l'Inde; *Neoaulobia aratingae* nov. gen., nov. spec. (espèce type) ex *Aratinga jandaya* du Brésil; *N. agapornis* nov. spec. ex *Agapornis nigrigenis* de Zambia; *N. psittaculae* nov. spec. ex *Psittacula cyanocephala* de l'Inde; *Psittaciphilus amazonae* nov. gen., nov. spec. (espèce type) ex *Amazona amazonica* de Colombie; *P. fritschi* nov. spec. provenant d'un perroquet non identifié mort au Zoo d'Anvers; *Syringophiloides cypsiuri* nov. spec. ex *Cypsiurus parvus* de la République Démocratique du Congo; *S. graculae* nov. spec. ex *Gracula religiosa intermedia* du S.E. Asiatique; *S. dendrocittae* nov. spec. ex *Dendrocitta rufa rufa* d'Asie Orientale; *Syringophilopsis emberizae* nov. spec. ex *Emberiza luteola* du Rwanda; *S. sylviettae* nov. spec. ex *Sylvietta whytti johnstoni*, du Rwanda; *Niglarobia rhinoptili* nov. spec. ex *Rhinoptilus africanus* d'Afrique du Sud; *Picobia brotogeris* nov. spec. ex *Broto-*

geris jugularis cyanopterus, du Brésil; *P. ramphastos* nov. spec. ex *Ramphastos sulfuratus* du Guatemala; *P. alectoris* nov. spec. ex *Alectoris* sp. du Rwanda; *P. phoeniculi* nov. spec. ex *Phoeniculus purpureus ruwenzoriae* du Rwanda. Des clés sont données pour les genres de la famille Syringophilidae et pour les espèces des 3 nouveaux genres.

Mots-clés: Systematique. Syringophilidae. Acari. Parasites. Tuyaux plumes oiseaux.

Introduction

According to the classification proposed by KETHLEY (1982), the quill mites of the family Syringophilidae belong to the superfamily Cheyletoidea, subcohort Raphignathae, cohort Eleutherengona, suborder Prostigmata. All members of this family are obligatory parasites, dwelling in the quill cavities of feathers and associated with 13 orders of birds (KETHLEY, 1970; KETHLEY & JOHNSTON, 1975; CASTO, 1977; PHILIPS & NORTON, 1978). Syringophilids have still not been found on such host orders as Spheniciformes, Struthioniformes, Casuariformes, Apterygiiformes, Tinamiformes, Gaviiformes, Podicipediformes and Trogoniformes. It is worthy of note, that the Harpirhynchidae, related to Syringophilidae are also absent on these bird orders (MOSS & WOJCIK, 1978; BOCHKOV et al., 1999). The majority of syringophilid species are monoxenous or oligoxenous parasites (KETHLEY & JOHNSTON, 1975). Most species are restricted to a single bird genus or to some groups of closely related host genera.

The syringophilids are closely related to the predator mites of the family Cheyletidae (VOLGIN, 1969; BOCHKOV, 1999). It is possible that they derived from a cheyletoid-like ancestor that lived in bird's nests. The syringophilids are associated both with birds from orders of the Paraneornites group (Galliformes, Anseriformes) and from the Neornites group (Passeriformes, Charadriiformes etc). It is suggested that these two birds phyla diverged in the Late Jurassic (KUROCHKIN, 1993). The ancestors of syringophilids, probably migrated from bird's nests onto the hosts in this time.

A comprehensive generic review of the syringophilid

mites was published by KETHLEY (1970). Subsequently, the relationships between syringophilid genera were reconstructed by numerical taxonomy methods (JOHNSTON & KETHLEY, 1973). At the present time the world fauna of the syringophilid mites includes more than 60 species assigned to 24 genera (KETHLEY, 1970, 1973; CASTO, 1977, 1979, 1980a, 1980b; PHILIPS & NORTON, 1978; LIU BAL-LI, 1988; KIVGANOV & SHARAFAT, 1995; CHIROV & KRAVTSOVA, 1995; BOCHKOV & MIRONOV, 1998, 1999; SKORACKI, 1999). It has been suggested that the world fauna of the Syringophilidae might include at least 5000 species (JOHNSTON & KETHLEY, 1973). Owing to the wide distribution of the syringophilid genera among the birds of higher taxa one may suggest that about one third of the existing genera have already been recognized and described.

Material and Methods

The present paper is devoted to the study of a collection of quill-feather mites of the family Syringophilidae, almost all collected from 1952 to 1970 by A.F., from birds freshly imported in the zoo of Antwerp and which died during their quarantine. They belong to 3 new genera and 11 new species, i.e. *Megasyringophilus kethleyi* n.sp., *M. trichoglossus* n.sp., *M. cyanocephala* n.sp., *Neoaulobia aratingae* n.sp., *N. agapornis* n.sp., *N. psittaculæ* n.sp., *Psittaciphilus fritschi* n.sp., *Syringophiloides graculæ* n.sp., *S. dendrosittæ* n.sp., *Picobia brotogeris* n.sp., *P. ramphastus* n.sp. Four species were collected by A.F. in Rwanda, i.e. *Syringophilopsis emberizæ* n.sp., *S. sylvietæ* n.sp., *Picobia alectoris* n.sp. and *P. phoeniculi* n.sp. One species, *Syringophiloides cypsiuri* n.sp. was found by A.F. from the quills of *Cypsiurus parvus*, collected in the Democratic Republic of the Congo by A. DE ROO, in 1965. Finally, 2 new species, *Psittaciphilus amazonæ* from Colombia and *Niglarobia rhinoptili* from South Africa were collected by late Dr P.H. Vercammen-Grandjean and Dr F. Zumpt respectively.

All the measurements are in micrometers (μm). The nomenclature of the idiosomal setae follows that of Fain (1979). It was originally elaborated for the family Cheyletidae, but it can also easily be adapted to all the other families of the Cheyletoidea (FAIN, 1972; BOCHKOV & MIRONOV, 1998; BOCHKOV & al. 1999). The terminology and the leg chaetotaxy follow Kethley (1970).

The holotypes and paratypes of the new species have been deposited in the following Institutions:

1. Musée Royal de l'Afrique Centrale, Tervuren (MRAC): material from afro-tropical birds (holotypes and paratypes).
2. Institut Royal des Sciences naturelles de Belgique (IRSNB): material from other parts of the world (holotypes and paratypes).
3. Zoological Institute of the Russian Academy, St Petersburg, Russia (ZISP): paratypes.

STUDY OF THE SPECIES

Family Syringophilidae LAVOPIERRE, 1953

Type genus: *Syringophilus* HELLER, 1880

The family Syringophilidae has been divided into 2 subfamilies, Syringophilinae and Picobiinae and it includes at the present time a total of 27 genera.

A third subfamily, Lobatinae, had been proposed for the single genus *Calamincola* Casto, 1978 (Casto, 1977 and 1978), but the name Lobatinae is not valid because it was not based on the name of the type genus. In the single member of this subfamily, *Calamincola lobatus* (Costa 1978), the chaetotaxy of the idiosoma and the legs is similar to that of the genus *Picobia* (see Bochkov & Mironov, 1998) and we propose, therefore, to include this genus in the subfamily Picobiinae.

KEY TO THE FAMILY SYRINGOPHILIDAE

LAVOPIERRE, 1953

- Tibiotarsus of palp rounded on distal margin; setae *a'*, *a''* multiserrate; setae *dFIII-dFIV* present (*dFII* present or absent) or *dFII-dFIV* absent Syringophilinae Lavoipierre, 1953
- Tibiotarsus of palp truncated distally; setae *a'*, *a''* not multiserrate; setae *dFIII-dFIV* absent, *dFII* present Picobiinae JOHNSTON & KETHLEY, 1973

Subfamily Syringophilinae LAVOPIERRE, 1953

The subfamily includes 25 genera of which 3 are new.

KEY TO THE SUBFAMILY SYRINGOPHILINAE LAVOPIERRE, 1953 (adapted from KETHLEY, 1970)

(Females)

1. Setae *dFII* absent 2
 - Setae *dFII* present 4
2. Small mites (600-800); setae *vs'I* absent; setae *vi* absent; setae *d5* short; propodosomal plate not divided 3
 - Large mites (1200-1400); setae *vs'I* present; setae *vi* present; setae *d5* long; propodosomal plate divided; Gruiformes *Ascetomylla* KETHLEY, 1970
3. Setal pattern of propodosomal region arranged 2-1-2; anterior part of propodosomal plate with pair of pocket-like structures; stylophore constricted posterior; Psittaciformes *Psittaciphilus* nov. gen.
 - Setal pattern of propodosomal region arranged 1-1-1-2; the anterior part of propodosomal plate without pocket-like structures; the stylophore rounded posterior; Columbiformes *Peristerophila* KETHLEY, 1970
4. Setae *dGII* absent 5
 - Setae *dGII* present 6

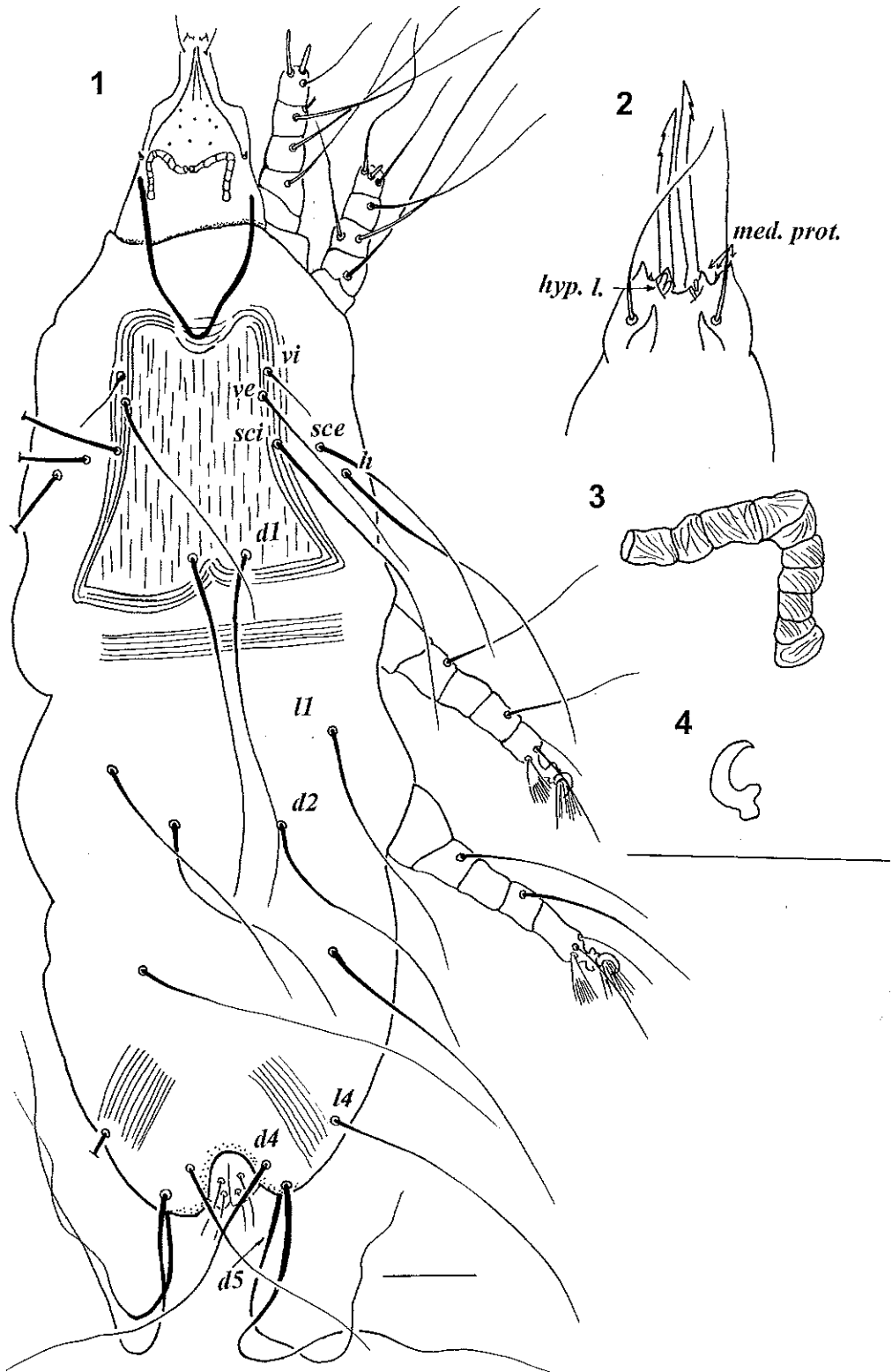
5. Setae *vs*'I absent; epimeres I divergent, fused to epimeres II; setal propodosomal pattern with setae arranged 2-2-2; Charadriiformes *Philoxanthornea* KETHLEY, 1970
- Setae *vs*'I present; epimeres I parallel, not fused to epimeres II; setal propodosomal pattern with setae arranged 2-1-1-2; Passeriformes *Syringophiloidus* KETHLEY, 1970
6. Four or more pairs of *pg* setae present 7
- Three pairs of *pg* setae present 8
7. Large mites (1500-1900); setae *vs*'III present; seven or more pairs of *pg* setae present; setal propodosomal pattern with setae arranged 3-1-2; Ciconiiformes *Trypetoptila* KETHLEY, 1970
- Small or medium mites (600-900); setae *vs*'III absent; 4-6 pairs of *pg* setae present; setal propodosomal pattern with setae arranged 3-2-1; Passeriformes *Torotroglia* KETHLEY, 1970
8. One pair of anal setae present 9
- Two pairs of anal setae present 10
9. Setae *vi* absent; epimeres I parallel; Passeriformes *Aulonastus* KETHLEY, 1970
- Setae *vi* present; epimeres I parallel; Galliformes *Mironovia* CHIROV & KRAVTSOVA, 1995
10. Only one pair of genital setae present 11
- Two pairs of genital setae present 12
11. Setae *vs*'II absent; setae *d5* short; claws not recurved; Procellariiformes *Syringonomus* KETHLEY, 1970
- Setae *vs*'II present; setae *d5* long; claws recurved; Charadriiformes *Kethleyana* KIVGANOV, 1995
12. Setae *vs*'II absent 13
- Setae *vs*'II present 14
13. Lateral hypostomal teeth present; setae *vi*, *ve*, *sci*, *sce*, *h*, *d1*, *d2*, *l1*, *l2* knobbed; Pelecaniiformes; Ciconiiformes *Stibarokris* KETHLEY, 1970
- Lateral hypostomal teeth absent; setae *vi*, *ve*, *sci*, *sce*, *h*, *d1*, *d2*, *l1*, *l2* smooth; Charadriiformes; Gruiformes; Cuculiformes *Niglarobia* KETHLEY, 1970
14. Setae *vi* present 15
- Setae *vi* absent; Passeriformes *Dissonus* SKORACKI, 1999
15. Peritremes M-shaped 16
- Peritremes U-shaped; Galliformes *Syringophilus* HELLER, 1880
16. Epimeres I parallel, not fused to epimeres II 17
- Epimeres I divergent, fused to epimeres II 20
17. Lateral hypostomal teeth absent 18
- Lateral hypostomal teeth present; Galliformes *Colinophilus* KETHLEY, 1973
18. Hypostomal apex with one pair of median protuberances, slightly ornamented; stylophore rounded posterior or slightly constricted 19
- Hypostomal apex without median protuberances and ornamentation; stylophore constricted posterior; Galliformes *Kalamotrypates* CASTO, 1980
19. Setae *d*III absent; Psittaciformes *Neoaulobia* nov. gen.
- Setae *d*III present; Passeriformes *Aulobia* KETHLEY, 1970
20. Setae *l4* long, subequal or longer than *l1* 21
- Setae *l4* short, about 2 times shorter than *l1* *Chenophila* KETHLEY, 1970
21. Epimeres I dissimilar in size and shape to epimeres II 22
- Epimeres I similar in size and shape to epimeres II 24
22. Large mites (900-1400) 23
- Small mites (550-650); Strigiformes *Bubophilus* PHILIPS & NORTON, 1978
23. Setal pattern of propodosomal region arranged 3-1-1-1; propodosomal plate weakly sclerotized; setae *d2* closer to setae *l1* than *l2*; Psittaciformes *Megasyringophilus* nov. gen.
- Setal pattern of propodosomal region arranged 3-1-2; propodosomal plate with pair of well sclerotized bands; setae *d2* closer to setae *l2* than *l1*, or equidistant between *l1* and *l2*; Passeriformes *Syringophilopsis* KETHLEY, 1970
24. Setae *d5* short; setal pattern of propodosomal region arranged 3-2-1; claws recurved; Charadriiformes *Greagonycha* KETHLEY, 1970
- Setae *d5* long; setal pattern of propodosomal region arranged 2-3-1; claws broadly open; Charadriiformes *Selenonycha* KETHLEY, 1970

Genus *Megasyringophilus* nov. gen.

Female: Large mites (950-1350 in length). Hypostomal apex with 2 pairs of lips and 1 or 3 pairs of medial protuberances, slightly ornamented. Lateral hypostomal teeth absent. Cheliceral digit dentate with 2-3 teeth. Peritremes M-shaped, number of chambers in lateral branches and longitudinal branches variable. Stylophore rounded or slightly constricted posterior, extending to anterior edge of propodosomal plate. All dorsal setae smooth. Propodosomal plate weakly sclerotized, with deep cleft on anterior margin. Hysterosomal plate absent. Pygidial plate almost absent, with indistinct anterior margin. Setal pattern of propodosomal region with 6 pairs of setae arranged 3-1-1-1. Setae *l1*, *l2*, *l4*, *l5*, *d2*, *d4*, *d5* are long (as propodosomal setae). Setae *d2* closer to setae *l1* than *l2*. Genital and anal series with 2 pairs of setae, paragenital series with 3 pairs of setae. Epimeres I divergent, dissimilar in size and shape to epimeres II and almost fused to them at anterior base. Coxal region III-IV weakly sclerotized. All legs subequal in thickness. Legs with full complement of setae. Setae *a* well developed, multiseriate, with 17-25 tines. Antaxial and paraxial members of claw pair subequal, basal angle of claws present or absent; claws about 1/2 length of empodium.

Male: Large mites (860-1120 in length). Characters as in female except: hypostomal apex without protuberances, cheliceral digit edentate, length of setae *l1* variable, setae *l2*, *d2*, *d5* short, two pairs of paragenital setae.

Order of hosts: Psittaciformes.



Figs. 1-4. — *Megasyringophilus kethleyi* nov. spcc. - Female in dorsal view (1); hypostomal apex in ventral view (2); peritreme (3); claw of tarsus III (4). Scale lines: 100 μm (Fig. 1), 50 μm (figs 2-4).

Type species: Megasyringophilus kethleyi nov. spec. This genus included 2 other species.

Differential diagnosis: Megasyringophilus nov. gen. is closely related to the genus *Syringophilopsis* Kethley, 1970. Both genera present the following combination of characters: a full complement of leg setae; epimeres I are divergent and dissimilar in size and shape to epimeres II, fused to them; 2 pairs of genital and anal setae; 3 pairs of paragenital setae in female etc. This new genus is distinguished from *Syringophilopsis* as follows: In *Megasyringophilus* nov. gen. the setal pattern of propodosomal region is arranged 3-1-1-1, propodosomal plate weakly sclerotized; setae *d2* closer to setae *l1* than *l2*. In *Syringophilopsis* the setal pattern of propodosomal region is arranged 3-1-2, the propodosomal plate with a pair of well sclerotized bands; the setae *d2* is closer to seta *l2* than *l1*, or equidistant between *l1* and *l2*.

Etymology: From *Mega* (Gr. - Large) and *Syringophilus* (a genus name).

1. *Megasyringophilus kethleyi* nov. spec.

Female, holotype (Figs. 1-5): length 1350 (1460 in paratype), width at level of setae *h* 416. Hypostomal apex (Fig. 2) slightly ornamented, with 3 pairs of medial protuberances. Peritremes (Fig. 3): lateral branch with 4 chambers; longitudinal branch with 6-8 chambers. Cheliceral digit dentate with 2 teeth. Dorsum (Fig. 1). Stylophore slightly constricted posteriorly. Propodosomal plate with indistinct margin. Length of setae: *vi* 90 (114), *ve* 393 (400), *sci* 315 (450), *sce* 416 (506), *h* 450 (540), *d1* 417, *d2* 393, *d4* 450 (506), *d5* 551, *l1* 438 (506), *l2* 450, *l4* 483 (562), *l5* 573. Distances between setae *l1-d2* 74, *d2-l2* 165. Ventral idiosoma (Fig. 5). Cuticular striations as in Fig. 5. Length of setae: *ic1* 191 (225), *ic3* 202 (209), *pg1* 281, *pg2* 337 (340), *pg3* 472 (450), *g1* 213, *g2* 270 (288), *a1* and *a2* approximately 78. Legs. Claws with basal angle (Fig. 4). Length of setae: *cx1* 2 146 (162), *cxII* 2 213 (252), *cxIII* 2 225 (185), *cxIV* 2 225 (144), *scIII* and *scxIV* approximately 78, not extending beyond genu, *tc'III* and *tc'IV* approximately 65, *tc''III* and *tc''IV* approximately 135. Setae *a'*, *a''* of tarsi I-II with 18-20 tines, *a'*, *a''* of tarsi III-IV with 24-26 tines.

Male, paratype (Figs. 6-7): length 1120 (1068 in other paratype), width 393 (395). Length of setae: *vi* 60, *ve* 101, *sci* 179, *sce* 235, *h* 315, *d1* 81, *d2* 51, *d5* 24, *l1* 101, *l2* 56, *l5* 157, *a1,2* approximately 22, *g1,2* approximately 33, *pg1* 94, *pg2* 108, *ic1* 168, *ic3* .180, *cx1* 2 135, *cxII* 2 224, *cxIII* 2 171, *cxIV* 2 157, *scIII* and *scxIV* approximately 40, *tc'III* and *tc'IV* approximately 45, *tc''III* and *tc''IV* approximately 110. Distance between setae *l1-d2* 67, *d2-l2* 123. Setae *a'*, *a''* of tarsi I-II with 18-20 tines, *a'*, *a''* of tarsi III-IV with 20-23 tines. Length of aedeagus 225.

Host and locality:

Holotype female from *Aratinga jandaya* (Psittacidae),

Brazil. This bird died in the Zoo of Antwerp (coll. A. FAIN, 5. III. 1970). *Paratypes:* 2 females, 1 male, 2 tritonymphs, 2 protonymphs and 2 larvae, with the same data as for the holotype; 4 female, 1 male, 5 tritonymphs, 3 protonymphs (coll. A. Fain, 2.IV.1970, also from 1 bird dying in the Antwerp Zoo).

Holotype, 4 females, 2 males, 5 tritonymphs, 3 protonymphs and 1 larva in the IRSNB; 2 females, 2 tritonymphs, 2 protonymphs and 1 larva in ZISP. Holotype n° 29032.

Differential diagnosis: Megasyringophilus kethleyi nov. spec. is most similar to *Megasyringophilus trichoglossus* nov. spec., see below. Both species have the claws with basal angle, cheliceral digit dentate with 2 teeth, 3 pairs of medial protuberances and similar shape of peritremes. The new species is distinguished from *M. trichoglossus*. by following characters: In females of *M. kethleyi*, the setae *scIII*, *scIV* do not extend beyond genua; the setae *tc'III*, *tc'IV* are approximately 2 times shorter than *tc''III*, *tc''IV*. In females of *M. trichoglossus* nov. spec., the setae *scIII*, *scIV* extend beyond genua; the setae *tc'III*, *tc'IV* and *tc''III*, *tc''IV* are subequal.

Etymology: The species is named after the prominent acarologist Dr. J. KETHLEY (USA).

2. *Megasyringophilus trichoglossus* nov. spec.

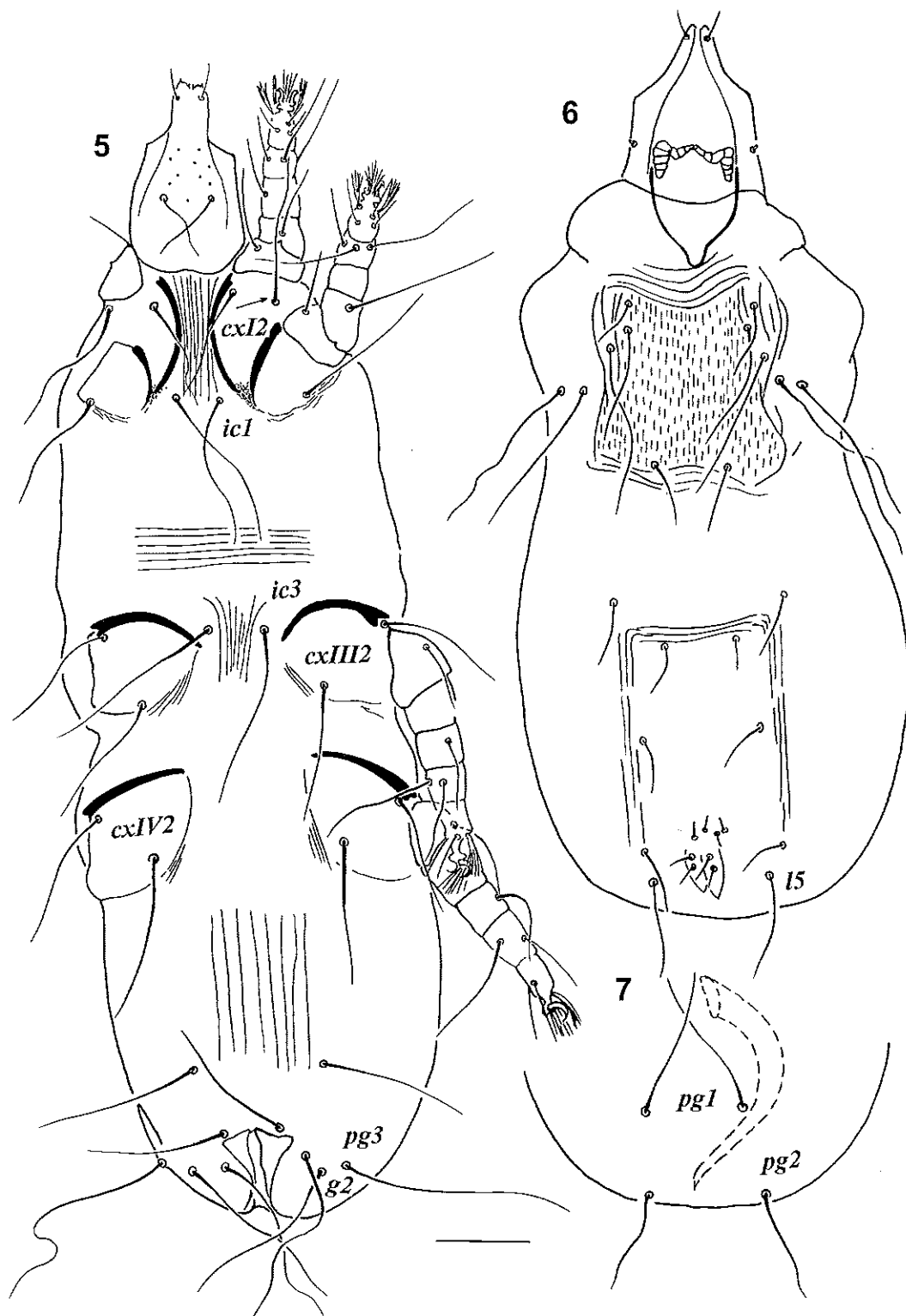
The 3 female specimens of our collection are in rather poor condition, many idiosomal setae are broken and the body is not well-oriented. However, they display some characteristic structures that prove that they belong to a new species.

Female, holotype (Figs. 8-12): length 1235 (1180 in paratype), width at level of setae *h* 393 (450). Hypostomal apex (Fig. 10) slightly ornamented, with 3 pairs of medial protuberances. Peritremes (Fig. 11): lateral branch with 5 chambers; longitudinal branch with 10-11 chambers. Cheliceral digit dentate with 2 teeth. Stylophore slightly constricted posterior. Propodosomal plate with indistinct margin. Setae *d2* close to *l1* than *l2*. Legs: Claws with basal angle (Fig. 12). Setae *scIII* 135, *scxIV* 90 extending beyond genua, setae *tc'III*, *tc'IV* and *tc''III*, *tc''IV* subequal, approximately 78 (90) in length. Setae *a'*, *a''* of tarsi I-II with 14-16 tines, *a'*, *a''* of tarsi III-IV with 16-17 tines.

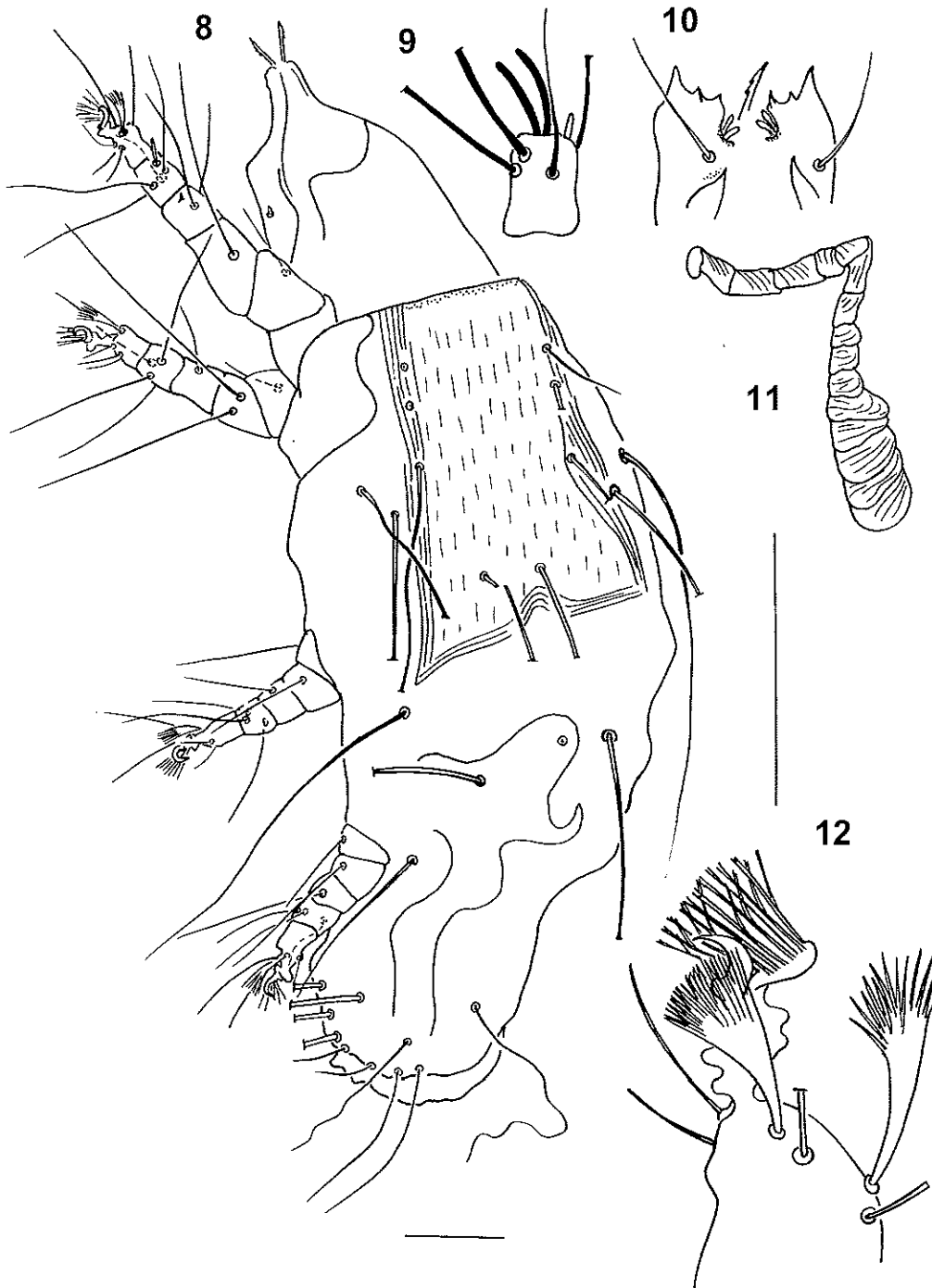
Host and locality:

Holotype female from *Trichoglossus* sp. (Psittacidae), New Guinea. This bird died in the Zoo of Antwerp (coll. A. FAIN, XII. 1970). *Paratypes:* 2 females, 3 tritonymph, 1 protonymph, 5 larvae, all with the same data as in the holotype. Holotype and paratypes in IRSNB. Holotype n° 29033.

Differential diagnosis: See previous species.



Figs. 5-7. — *Megasyringophilus kethleyi* nov. spec. - Female in ventral view (5); male in dorsal view (6); opisthosoma of male in ventral view (7). Scale line 100 μ m



Figs. 8-12 — *Megasyringophilus trichoglossus* nov. spec. - Female in dorsal view (8); tarsus of palp in dorsal view (9); hypostomal apex in ventral view (10); peritreme (11); tarsus III in lateral view (12). Scale lines: 100 μ m (Fig. 8), 50 μ m (Figs. 9-12).

Etymology: The name *trichoglossus* refers to the generic name of the host.

3. *Megasyringophilus cyanocephala* nov. spec.

Female, holotype (Figs. 13-20): length 1350, width at level of setae *h* 337. Hypostomal apex (Fig. 14) slightly ornamented, with 1 pair of medial protuberances. Peritremes (Fig. 14): lateral branch with 5 chambers; longitudinal branch with 4 chambers. Cheliceral digit dentate with 3 teeth. Dorsum (Fig. 13). Stylophore rounded posterior. Propodosomal plate with indistinct margins. Length of setae: *vi* 99, *ve* 202, *sci* 573, *sce* 585, *h* 528, *d1* 607, *d2* 450, *d4* 506, *d5* 562, *l1* 573, *l2* 506, *l4* 618, *l5* 516. Distances between setae *l1-d2* 157, *d2-l2* 202. Ventral idiosoma (Fig. 20). Cuticular striations as in Fig. 20. Length of setae: *ic1* 171, *ic3* 184, *pg1* 247, *pg2* 157, *pg3* 393, *g1*, *g2* approximately 51, *a1*, *a2* approximately 58. Legs: Claws without basal angle. Length of setae: *cxI* 294, *cxII* 2105, *cxIII* 292, *cxIV* 2105, *scIII* and *scIV* approximately 94, not extending beyond genua, *tc'III* and *tc'IV* approximately 67, *tc''III* and *tc''IV* approximately 112. Setae *a'*, *a''* of tarsi I-II with 19-21 tines, *a'*, *a''* of tarsi with III-IV approximately 26 tines.

Male, paratype (Figs. 21-23): length 866, width 281. Length of setae: *vi* 60, *ve* 65, *sci* 224, *sce* 247, *h* 270, *d1* 179, *d2* 56, *d5* 65, *l1* 101, *l2* 51, *l5* 154, *a1,2* approximately 15, *g1,2* approximately 24, *pg1* 173, *pg2* 224, *ic1* 162, *ic3* 155, *scIII* and *scIV* approximately 56, *tc'III* and *tc'IV* approximately 67, *tc''III* and *tc''IV* approximately 112.

Host and locality:

Holotype female from *Psittacula cyanocephala* (Psittacidae), India. The bird died in the Zoo of Antwerp (coll. A. FAIN, 22. IV. 1966). *Paratypes*: 6 female, 3 males, 5 tritonymphs, all with the same data as for the holotype. *Holotype*, 4 females, 2 males, 4 nymphs in IRSNB; 2 females, 1 male and nymphs in ZISP. *Holotype* n° 29034.

Differential diagnosis: *Megasyringophilus cyanocephala* nov. spec. clearly differs from two other members of genus *Megasyringophilus* by following characters. In females of *M. cyanocephala* the claws without basal angle, the cheliceral digit with 3 teeth, only 1 pair of medial protuberances. In two other species of the genus *Megasyringophilus*, the claws with basal angle, the cheliceral digit with 2 teeth, 3 pairs of the medial protuberances present.

Etymology: The name *cyanocephala* refers to the specific name of the host.

Genus *Neoaulobia* nov. gen.

Female: Medium sized mites (550-730 in length). Hypostomal apex with 1-2 pairs of lips and 1 pair of small medial protuberances, slightly ornamented. Lateral hy-

postomal teeth absent. Cheliceral digit edentate. Peritremes M-shaped, number of chambers in lateral branches and longitudinal branches variable. Stylophore rounded or slightly constricted posterior, extending to anterior edge of propodosomal plate. All dorsal setae smooth. Propodosomal plate entire, lateral margins parallel. Hysterosomal plate present. Pygidial plate present, fused with hysterosomal plate. Setal pattern of propodosomal region with 6 pairs of setae arranged 2-1-1-2. Setae *l1*, *l2*, *l4*, *l5*, *d2* are long (as setae *h*), setae *d4*, *d5* are short. Setae *d2* closer to *l1* than *l2*. Genital and anal series with 2 pairs of setae, paragenital series with 3 pairs of setae. Epimeres I parallel, not fused to epimeres II. Coxal region III-IV strongly sclerotized. All legs subequal in thickness. Legs without setae *dTIII*, *dTIV* or setae *dTII* only, all other setae present. Setae *a* well developed, multiserrate, with 18-14 tines. Antaxial and paraxial members of claw pair subequal, claws approximately 1/2 length of empodium.

Male: unknown

Order of hosts: Psittaciformes.

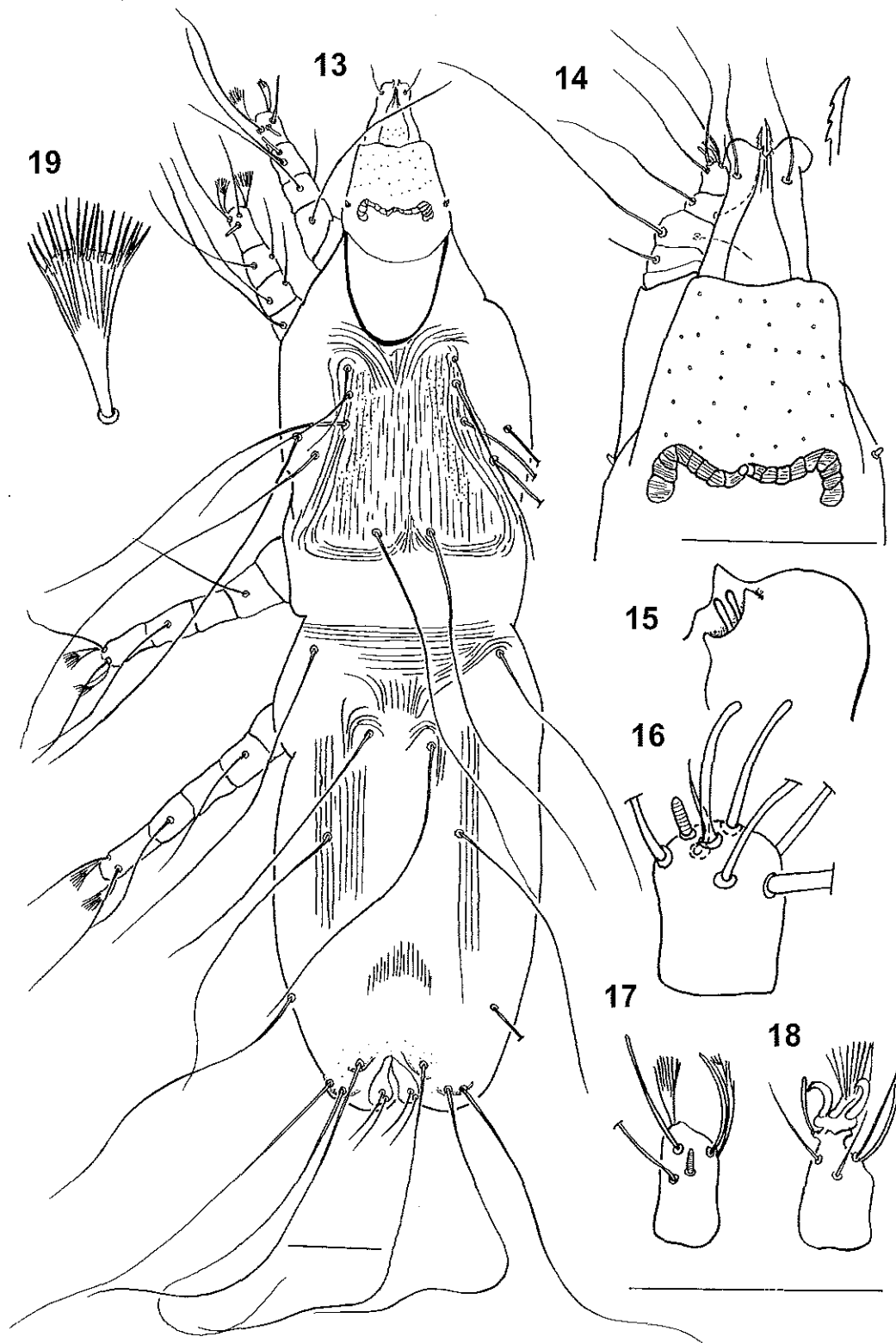
Type species: *Neoaulobia aratingae* nov. spec. This genus includes 3 species.

Differential diagnosis: *Neoaulobia* nov. gen. is closely related to the genus *Aulobia* KETHLEY, 1970. Both genera present the following combination of characters: the epimeres I are parallel and not fused to epimeres II; 2 pairs of genital and anal setae; 3 pairs of paragenital setae in female, parallel lateral margins of propodosomal plate, the setae of propodosomal region are arranged as 2-1-1-2, the setae *d4*, *d5* are short. The new genus is distinguished from *Aulobia* by the leg chaetotaxy. In *Neoaulobia* nov. gen., the setae *dTIII* are absent; in *Aulobia*, the legs bears a full set of setae.

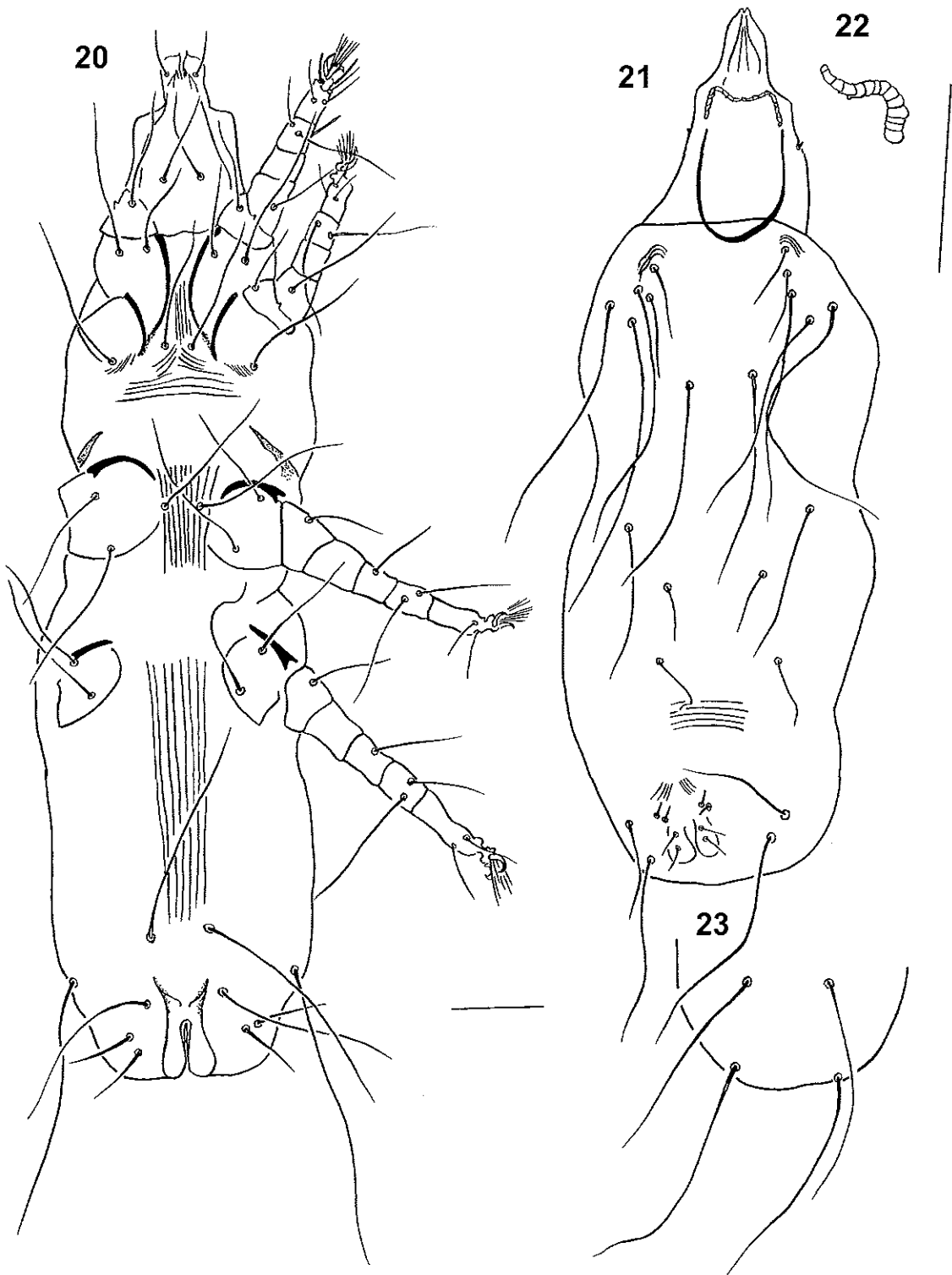
Etymology: From *Neo* (Gr.- new) and *Aulobia*, a genus of Syringophilidae.

1. *Neoaulobia aratingae* nov. spec.

Female, holotype (Figs. 24-28): length 641 (618, 630 in 2 paratypes), width at level of setae *h* 146 (135, 150). Peritremes (Fig. 26): lateral branch with 1-2 chambers; longitudinal branch with 4 chambers. Dorsum (Fig. 24). Stylophore slightly constricted posterior. Length of setae: *vi* 36 (29, 47), *ve* 143 (121, 135), *sci* 198 (208, 225), *sce* 225 (238, 247), *h* 256 (240, 249), *d1* 225 (218, 234), *d2* 105 (74, 99), *d4* 35 (27, 29), *d5* 23 (18, 18), *l1* 230 (220, 252), *l2* 156 (130, 166), *l4* 114 (70, 112), *l5* 380 (372, 401). Distances between setae *l1-d2* 45 (33, 33), *d2-l2* 78 (72, 78). Ventral idiosoma (Fig. 27). Cuticular striations as in Fig. 27. Length of setae: *ic1* 85 (56, 80), *ic3* 83 (65, 67), *pg1* 112 (121, 132), *pg2* 78 (45, 72), *pg3* 220 (175, 224), *g1* and *g2* approximately 33 (27, 38), *a1* and *a2* approximately 15 (18, 22). Legs. Setae *dTIV* absent.



Figs. 13-19 — *Megasyringophilus cyanocephala* nov. spec. - Female in dorsal view (13); gnathosoma in dorsal view (14); hypostomal apex in ventral view (15); tarsus of palp in ventral view (16); tarsus I in dorsal view (17) and ventral view (18), seta a'' of tarsus III (19). Scale lines: 100 μ m (Figs. 13-14, 17-18), 50 μ m (Figs. 15-16, 19).



Figs. 20-22 — *Megasyringophilus cyanocphala* nov. spec. - Female in ventral view (20); male in dorsal view (21); peritreme of male (22); opisthosoma of male in ventral view (23). Scale line 100 μ m.



Figs. 24-28 — *Ncoaulobia aratingae* nov. spec. - Female in dorsal view (24); hypostomal apex in ventral view (25); peritreme (26); female in ventral view (27); seta 'a'' of tarsus III (28). Scale lines: 100 μ m (Figs. 24, 27), 20 μ m (Figs. 25-26, 28).

Length of setae: *cxI* 2 67 (60, 78), *cxII* 2 112 (101, 117), *cxIII* 2 83 (78, 81), *cxIV* 2 74 (76, 78), *scIII* and *scxIV* approximately 27 (20, 24), not extending beyond genua, *tc'III* and *tc'IV* approximately 27 (27, 29), *tc''III* and *tc''IV* approximately 51 (53, 56). Setae *a'*, *a''* of tarsi I-II with 6-8 tines, *a'*, *a''* of tarsi III-IV with 8-10 tines.

Host and locality:

Holotype female from *Aratinga jandaya* (Psittacidae), Brazil. This bird died in the Zoo of Antwerp (coll. A. FAIN, 5. III. 1970). *Paratypes*: 8 females with the same data as for the holotype; 1 female (2. IV. 1970)

Holotype and 7 females in IRSNB; 1 female in ZISP. Holotype n° 29036.

Differential diagnosis: Neoaulobia aratingae nov. spec. is closely related to *Neoaulobia agapornis* nov. spec. In both species, the setae *dTIV* are absent. The new species is distinguished from *N. agapornis* by following characters. In *N. aratingae*, the setae *ve*, *sci*, *II*, *d2* and *l2* are long, 143, 198, 230, 105 and 156 respectively, the longitudinal branch of peritreme with 4 chambers, the stylophore is slightly constricted posterior. In *N. agapornis*, the setae *ve*, *sci*, *II*, *d2* and *l2* are short, 20, 31, 40, 27 and 38 respectively, the longitudinal branch of peritreme with 3 chambers, the stylophore is rounded posterior.

Etymology: The name *aratingae* refers to the generic name of the host.

2. *Neoaulobia agapornis* nov. spec.

Female, holotype (Figs. 29-35): length 596 (550, 585 in 2 paratypes), width at level of setae *h* 129 (130, 135). Peritremes (Fig. 34): lateral branch with 2 chambers; longitudinal branch with 3 chambers. Dorsum (Fig. 29). Stylophore rounded constricted posterior. Length of setae: *vi* 18 (16), *ve* 20 (22), *sci* 31 (29), *sce* 179, *h?* (190), *d1?* (195), *d2* 27, *d4?*, *d5* 24 (27), *II* 40 (30), *l2* 38 (35), *l4?* (85), *l5* 279 (256). Distances between setae *II-d2* 22 (27, 38), *d2-l2* 78 (85, 90). Ventral idiosoma (Fig. 35). Cuticular striations as in Fig. 35. Length of setae: *ic1* 60 (76, 85), *ic3* 44 (65), *pg1* 78 (83-90), *pg2* 49 (51, 78), *pg3* 112 (110, 126), *g1* and *g2* approximately 22, *a1* and *a2* approximately 18. Legs. Setae *dTIV* absent. Length of setae: *cxI* 2 51 (63, 67), *cxII* 2 90 (78, 92), *cxIII* 2? (40, 63), *cxIV* 2 38 (45, 60), *scIII* and *scxIV* approximately 24 (22, 24), not extending beyond genua, *tc'III* and *tc'IV* approximately 22 (20, 33), *tc''III* and *tc''IV* approximately 40 (40, 45). Setae *a'*, *a''* of tarsi I-II with 6-7 tines, *a'*, *a''* of tarsi with III-IV 7-8 tines.

Host and locality:

Holotype female from *Agapornis nigrigenis* (Psittacidae), Zambia. This bird died in the Zoo of Antwerp (coll. A. FAIN, 21. II. 1968). *Paratypes*: 12 females, 7 protonymphs and 3 larvae, all with the same data as for the holotype.

Holotype, 11 females and 5 protonymphs in MRAC; 2 females and 2 nymphs in ZISP. Holotype n° 187368.

Differential diagnosis: See above.

Etymology: The name *agapornis* refers to the generic name of the host.

3. *Neoaulobia psittaculæ* nov. spec.

Female, holotype (Figs. 36-41): length 731 (697, 731 in 2 paratypes), width at level of setae *h* 135 (146, 157). Peritremes (Fig. 38): lateral branch with 3 chambers; longitudinal branch with 4 chambers. Dorsum (Fig. 36). Stylophore slightly constricted posterior. Length of setae: *vi* 15 (18, 22), *ve* 18 (29, 29), *sci* 29 (40, 41), *sce* 190 (185, 195), *h* 205 (179, 207), *d1* 187 (198, 207), *d2* 51 (60, 67), *d4* 36 (40, 45), *d5* 31 (22, 27), *II* 40 (38, 47), *l2* 74 (90, 101), *l4* 105 (112, 115), *l5* 306 (301, 330). Distances between setae *II-d2* 60 (45, 63), *d2-l2* 90 (90, 94). Ventral idiosoma (Fig. 39). Cuticular striations as in Fig. 39. Length of setae: *ic1* 90 (74, 90), *ic3* 76 (67, 78), *pg1* 112 (96, 112), *pg2* 108 (110, 119), *pg3* 157 (142, 146), *g1* and *g2* approximately 31 (33, 38), *a1* and *a2* approximately 18. Legs. Setae *dTIV* present. Length of setae: *cxI* 2 60 (56, 74), *cxII* 2 112 (114, 123), *cxIII* 2 78 (72, 90), *cxIV* 2 73 (74, 83), *scIII* and *scxIV* approximately 29 (33, 40), not extending beyond genua, *tc'III* and *tc'IV* approximately 56 (51, 60), *tc''III* and *tc''IV* approximately 54 (53, 60). Setae *a'*, *a''* of tarsi I-II with 6-8 tines, *a'*, *a''* of tarsi III-IV with 12-14 tines.

Host and locality:

Holotype female from *Psittacula cyanocephala* (Psittacidae), India. This bird died in the Zoo of Antwerp (coll. A. FAIN, 22. IV. 1966). *Paratypes*: 15 females, 1 male, 2 tritonymphs and 2 protonymphs, with the same data as for the holotype.

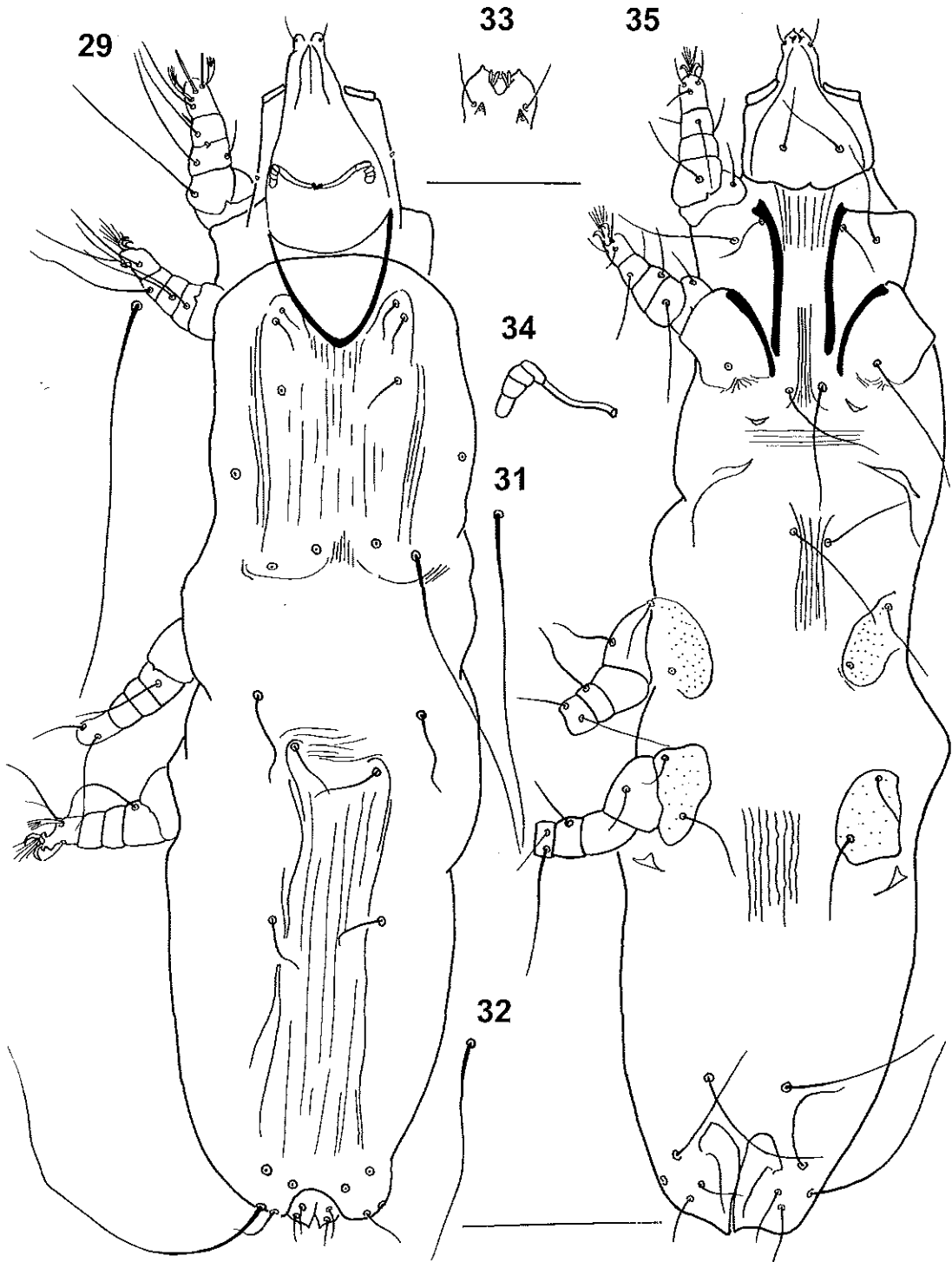
Holotype, 12 females, 1 male, 4 nymphs in IRSNB; 3 females in ZISP. Holotype n° 29035.

Differential diagnosis: Neoaulobia psittaculæ nov. spec. clearly differs from two other members of genus *Neoaulobia* by following characters. In *N. psittaculæ*, the setae *dTIV* are present; the setae *tc'III-tc'IV* and *tc''III-tc''IV* are subequal. In other species of the genus *Neoaulobia*, the setae *dTIV* are absent; the setae *tc'III-tc'IV* 1.5-2 times shorter than *tc''III-tc''IV*.

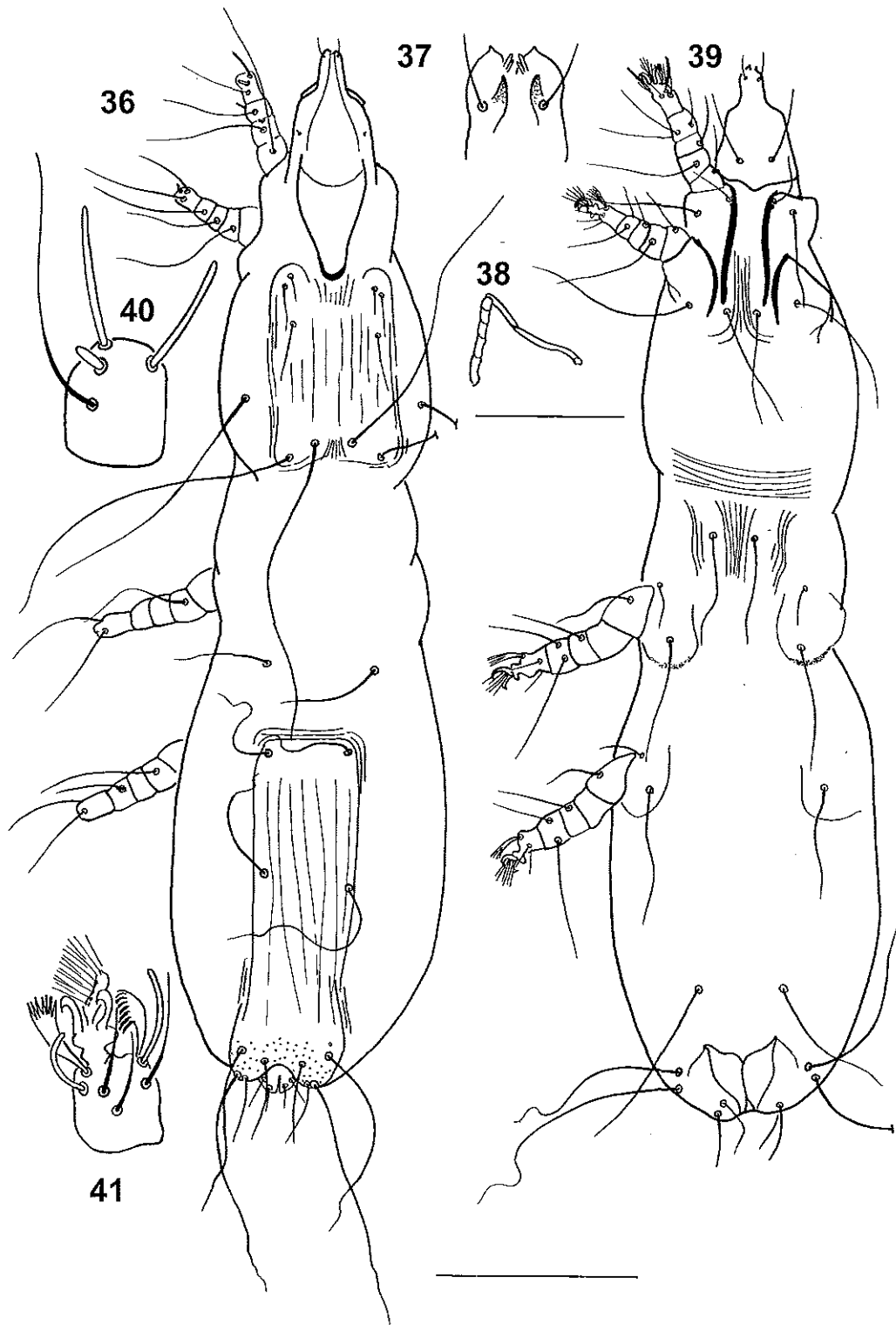
Etymology: The name *psittaculæ* refers to the generic name of host.

Genus *Psittaciphilus* nov. gen.

Female: Medium mites (670-770 in length). Hypostomal apex with 2 pairs of lips and without medial protuberances, ornamented. Lateral hypostomal teeth absent. Che-



Figs. 29-35 — *Neoaulobia agapornis* nov. spec. - Female in dorsal view (29); seta *h* in paratype (30); seta *d1* in paratype (31); seta *14* in paratype (32); hypostomal apex in ventral view (33); peritreme (34); female in ventral view (35). Scale lines: 100 μ m (Figs. 29-32, 35), 20 μ m (Figs. 33-34).



Figs. 36-41 — *Ncoaulobia psittaculæ* nov. spec. - Female in dorsal view (36); hypostomal apex in ventral view (37); peritreme (38); female in ventral view (39); tarsus I in dorsal view (40) and ventral view (41). Scale lines 100 μm (Figs. 36, 39), 20 μm (Figs. 37-38, 40-41).

lateral digit edentate. Peritremes M-shaped, number of chambers in lateral branches and longitudinal branches variable. Stylophore constricted posterior, extending to anterior edge of propodosomal plate. All dorsal setae smooth. Propodosomal plate weakly sclerotized, margins indistinct. Anterior part of propodosomal plate with pair of pocket-like structures. Hysterosomal plate present. Pygidial plate fused to hysterosomal plate. Setal pattern of propodosomal region with 5 pairs of setae (setae *vi* absent), arranged 2-1-2. Setae *II*, *I2*, *I4*, *I5*, *d2*, as long as setae *h*, setae *d4* and *I4* are short. Setae *d2* closer to *II* than *I2*. Genital and anal series with 2 pairs of setae, paragenital series with 3 pairs of setae. Epimeres I weakly divergent, dissimilar in size and shape to epimeres II and almost fused to them at posterior part. Coxal region III-IV weakly sclerotized. Legs I slightly thicker than legs II, legs II slightly thicker than legs III-IV or subequal in thickness to them. Leg setae *dFII-dFIV*, *vs''II* are absent. Setae *a* well developed, multiserrate, with 15-18 tines. Antaxial and paraxial members of claw pair subequal, claws approximately 1/2 length of empodium.

Male: Medium mites (470-530 in length). Characters as in female, except: hypostomal apex unornamented; length of setae *II* variable, setae *I2*, *d2* are short, paragenital setae two pairs; hysterosomal plate absent; legs subequal in thickness.

Order of hosts: Psittaciformes.

Type species: *Psittaciphilus amazonae* nov. spec. This genus includes 2 species.

Differential diagnosis: *Psittaciphilus* nov. gen. is closely related to the genus *Peristerophila* KETHLEY, 1970. Both genera present the following combination of characters: the small size (600-800); the setae *vs''II*, *dFII-dFIV* and *vi* are absent; the setae *d5* are short; the propodosomal plate not divided; the epimeres I are slightly divergent and fused to epimeres II; 2 pairs of genital and anal setae, 3 pairs of paragenital setae in female; legs I thicker than legs II. The new genus is distinguished from *Peristerophila* by following characters. In female of *Psittaciphilus*, the setal pattern of propodosomal region arranged 2-1-2; the anterior part of propodosomal plate with a pair of pocket-like structures; the stylophore constricted posterior. In female of *Peristerophila*, the setal pattern of propodosomal region arranged 1-1-1-2, the anterior part of propodosomal plate without pocket-like structures; the stylophore rounded posterior.

Etymology: From *Psittacius* (Lat.) - parrot and *philos* (Gr.) - love.

1. *Psittaciphilus amazonae* nov. spec.

Female, holotype (Figs. 42-47): length 720 (675-697 in three paratypes), width at level of setae *h* 168 (146-150).

Peritremes (Fig. 44): lateral branch with 3-4 chambers; longitudinal branch with 5 chambers. Dorsum (Fig. 42). Length of setae: *ve* 113 (110-123), *sci* 56 (45-47), *sce* 190 (166-179), *h* 164 (157-168), *d1* 179 (171-177), *d2* 146 (144-155), *d4* 29 (27-32), *d5* 56 (31-33), *II* 192 (179-184), *I2* 186 (179-184), *I4* 202 (184-234), *I5* 315 (315-337). Distances between setae *II-d2* 45 (43-56), *d2-I2* 67 (58-67). Ventral idiosoma (Fig. 45). Cuticular striations as in Fig. 45. Length of setae: *ic1* 76 (85-90), *ic3* 72 (60-74), *pg1* 112 (135-157), *pg2* 38 (36-56), *pg3* 164 (168-198), setae *g1*, *g2* approximately 27 (22-29), setae *a1*, *a2* approximately 15 (15-17). Legs. Length of setae: *cxI* 2 65 (69-78), *cxII* 2 90 (83-90), *cxIII* 2 74 (90-101), *cxIV* 2 90 (101-112), *scIII* 31 (32-45), extending beyond genua, *scxIV* 24 (27-38), not extending beyond genua, *tc'''III* and *tc'''IV* approximately 30 (27-38), *tc'''III* and *tc'''IV* approximately 40 (45-51). Setae *a'*, *a''* of tarsi I-II with 14-16 tines, *a'*, *a''* of tarsi III-IV with 15-17 tines.

Male, paratype (Figs. 48-49): length 528 (472 in other paratype), width 180 (168). Peritremes: lateral branch with 3 chambers; longitudinal branch with 7 chambers. Length of setae: *ve* 78 (112), *sci* 56 (60), *sce* 119 (123), *h* 117 (128), *d1* 121 (119), *d2* 15 (13), *d5* 22, *II* 123 (132), *I2* 27 (17), *I5* 34, *a1,2* approximately 9, *g1,2* approximately 8, *pg1* 67, *pg2* 78. Distances between setae *II-d2* and *d2-I2* are subequal, approximately 33. Length of aedeagus approximately 101.

Host and locality:

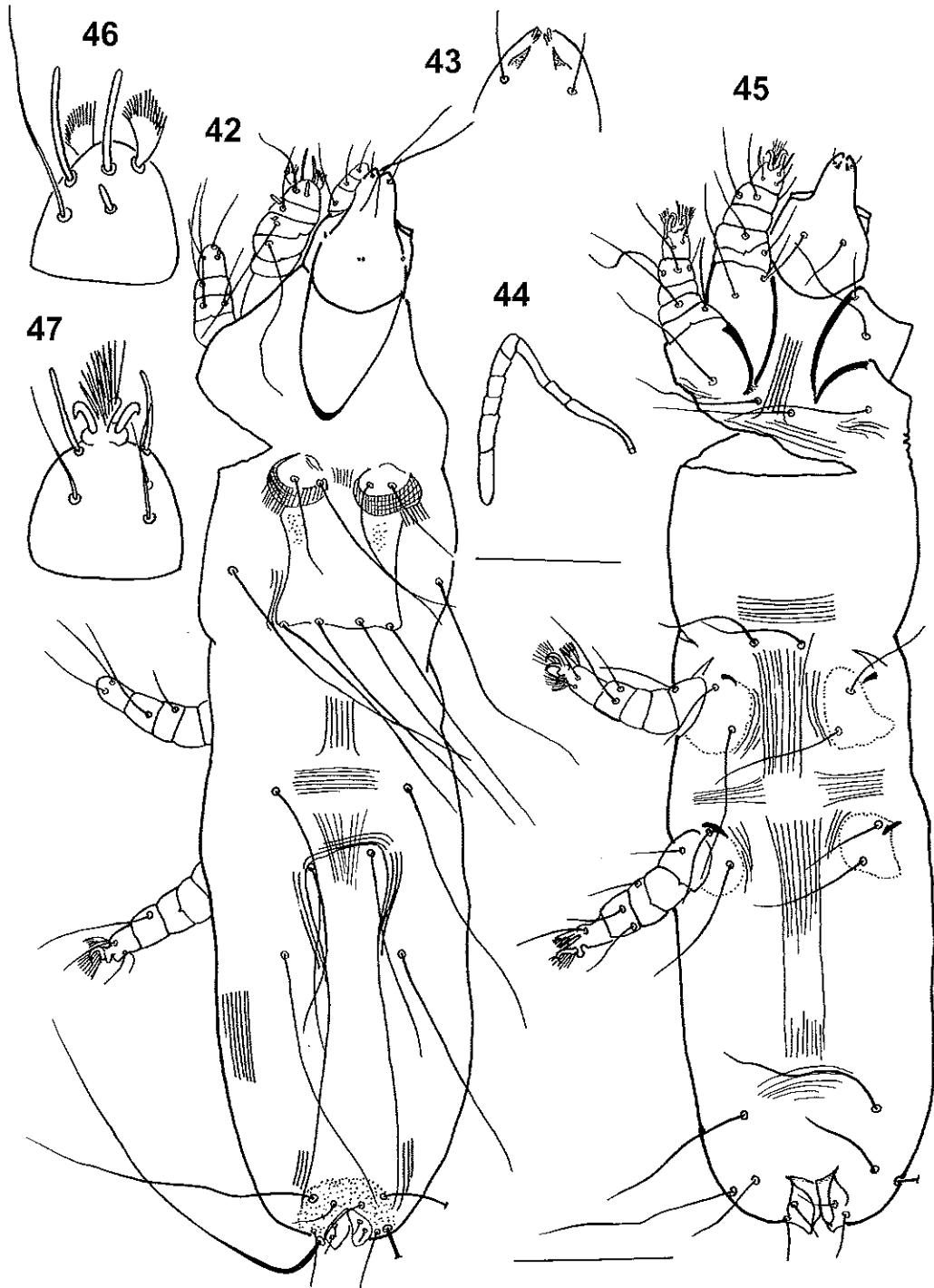
Holotype female from *Amazona amazonica* (Psittacidae), Baranquilla, Colombia (coll. P. H. VERCAMMEN-GRANDJEAN, 15. X. 1992.). *Paratypes*: 15 females, 5 males, 6 tritonymphs, 4 protonymphs and 6 larvae, all with the same data as for the holotype. Holotype, 8 females, 3 males and 4 larvae in IRSNB; 4 females, 1 male, 2 nymphs and 2 larvae in ZISP. Holotype n° 29038.

Differential diagnosis: *Psittaciphilus amazonae* nov. spec. is distinguished from the second species of this genus, *Psittaciphilus fritschi* nov. spec., by longer setae *sci* 45-56 in females and 56-60 in males respectively. In *P. fritschi* nov. spec., setae *sci* are short, 18-22 in females and 18 in male.

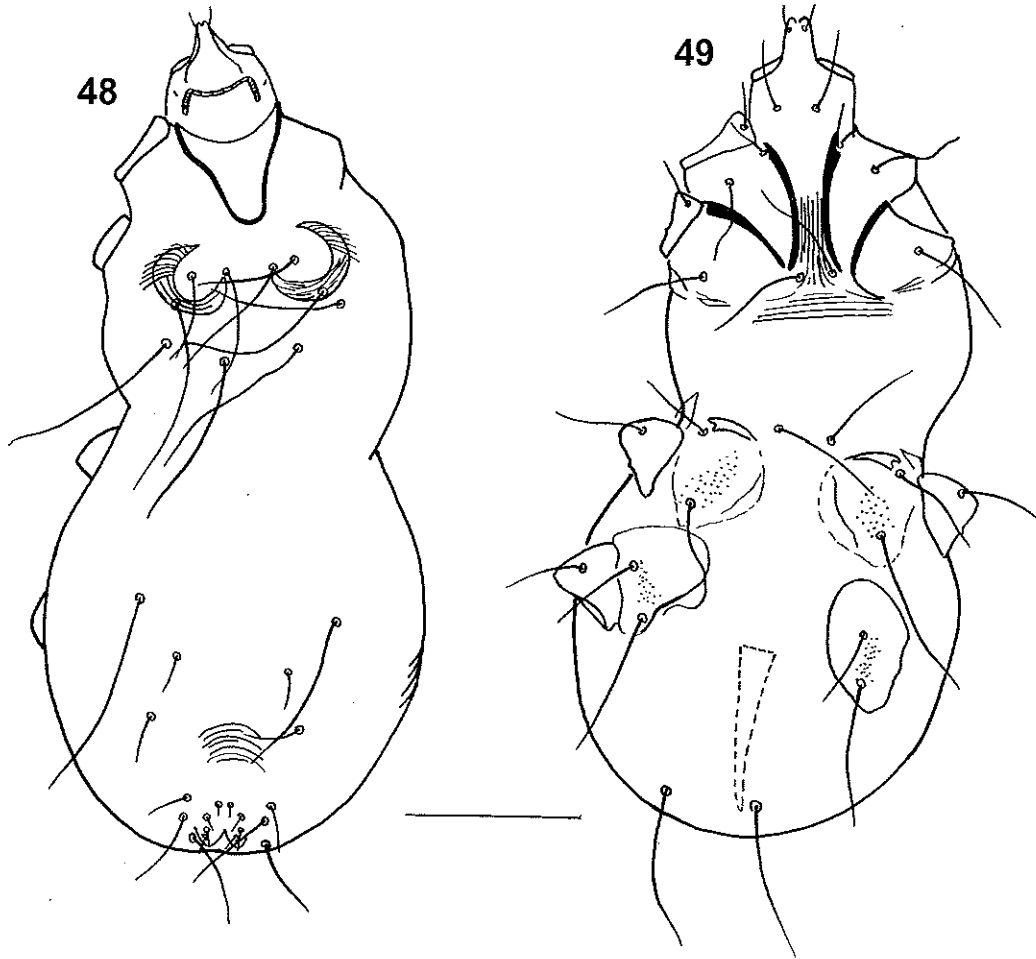
Etymology: The name *amazonae* refers to the generic name of the host.

2. *Psittaciphilus fritschi* nov. spec.

Female, holotype (Figs. 50-51): length 770 (731, 765 in two paratypes), width at level of setae *h* 157 (146, 156). Peritremes: lateral branch with 2 chambers; longitudinal branch with 6 chambers. Dorsum (Fig. 50). Length of setae: *ve* 101 (83, 101), *sci* 22 (18, 22), *sce* 225 (195, 225), *h* 211 (198, 199), *d1* 238 (198, 257), *d2* 202 (189), *d4* 23 (22, 33), *d5* 25 (24, 29), *II* 190 (225), *I2* 190 (211, 238), *I4* 194 (194, 238), *I5* 360 (330, 365). Distances



Figs. 42-47 — *Psittaciphilus amazonae* nov. spec. - Female in dorsal view (42); hypostomal apex in ventral view (43); peritreme (44); female in ventral view (45); tarsus I in dorsal view (46) and ventral view (47). Scale lines: 100 μm (Figs. 42, 45), 20 μm (Figs. 43-44, 46-47).



Figs. 48-49 — *Psittaciphilus amazonae* nov. spec. - Male in dorsal view (48) and ventral view (49). Scale line 100 μ m.

between setae *II-d2* 33 (33-39), *d2-l2* 96 (90, 105). Ventral idiosoma (Fig. 51). Cuticular striations as in Fig. 51. Length of setae: *ic1* 103 (83, 94), *ic3* 101 (90), *pg1* 180 (180, 216), *pg2* 56 (43, 56), *pg3* 270 (243, 256), setae *g1*, *g2* approximately 45 (33, 45), setae *a1*, *a2* approximately 24 (18, 22). Legs. Length of setae: *cxI* 2 87 (76, 85), *cxII* 2 96 (90-101), *cxIII* 2 90 (90-100), *cxIV* 2 144 (114-135), *scIII* and *scxIV* approximately 67 (60), extending beyond genua, *tc'III* and *tc'IV* approximately 40 (40, 44), *tc''III* and *tc''IV* approximately 67 (60). Setae *a'*, *a''* of tarsi I-II with 14-15 tines, *a'*, *a''* of tarsi III-IV with 16-17 tines.

Male, paratype (Fig. 52): length 483 (479 in other paratype), width 168 (191). Length of setae: *ve* 48 (42), *sci* 18, *sce* 135, *h* 112, *d1* 135, *d2* 22, *d5* 27, *l1* 144, *l2* 27, *l5* 123. Distances between setae *II-d2* and *d2-l2* are subequal, approximately 37 (45). Length of aedeagus approximately 112.

Host and locality:

Holotype female from parrot N 322. This bird died in the Zoo of Antwerp (coll. A. FAIN, 21. V. 1970.). *Paratypes*: 10 females, 4 males, 1 tritonymph, 1 protonymph and 1 larva, all with the same data as for the holotype.

Holotype, 8 females, 2 males, 2 nymphs and 1 larva in IRSNB; 2 females and 2 males in ZISP.

Holotype n° 29037.

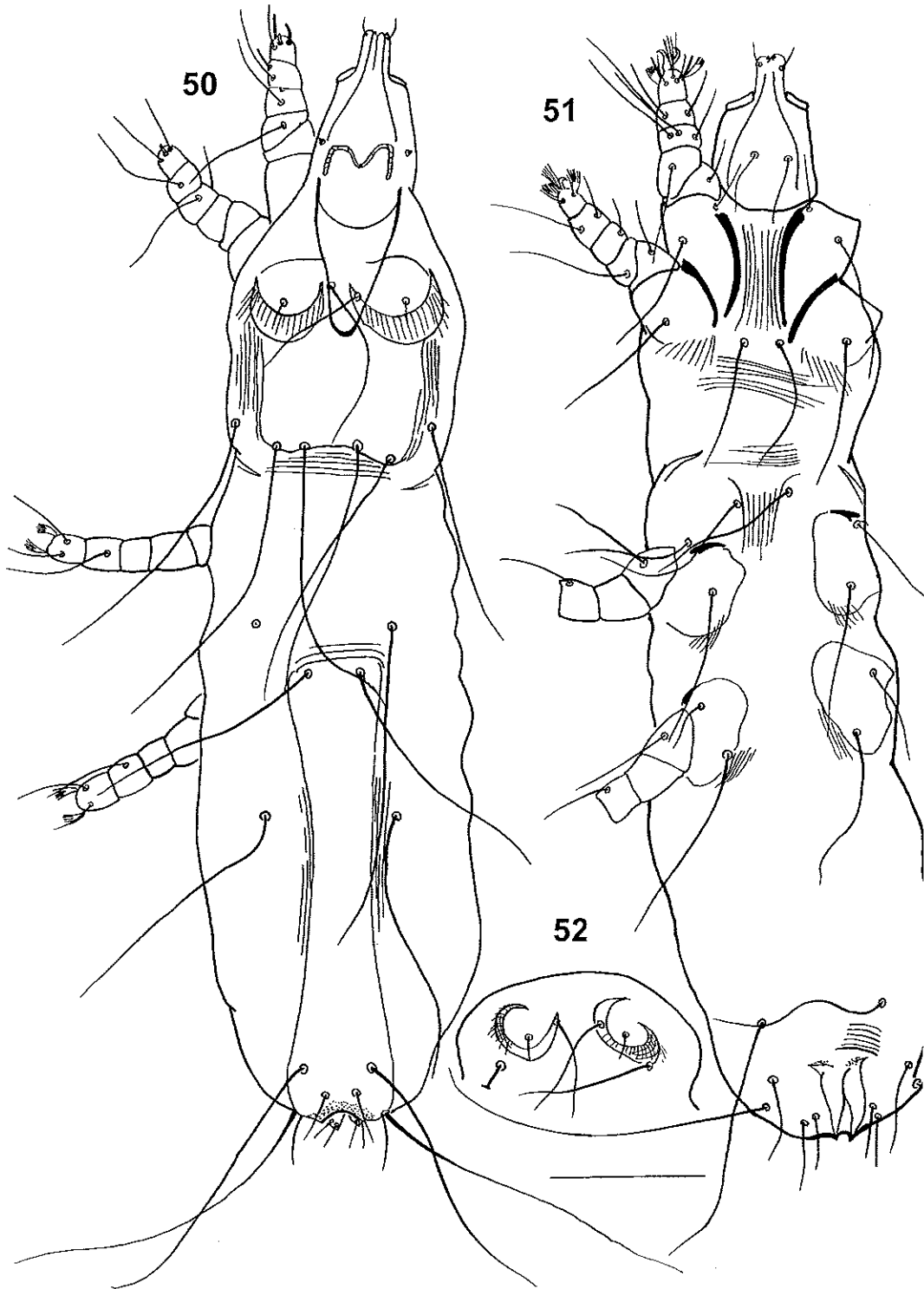
Differential diagnosis: See previous species.

Etymology: The species is named for the prominent German acarologist Dr. W. FRITSCH.

Genus *Syringophiloidus* Kethley, 1970

Type species: *Syringophilus minor* Berlese, 1887

The genus includes 5 described and 3 new species.



Figs. 50-52 — *Psittaciphilus fritschi* nov. spec. - Female in dorsal view (50) and ventral view (51); anterior part of propodosomal plate in male (52). Scale line 100 μm .

KEY TO THE GENUS SYRINGOPHILOIDUS

KETHLEY, 1970

(Females)

1. Setae *ve* shorter than 90 2
- Setae *ve* longer than 90 7
2. Setae *sci* shorter than 90 3
- Setae *sci* longer than 90 4
3. Setae *vi* and *ve* are thin (fig 68); setae *sci* 29-33 in length, are shorter or subequal to *ve*
..... *S. dendrocittae* nov. spec
- Setae *vi* and *ve* are strong (fig 70); setae *sci* 45-65 in length, are slightly longer than *ve*
..... *S. minor* (Berlese, 1887)
4. Lateral branch of peritremes with short chambers (Fig. 71); setae *vi* 1.5-1.8 times shorter than *ve*; setae *sci*, *sce*, *h*, *d1*, *d2*, *l1*, *l2* are enlarged in basal part . 5
- Lateral branch of peritremes with short chambers, setae *vi* 2 times shorter than *ve*; setae *sci*, *sce*, *h*, *d1*, *l1*, *l2*, are not enlarged in basal part 6
5. Setae *pg 2* 1.5 - 1.6 times shorter than *pg 1*
..... *S. motacillae* BOCHKOV & MIRONOV, 1998
- Setae *pg 2* 2-3 times shorter than *pg 1*
..... *S. seiurus* (CLARK, 1964)
6. Setae *vi* are slightly thicker than *ve*; setae *sci* 189-247 (in males, setae *sci* 110-123, the seta 78-90, 3-4 times longer than *d2*, *l2*) *S. graculae* nov. spec.
- Setae *vi* and *ve* are subequal in thickness, setae *sci* 79-101 (in males, setae *sci* 35-56, setae *l1* 25-31, 2 times longer than *d2*, *l2*
..... *S. presentalis* CHIROV & KRAVTSOVA, 1995
7. Setae *vi* and *ve* are 77-105 and 203 respectively ...
..... *S. cypsiuri* nov. spec.
- Setae *vi* and *ve* are 45 - 50 and 90 - 101 respectively
..... *S. glandarii* (Fritsch, 1958)

1. *Syringophiloidus cypsiuri* nov. spec.

Female, holotype (Figs. 53-57): length 810 (911 in paratype), width at level of setae *h* 112 (135). Peritremes (Fig. 55): lateral branch with 3 chambers; longitudinal branch with 8-9 chambers. Dorsum (Fig. 53). All setae smooth. Length of setae: *vi* 105 (77), *ve* 203, *sci* 210 (157), *sce* 270, *h* 216 (238), *d1* 292, *d2* 216, *d4* 38 (40), *d5* 40 (38), *l1* 180, *l2* 202 (180), *l4* 220, *l5* 275. Ventral idiosoma (Fig. 57). Cuticular striations as in Fig. 57. Length of setae: *ic1* 90, *ic3* 112, *pg1* 168 (170), *pg2* 112 (117), *pg3* 185 (174), *g1*, *g2* approximately 31 (27), *a1* and *a2* approximately 31 (27). Legs. Length of setae: *cxI* 2 83, *cxII* 2 105, *cxIII* 2 117, *cxIV* 2 96, *scIII* and *scxIV* approximately 53 (62), extending beyond genua, *tc'III* and *tc'IV* approximately 40 (45), *tc''III* and *tc''IV* approximately 60 (78). Setae *a'*, *a''* of tarsi I-II with 6-7 times.

Male, paratype (Fig. 58): length 596, width 159. Length of setae: *vi* 101, *ve* 112, *sci* 150, *sce* 154, *h* 157, *d1* 135, *d2*, *l1* and *l2* approximately 20, *d5* 40, *l5* 179, *pg1* 117, *pg2* 78.

Host and locality:

Holotype female from *Cypsiurus parvus* (Apodiformes: Apodidae), Kasai Prov., Republ. Democr. Congo. The bird was provided to A.F. by Mr A. De Roo, collaborator of the MRAC. *Paratypes*: 1 female, 4 males, 4 tritonymphs, all with the same data as for the holotype.

Holotype, 1 female, 3 males, 3 tritonymphs in MRAC; 1 male and 1 tritonymph in ZISP. Holotype n° 187369.

Differential diagnosis: *Syringophiloidus cypsiuri* nov. spec. is closely related to *Syringophiloidus glandarii* (FRITSCH, 1958) ex *Garrulus glandarius* (Passeriformes: Corvidae) from Germany (FRITSCH, 1958). The later species was also collected ex *Delichon urbica* (Passeriformes: Hirundinidae) from Russia (BOCHKOV & MIRONOV, 1998). In both species, the setae *ve* are long and smooth (longer than 90). The new species is distinguished from *S. glandarii* by following characters. In females of *S. cypsiuri*, the setae *vi* and *ve* are 77-105 and 203 respectively; in males, the setae *l1* are short (20), subequal to *d2*, *l2*. In females of *S. glandarii*, the setae *vi* and *ve* are 45-50, 90-101 (in five females ex *D. urbica* from Russia); in males, the setae *l1* are long, 3 times longer than *d2*, *l2*.

Etymology: The name *cypsiuri* refers to the generic name of host.

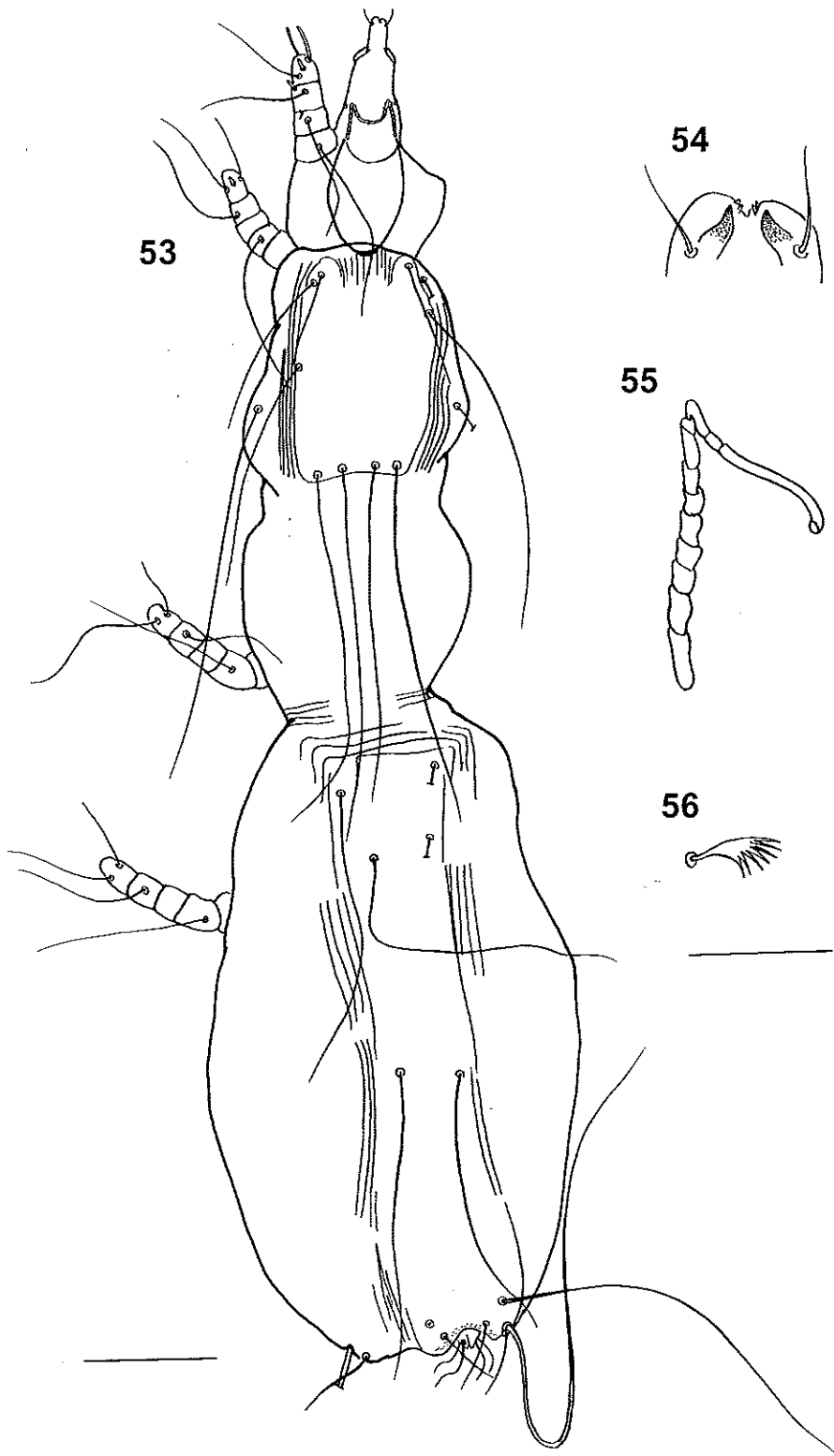
2. *Syringophiloidus graculae* nov. spec.

Female, holotype (Figs. 59-63): length 675 (615-680 in five paratypes), width at level of setae *h* 135 (123-146). Peritremes (Fig. 61): lateral branch with 3 chambers; longitudinal branch with 10-13 chambers. Dorsum (Fig. 59). Setae *vi* and *ve* weakly serrate, *vi* slightly thickened (fig 62). Length of setae: *vi* 22 (18-24), *ve* 45 (42-50), *sci* 225 (189-247), *sce* 247 (230-265), *h* 235 (220-243), *d1* 225 (220-240), *d2* 171 (157-180), *d4* 24 (22-27), *d5* 27 (22-29), *l1* 202 (182-225), *l2* 158 (157-180), *l4* 256 (243-270), *l5* 300 (289-303). Ventral idiosoma (Fig. 63). Cuticular striations as in Fig. 63. Length of setae: *ic1* 101, *ic3* 84, *pg1* 135 (114-140), *pg2* 108 (94-112), *pg3* 179 (150-179), *g1*, *g2* approximately 33, *a1* and *a2* approximately 27. Legs. Setae *scIII* and *scxIV* extending beyond genua. Setae *a'*, *a''* of tarsi I-II with 7-8 times.

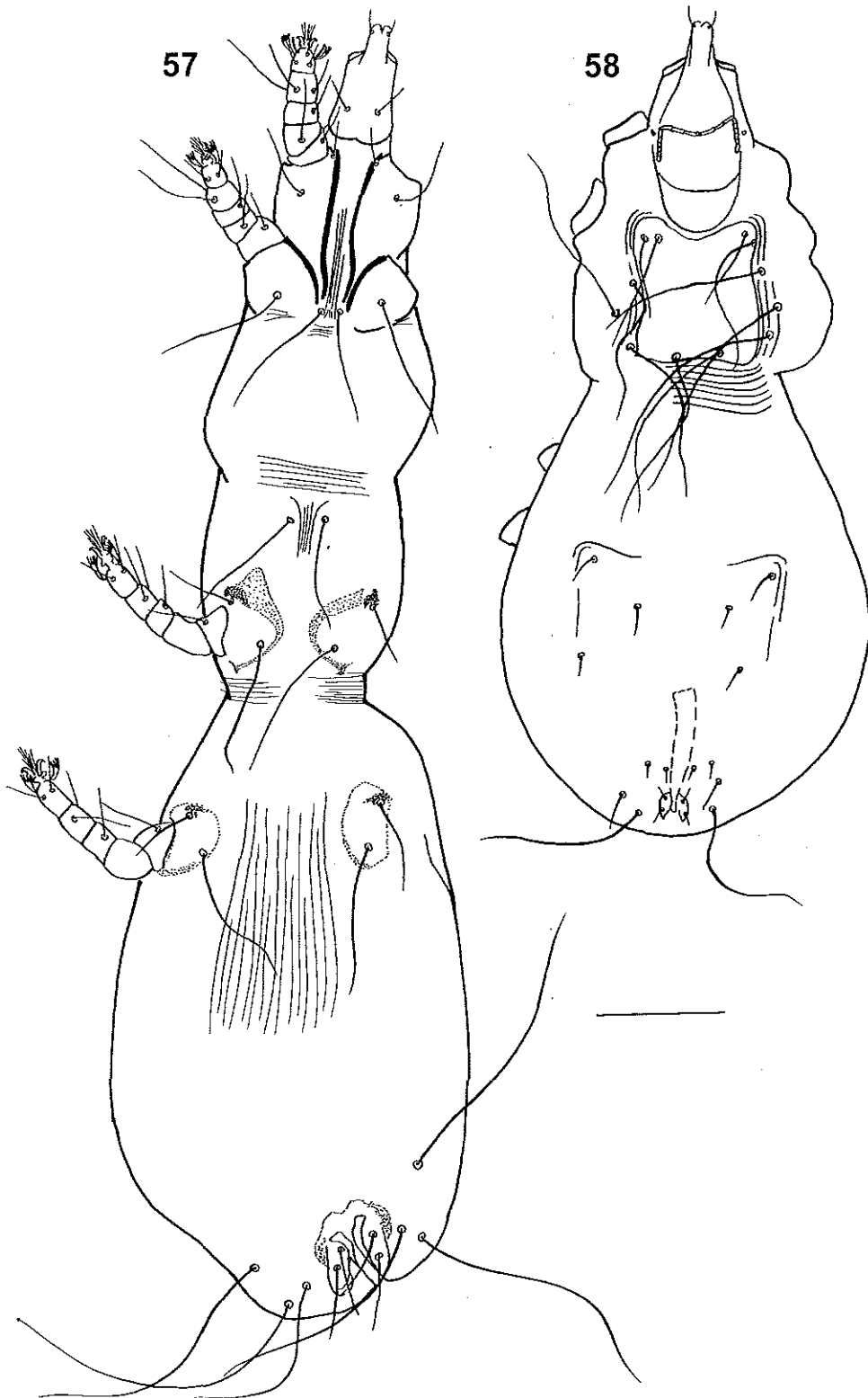
Male, paratype (Figs. 64-65): length 506 (495-520 in other five paratypes), width 139 (135-146). Length of setae: *vi* 30 (27-45), *ve* 38 (33-45), *sci* 115 (110-123), *sce* 129 (123-135), *h* 135 (132-140), *d1* 154 (146-157), *d2*, *l1* and *l2* approximately 15-18, *d5* 27 (25-29), *l5* 150 (145-152), *pg1* 51 (48-60), *pg2* 61 (56-63).

Host and locality:

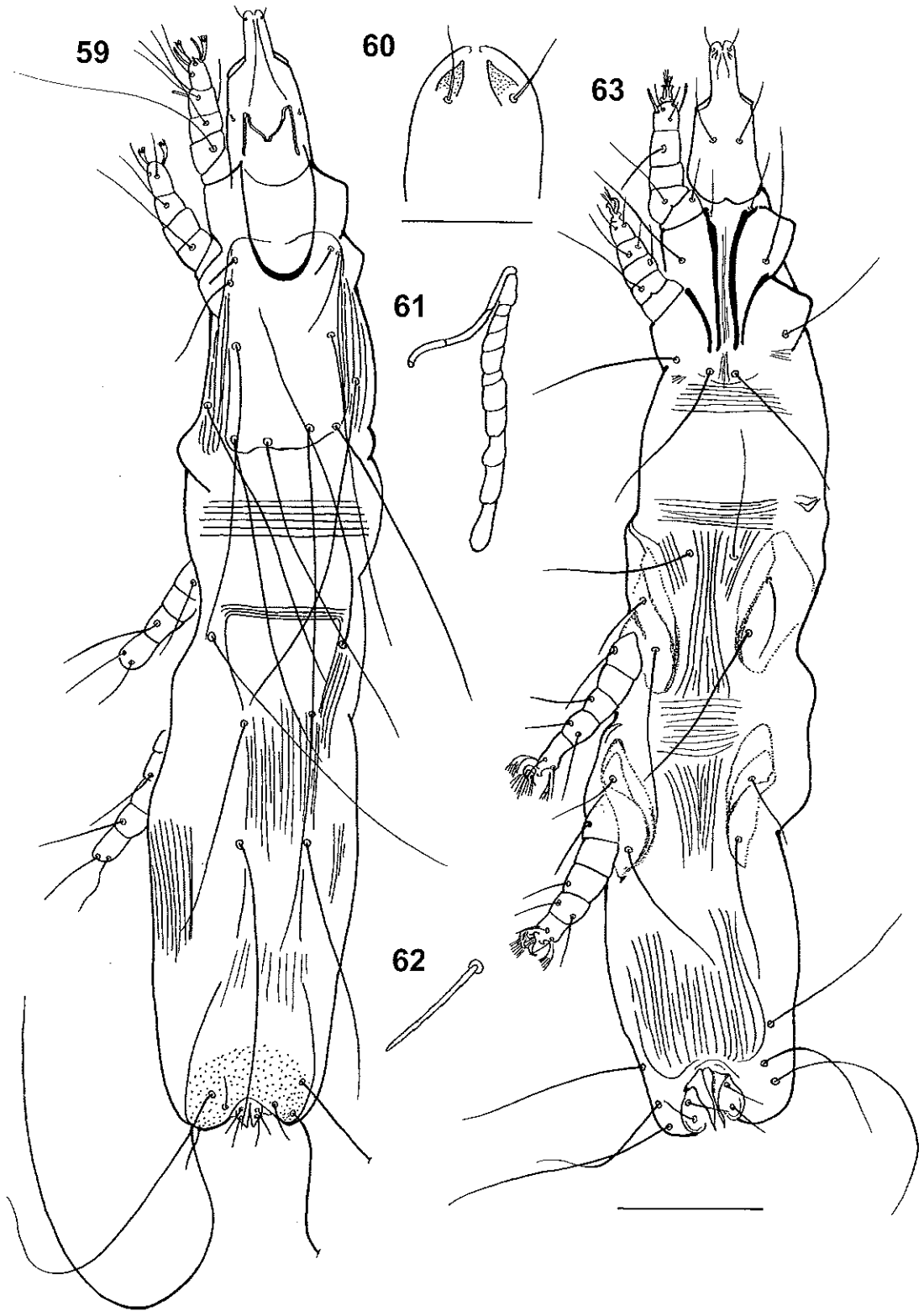
Holotype female from *Gracula religiosa intermedia* (= *Eulabes javana*) (Passeriformes: Sturnidae), S.E. Asia. This bird died in the Zoo of Antwerp (coll. A. FAIN, 22.



Figs. 53-56 — *Syringophiloidus cypsiuri* nov. spec. - Female in dorsal view (53); hypostomal apex in ventral view (54); peritreme (55); seta *a''* of tarsus III (56). Scale lines: 100 μ m (53), 20 μ m (54-56).



Figs. 57-58 — *Syringophiloidus cypsiuri* nov. spec. - Female in ventral view (57); male in dorsal view (58). Scale line 100 μ m.



Figs. 59-63 — *Syringophiloidus graculae* nov. spec. - Female in dorsal view (59); hypostomal apex in ventral view (60); peritreme (61); seta vi (62); female in ventral view (63). Scale lines: 100 μ m (59, 63), 20 μ m (60-62).

IV. 1966). *Paratypes*: 12 female, 10 males, 2 tritonymphs, 7 protonymphs and 1 larva, all with the same data as for the holotype. Many of these specimens are in rather poor condition.

Holotype, 9 females, 4 males, 1 tritonymph, 5 protonymphs, 1 larva in IRSNB; 3 females, 1 male and 3 nymphs in ZISP. *Holotype* n° 29039.

Differential diagnosis: *Syringophiloidus graculae* nov. spec. is closely related to *Syringophiloidus presentalis* CHIROV & KRAVTSOVA, 1995 ex *Sturnus vulgaris* (Passeriformes: Sturnidae) from Kirghizia (CHIROV & KRAVTSOVA, 1995). In both species, the setae *ve* are relatively short (shorter than 90) and slightly serrate, the setae *sci* long (longer than 120). The new species is distinguished from *S. presentalis* by following characters. In females of *S. graculae* nov. spec., the setae *vi* are slightly thicker than *ve*; setae *sci* 189-247; in males, the setae *sci* 110-123, the setae *l1* 78-90, and 3-4 times longer than *d2*, *l2*. In females of *S. presentalis*, the setae *vi* and *ve* are subequal in thickness, setae *sci* 87 in holotype (79-101 in 10 specimens ex *Turdus pilaris* (Passeriformes: Turdidae) from Russia; in males, the setae *sci* 41 in paratype (35-56 in specimens ex *T. pilaris*), the setae *l1* 27 (25-31), 2 times longer than *d2*, *l2*.

Etymology: The name *graculae* refers to the generic name of host.

3. *Syringophiloidus dendrocittae* nov. spec.

Female, holotype (Figs. 66-68, 70-71): length 641 (620 in paratype), width at level of setae *h* 135 (140). Peritremes (Fig. 67): lateral branch with 1-2 chambers; longitudinal branch with 9 chambers. Dorsum (Fig. 66). Setae *vi*, *ve* and *sci* slightly serrate (Fig. 68). Length of setae: *vi* 24, *ve* 45, *sci* 29 (33), *sce* 179 (150), *h* 174, *d1* 190 (155), *d2* 94, *d4* 22, *d5* 24, *l1* 157, *l2* 132, *l4* 247, *l5* 292. Ventral idiosoma. Length of setae: *pg1* 157 (128), *pg2* 135, *pg3* 166, *g1*, *g2* approximately 33, *a1* and *a2* approximately 27. Legs. Setae *a'*, *a''* of tarsi I-II with 7-8 tines.

Male, paratype (Fig. 69): length 506, width 135. Length of setae: *vi*, *ve* and *sci* approximately 22, *sce* 132, *h* 96, *d1* 101, *d2*, *l1* and *l2* approximately 14, *d5* 15, *l5* 119, *pg1* 33, *pg2* 29.

Host and locality:

Holotype female from *Dendrocitta rufa rufa* (Passeriformes: Corvidae), East Asia. This bird died in the Zoo of Antwerp (coll. A. FAÏN, 21. VI. 1966). *Paratypes*: female, male and 2 tritonymphs with the same data as in the holotype. *Holotype* and all paratypes in IRSNB. *Holotype* n° 29040.

Differential diagnosis: *Syringophiloidus dendrocittae* nov. spec. is closely related to *Syringophiloidus minor* (BERLESE, 1887) ex *Passer domesticus* and *P. montanus* (Passer-

iformes: Ploceidae) from Europe and USA (BERLESE, 1887; FRITSCH, 1958; CLARK, 1964; KETHLEY, 1970; BOCHKOV & MIRONOV, 1998). In both species, the setae *vi*, *ve* and *sci* are short (shorter than 70) and slightly serrate. The new species is distinguished from *S. dendrocittae* by characters as follows. In females of *S. dendrocittae*, the setae *vi*, *ve* and *sci* are thin (Fig. 68), the length of setae *sci* is 29-33. In females of *S. minor*, the setae *vi*, *ve* and *sci* are strong (Fig. 70), the length of setae *sci* is 45-65 (in 10 specimens ex *Passer domesticus* from Kirghizia).

Etymology: The name *dendrocittae* refers to the generic name of host.

Genus *Syringophilopsis* KETHLEY, 1970

Type species: *Syringophilus elongatus* Ewing, 1911

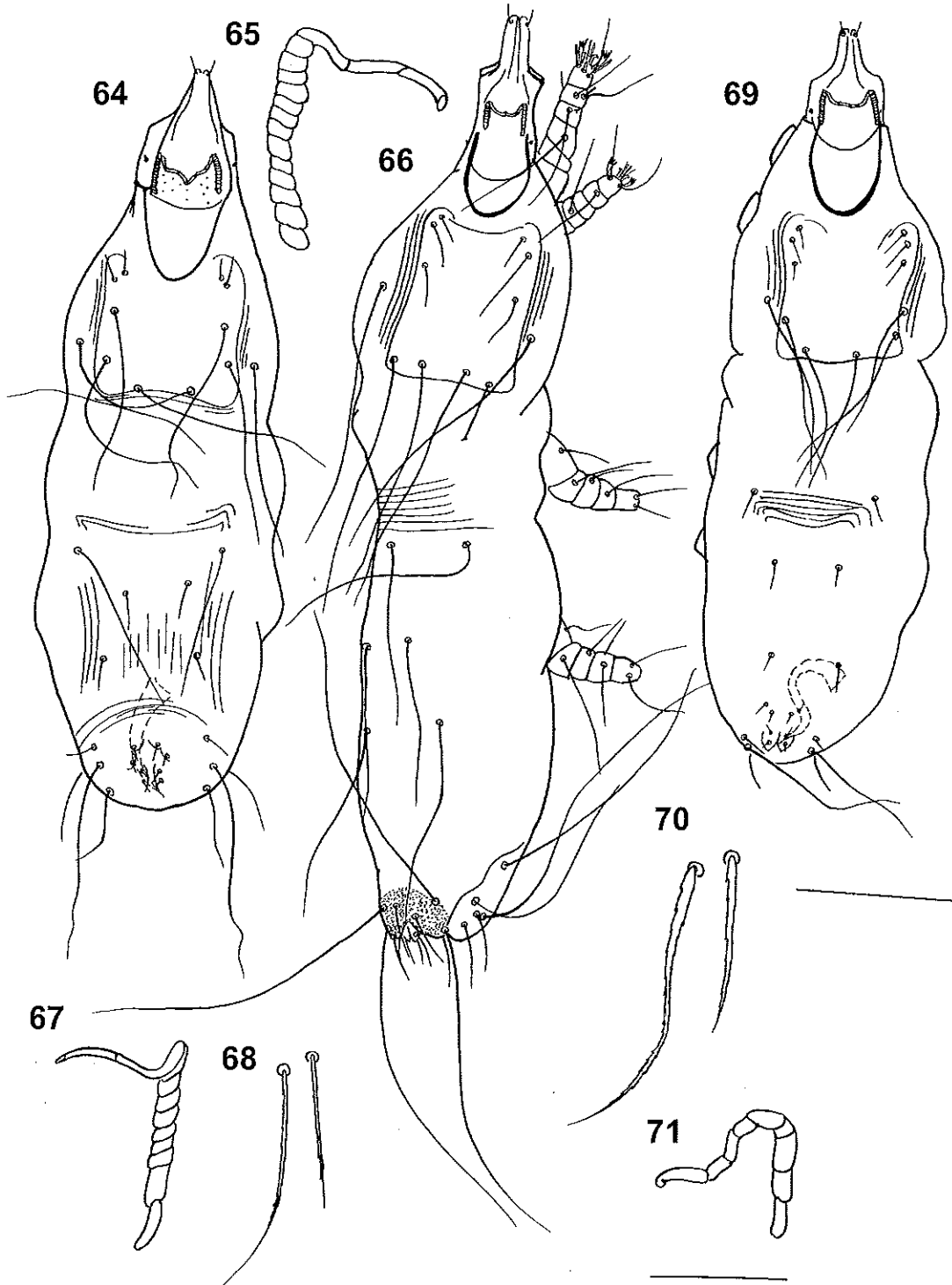
The genus includes 10 described and 2 new species.

KEY TO THE GENUS SYRINGOPHILOPSIS KETHLEY, 1970

(Females)

Three species, *Syringophilopsis passerina* (CLARK, 1964), *S. hylocichla* (CLARK, 1964) and *S. humanensis* LIU BAI-LI, 1988 incompletely described are not included here.

1. Setae *d4* are long, subequal to *l4* 2
- The setae *d4* are short, 3-5 times shorter than *l4* 5
2. Setae *vi*, *ve* and *sci* are short, subequal, 5-6 times shorter than *sce* *S. troglodytis* (FRITSCH, 1958)
- Setae *ve* and *sci* are long, 1.5-3 times longer than *vi* and 1.5-2 times shorter than *sce*. 3
3. Median hypostomal lip is finger-like; setae *vi* 1.5 shorter than *ve* (setae *pg3* are absent in male)
. *S. elongatus* (EWING, 1911)
- Median hypostomal lip is tongue-like (Fig. 73); setae *vi* 2-3 times shorter than *ve* (setae *pg3* are present in male) 4
4. Setae *a'*, *a''* of tarsi I-II with 16-18 tines, setae *a'*, *a''* of tarsi III-IV with 20-23 tines; peritremes with 17-18 chambers (setae *d5* 1.4-1.5 times shorter than *l5* in male) *S. emberizae* nov. spec.
- Setae *a'*, *a''* of tarsi I-II with 8-11 tines, setae *a'*, *a''* of tarsi III-IV with 12-16 tines; peritremes with 12-14 chambers (setae *d5* 4 times shorter than *l5* in male)
. *S. borini* BOCHKOV & MIRONOV, 1999
5. Setae *d5* are short, 3-5 times shorter than *l5* 6
- Setae *d5* are long, subequal to *l5*
. *S. fringilla* (FRITSCH, 1958)
6. 2 pairs of median protuberances are present
. *S. turdus* (FRITSCH, 1958)
- One pair of median protuberances is present 7
7. Setae *vi* approximately 4 times shorter than *ve*
. *S. acrocephali* SKORACKI, 1999
- Setae *vi* approximately 2 - 2.5 times shorter than *ve* 8



Figs. 64-71 — Mites of the genus *Syringophiloidus*. *S. graculae* nov. spec. (64-65). - Male in dorsal view (64); peritreme (65). *S. dendrocitae* nov. spec. (66-69). - Female in dorsal view (66); peritreme (67); setae vi and ve (68); male in dorsal view (69). *S. minor* (BERLESE) - setae vi and ve of female (70). *S. motacillae* (BOCHIKOV & MIRONOV). - peritreme of female (71). Scale lines: 100 μ m (64, 66, 69), 20 μ m (65, 67-68, 70-71).

8. Setae *vi*, *d4*, *d5* and *g* are short, 47, 29, 33 and 27 respectively; the peritreme with 7 chambers; median protuberances of hypostomal apex are finger-like (Fig. 80); hysterosomal plate present
 *S. sylviettae* nov. spec.
- Setae *vi*, *d4*, *d5* and *g* are relatively long, 87, 81, 61 and 87 respectively; peritreme with 15-17 chambers; median protuberances of hypostomal apex are short; hysterosomal plate absent, bases of setae *d2* surrounded by small sclerotized plates
 *S. sturni* CHIROV & KRAVTSOVA, 1995

1. *Syringophilopsis emberizae* nov. spec.

Female, holotype (Figs. 72-77): length 900 (889 in paratype), width at level of setae *h* 191 (180). Hypostomal apex (Fig. 73) with pair of short medial protuberances, medial hypostomal lips tongue-like, lateral hypostomal lips finger-like. Peritremes (Fig. 74): lateral branch with 4 chambers; longitudinal branch with 13-14 chambers. Dorsum (Fig. 72). Hysterosomal plate absent. Length of setae: *vi* 78 (67), *ve* 225 (175), *sci* 247 (238), *sce* 360 (351), *h* 349 (360), *d1* 380 (360), *d2* 247, *d4* 405 (360), *d5*? (370 in specimen from additional material), *l1*? (315 in specimen from additional material), *l2* 292 (270), *l4* 410 (395), *l5*? (390 in specimen from additional material). Setae *d2* 1.4-1.6 times closer to *l1* than *l2*. Ventral idiosoma (Fig. 77). Cuticular striations as in Fig. 77. Length of setae: *pg1* 179 (153), *pg2* 247 (230), *pg3* 279 (270), *g1*, *g2* approximately 180, *a1* and *a2* approximately 33. Legs. Setae *a'*, *a''* of tarsi I-II with 16-18 tines, setae *a'*, *a''* of tarsi III-IV with 20-23 tines.

Male, (5 specimens of additional material) (Fig. 78): length 787-840, width 260-280. Length of setae: *vi* 24-33, *ve* 45-50, *sci* 56-60, *sce* 90-123, *h* 85-128, *d1* 90-95, *d2* 33-40, *d5* 38-45, *l1* 45-50, *l2* 36-40, *l5* 56-80, *pg1* 33, *pg2* and *pg3* 96-112.

Host and locality:

Holotype female from *Emberiza luteola* (Passeriformes: Emberizidae) Rwanda. This bird died in the Zoo of Antwerp (coll. A. FAÏN, 22. IV. 1966). *Paratype* female with the same data as in the holotype. *Holotype* and *paratype* in MRAC. *Holotype* n° 187370.

Additional material: 5 males and 1 tritonymph containing a female, from the same host, Rwanda (coll. A. FAÏN, VIII. 1954). The specimens are deposited in IRSNB.

Differential diagnosis: *Syringophilopsis emberizae* nov. spec. is closely related to *Syringophilopsis borini* BOCHKOV & MIRONOV, 1999 ex *Sylvia borin* (Passeriformes: Sylviidae) from Russia (BOCHKOV & MIRONOV, 1999). In both species, the medial hypostomal lips of female are tongue-like (Fig. 73), the setae *vi* 2-3 times shorter than *ve* and the setae *pg3* are present in male. The new species is distinguished from *S. borini* by following characters. In females of *S. emberizae* nov. spec., the setae *a'*, *a''* of tarsi I-II with 16-18 tines, setae *a'*, *a''* of tarsi III-IV with

20-23 tines, the peritremes with 17-18 chambers; in male of new species, the setae *d5* 1.4-1.5 times shorter than *l5*. In females of *S. borini*, the setae *a'*, *a''* of tarsi I-II with 8-11 tines, setae *a'*, *a''* of tarsi III-IV with 12-16 tines; the peritremes with 12-14 chambers; in male of *S. borini*, the setae *d5* 4 times shorter than *l5*.

Etymology: The name *emberizae* refers to the generic name of host.

2. *Syringophilopsis sylviettae* nov. spec.

Female, holotype (Figs. 79-82): length 877, width at level of setae *h* 193. Hypostomal apex (Fig. 80) with one pair finger-like median protuberances. Peritremes (Fig. 81): lateral branch with 2 chambers; longitudinal branch with 5 chambers. Dorsum (Fig. 79). Hysterosomal plate present, with indistinct margins, bears setae *d2* and *l2*. Length of setae: *vi* 47, *ve* 92, *sci* 146, *sce* 265, *h* 180, *d1* 300, *d2* 247, *d4* 29, *d5* 33, *l1* 234, *l2* 238, *l4* 198, *l5* 310. Distance between setae *l1* and *d2* 83, *d2* and *l2* 67. Ventral idiosoma (Fig. 82). Cuticular striations as in Fig. 82. Length of setae: *pg1* 146, *pg2* 141, *pg3* 157, *g1*, *g2* approximately 33, *a1* and *a2* approximately 27. Legs. Setae *a'*, *a''* of tarsi I-II with 6-7 tines, setae *a'*, *a''* of tarsi III-IV with 7-8 tines.

Host and locality:

Holotype and 1 *paratype* female from *Sylvietta whytti johnstoni* (Passeriformes: Sylviidae), Rwanda (coll. A. FAÏN, VIII. 1955). *Holotype* in MRAC, n° 187371.

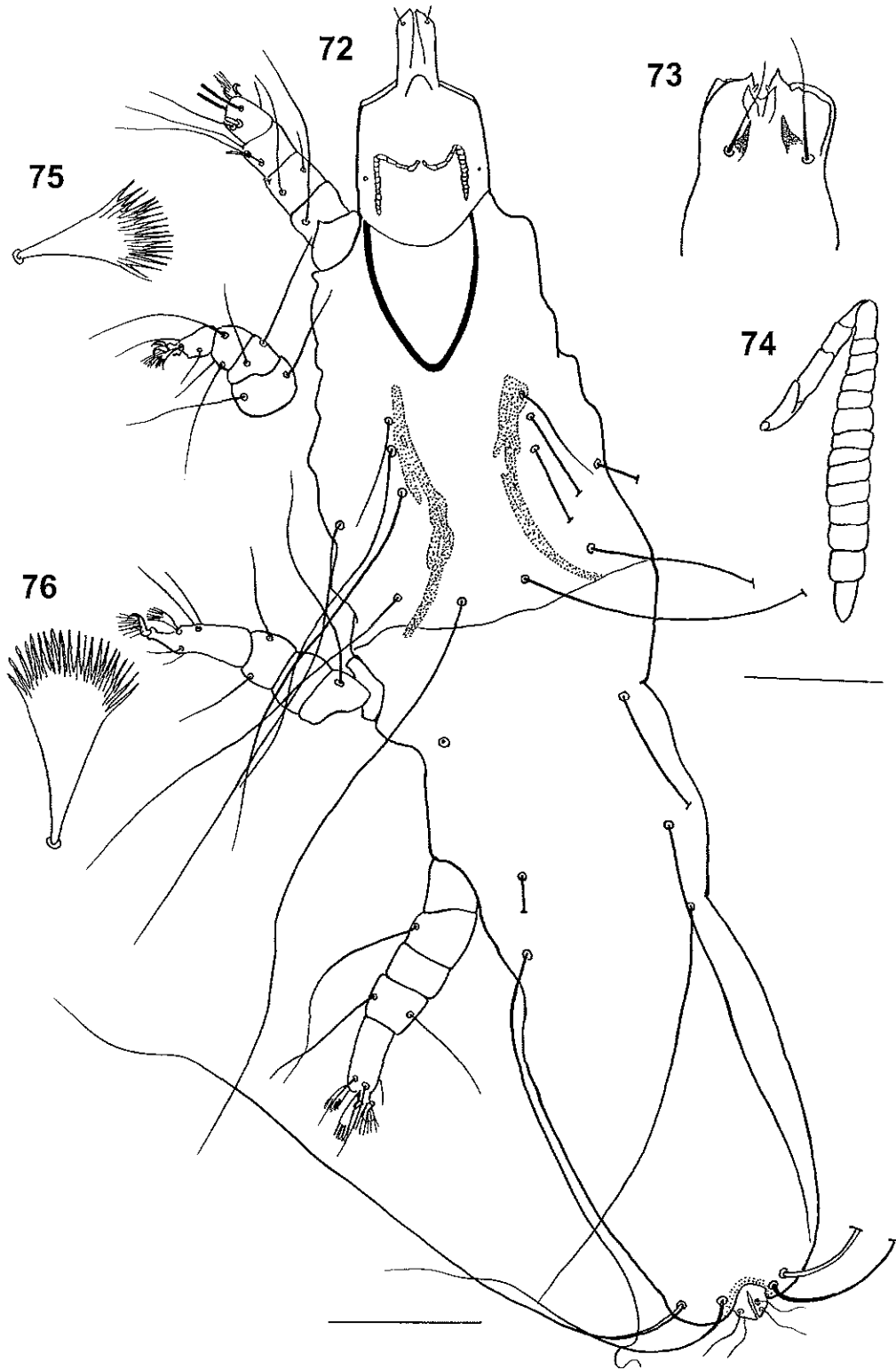
Differential diagnosis: *Syringophilopsis sylviettae* nov. spec. is closely related to *Syringophilopsis sturni* Chirov & KRAVTSOVA, 1995 ex *Sturnus vulgaris* (Passeriformes: Sturnidae) from Kirghizia (CHIROV & KRAVTSOVA, 1995; BOCHKOV & MIRONOV, 1998) and Kazakhstan (BOCHKOV & MIRONOV, 1998). In both species, the setae *vi* approximately 2 times shorter than *ve*. The new species is distinguished from *S. sturni* by characters as follows. In *S. sylviettae* nov. spec., the setae *vi*, *d4*, *d5* and *g* are short, 47, 29, 33 and 27 respectively, the peritreme with 7 chambers, the median protuberances of hypostomal apex are finger-like (Fig. 80), the hysterosomal plate present. In *S. sturni*, the setae *vi*, *d4*, *d5* and *g* are relatively long, 87, 81, 61 and 87, respectively, peritreme with 15-17 chambers, the median protuberances of hypostomal apex are short, hysterosomal plate absent, only small sclerotized plates around of setae *d2* are present.

Etymology: The name *sylviettae* refers to the generic name of the host.

Genus *Niglarobia* Kethley, 1970

Type species: *Niglarobia ereuneti* Kethley, 1970

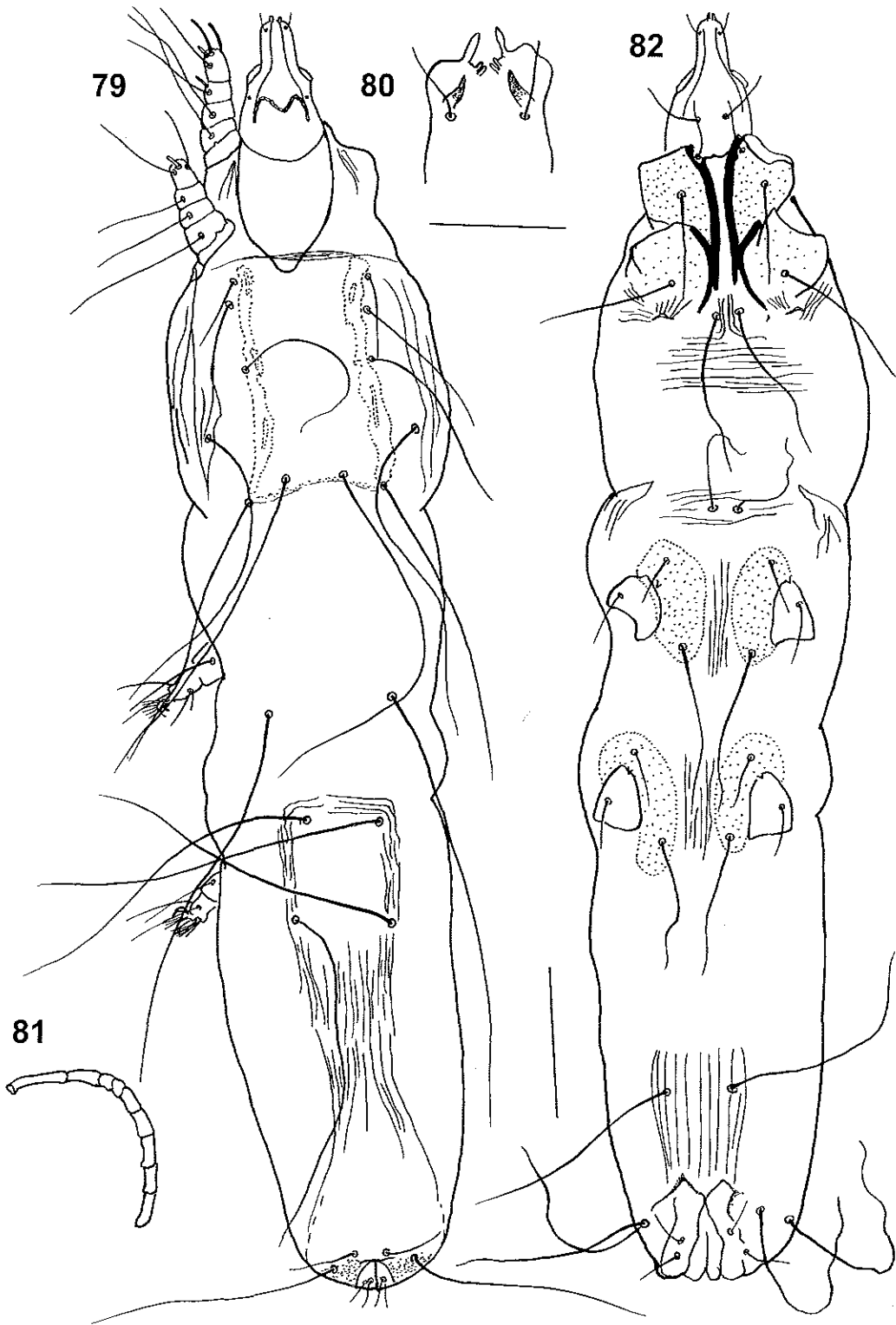
The genus includes 5 described and 1 new species.



Figs. 72-76 — *Syringophilopsis emberizae* nov. spec. - Female in dorsal view (72); hypostomal apex in ventral view (73); peritreme (74); seta a'' of tarsus I (75) and tarsus IV (76). Scale line: 100 μ m (72), 20 μ m (73-76).



Figs. 77-78 — *Syringophilopsis emberizae* nov. spec. - Female in ventral view (77); male in dorsal view (78). Scale line 100 μ m.



Figs. 79-82 — *Syringophilopsis sylvietae* nov. spec. - Female in dorsal view (79); hypostomal apex in ventral view (80); peritreme (81); female in ventral view (82). Scale lines: 100 μ m (79, 82), 20 μ m (80-81).

KEY TO THE GENUS *NIGLAROBIA* Kethley, 1970**(Females)**

1. Setae *sci* are short, subequal to *vi* 2
 – Setae *sci* are long, 3-4 times longer than *vi* 4
2. Setal propodosomal pattern with setae arranged 2-1-1-2; epimeres I are parallel; claws of tarsi III-IV with basal angle 3
 – Setal propodosomal pattern with setae arranged 3-1-1-1-; epimeres I slightly divergent; claws of tarsi III-IV without basal angle
 *N. chirovi* BOCHKOV & MIRONOV, 1998
3. Setae *d2* approximately 1.3 times shorter than *l2*
 *N. ereuneti* KETHLEY, 1970
 – Setae *d2* and *l2* are subequal
 *N. helleri* (OUDEMANS, 1904)
4. Setae *vi* 3-4 times shorter than *ve*; setae *vs'I* are absent; setal propodosomal pattern with setae arranged 2-2-2
 *N. calidridis* BOCHKOV & MIRONOV, 1998.
 – Setae *vi* and *ve* are subequal, short; setae *vs'I* are present; setal propodosomal pattern with setae arranged 2-1-1-2 5
5. Setae *d2* longer than *l2*; setae *d4* approximately 2 times shorter than *l2*; claws of tarsi III-IV with basal angle *N. trouessarti* (OUDEMANS, 1904).
 – Setae *d2* and *l2* are subequal; setae *d4* 6 times shorter than *l2*; claws of tarsi III-IV without basal angle
 *N. rhinoptili* nov. spec.

***Niglarobia rhinoptili* nov. spec.**

Female, holotype (Figs. 83-89): length 506, width at level of setae *h* 123. Hypostomal apex (Fig. 84) slightly ornamented. Peritremes (Fig. 85): lateral branch with 4 chambers; longitudinal branch with 2 chambers. Stylophore rounded posterior. Setal pattern of propodosomal region arranged 2-1-1-2. Hysterosomal plate absent. Length of setae: *vi* 22, *ve* 24, *sci* 76, *sce* 146, *h* 153, *d1* 144, *d2* 90, *d4* 15, *d5* 20, *l1* 51, *l2* 92, *l4* 72, *l5* 126, *icl* 54, *ic3* 58, *pg1* 38, *pg2* 24, *pg3* 56, *gl,2* approximately 12, *al,2* approximately 10. Legs. Claws without basal angle (Fig. 87). Epimeres I parallel (Fig. 86). Length of setae: *cxI2* 54, *cxII2* 78, *cxIII2* 72, *cxIV2* 76, *scIII* 18, *scxIV* 20, not extending beyond genua, *tc'III-IV* approximately 24, *tc''III-IV* approximately 40. Setae *a'*, *a''* of tarsi I-II with 5 times (Fig. 88), *a'*, *a''* of tarsi III-IV with 7 times (Fig. 89).

Male. unknown.

Host and locality:

Holotype female from *Rhinoptilus africanus* (Charadriiformes: Glareolidae), Bloemhof, South Africa (coll. F. ZUMPT, 10. VIII. 1964). Holotype in MRAC n° 187372.

Differential diagnosis: *Niglarobia rhinoptili* nov. spec. is closely related to *Niglarobia trouessarti* (OUDEMANS, 1904) ex *Aramus guarauna* (Gruiformes: Aramidae)

from South America (OUDEMANS, 1906). In both species, the setae *vi* and *ve* are subequal, shorter than *sci*; the setae *vs'I* are present; the setal propodosomal pattern with setae arranged 2-1-1-2. The new species is distinguished from *N. trouessarti* by the following characters: in *rhinoptili*, the setae *d2* and *l2* are subequal; the setae *d4* 6 times shorter than *l2*; the claws of tarsi III-IV without basal angle. In *N. trouessarti*, the setae *d2* longer than *l2*; the setae *d4* approximately 2 times shorter than *l2*; the claws of tarsi III-IV with basal angle.

Etymology: The name *rhinoptili* refers to the generic name of host.

Subfamily Picobiinae JOHNSTON & KETHLEY, 1953

Type genus: *Picobia* HALLER, 1878

The subfamily includes 2 genera.

KEY TO THE SUBFAMILY PICOBIINAE JOHNSTON & KETHLEY, 1973**(Females)**

- End of hysterosoma with a pair of lobes; cheliceral digit with 3 teeth *Calamincola* CASTO, 1978
 End of hysterosoma rounded, without lobes; cheliceral digit edentate *Picobia* HALLER, 1878

Genus *Picobia* HALLER, 1878

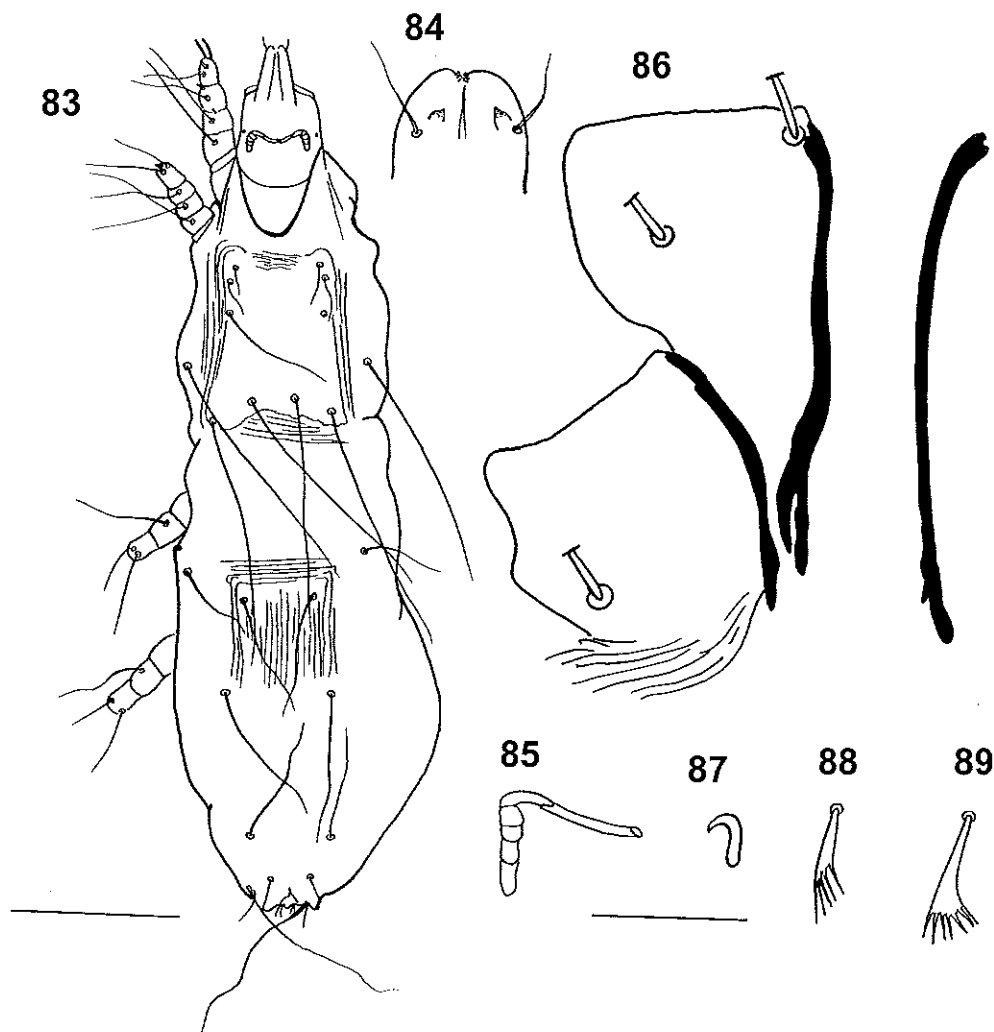
Type species: *Picobia heeri* HALLER, 1878.

This genus includes 5 described and 4 new species. All the species of the genus *Picobia* bear an uniform set of idiosomal and leg setae. They differ, however, from each other by the structure and the disposition of these setae and also by the shape of several other organs e.g. the hypostomal apex, the shields and the peritreme. It is possible that further investigations will reveal that this genus is a complex and should be divided into several new genera.

KEY TO THE GENUS *Picobia* HALLER, 1878**(Females)**

P. heeri is not included here.

1. Hypostomal apex rounded; propodosomal plate well developed 2
- Hypostomal apex truncate; propodosomal plate as a pair of longitudinal sclerotized bands 4
2. Pygidial plate present 3



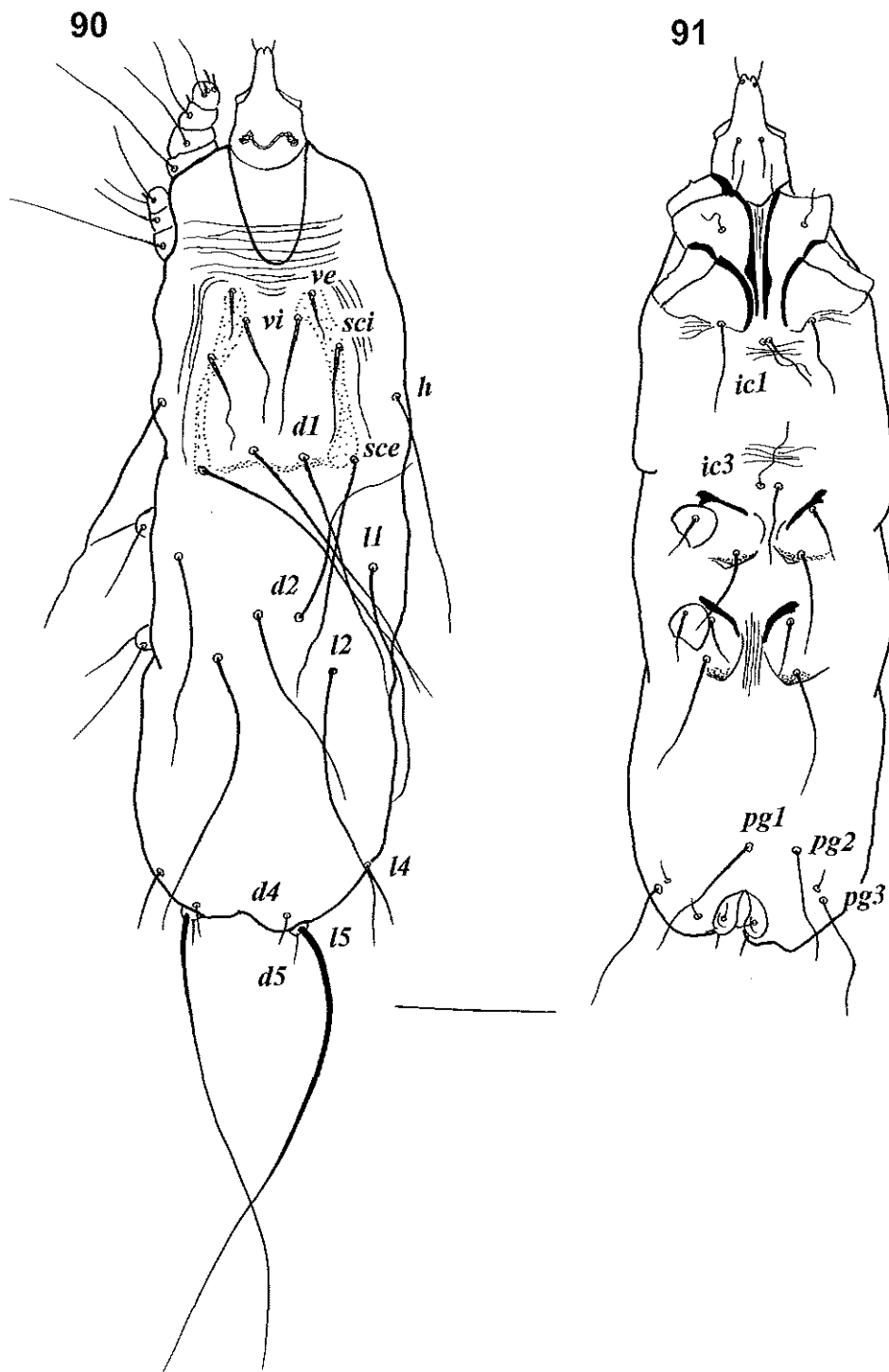
Figs. 83-89 — *Niglarobia rhinoptili* nov. spec. - Female in dorsal view (83); hypostomal apex in ventral view (84); peritreme (85); epimeres I and II (86); claw of tarsus III (87); seta *a''* of tarsus I (88) and tarsus IV (89). Scale lines: 100 μ m (83), 20 μ m (84-89).

- Pygidial plate absent *P. brotogeris* nov. spec.
- 3. Setae *pg2* only 2-3 times shorter than *pg1*; setae *vi* 5-7 times shorter than *ve* *P. anthi* (FRITSCH, 1958)
- Setae *pg2* 8-10 times longer than *pg1*; setae *vi* 2 times shorter than *ve* *P. ramphastos* nov. spec.
- 4. Setae *g1* are hair-like, ventral hysterosomal lobes are absent 5
- Setae *g1* are thick, localized on apices of small lobes (Fig. 115) 7
- 5. Setae *d5* are short as *g1* 6
- Setae *d5* are long as *l5*
- . . . *P. khushalkhani* (KIVGANOV & SHARAFAT, 1995)
- 6. Setae *d4* are short; setae *d2* closer to *l2* than *l1*
- *P. zumpti* (LAWRENCE, 1959)
- Setae *d4* are long; setae *d2* closer to *l1* than *l2*
- *P. alectoris* nov. spec.
- 7. Setae *pg2* only slightly shorter than *pg1*; setae *l5* smooth; setae *d4* situated as *l4*
- *P. dryobatis* (FRITSCH, 1958)

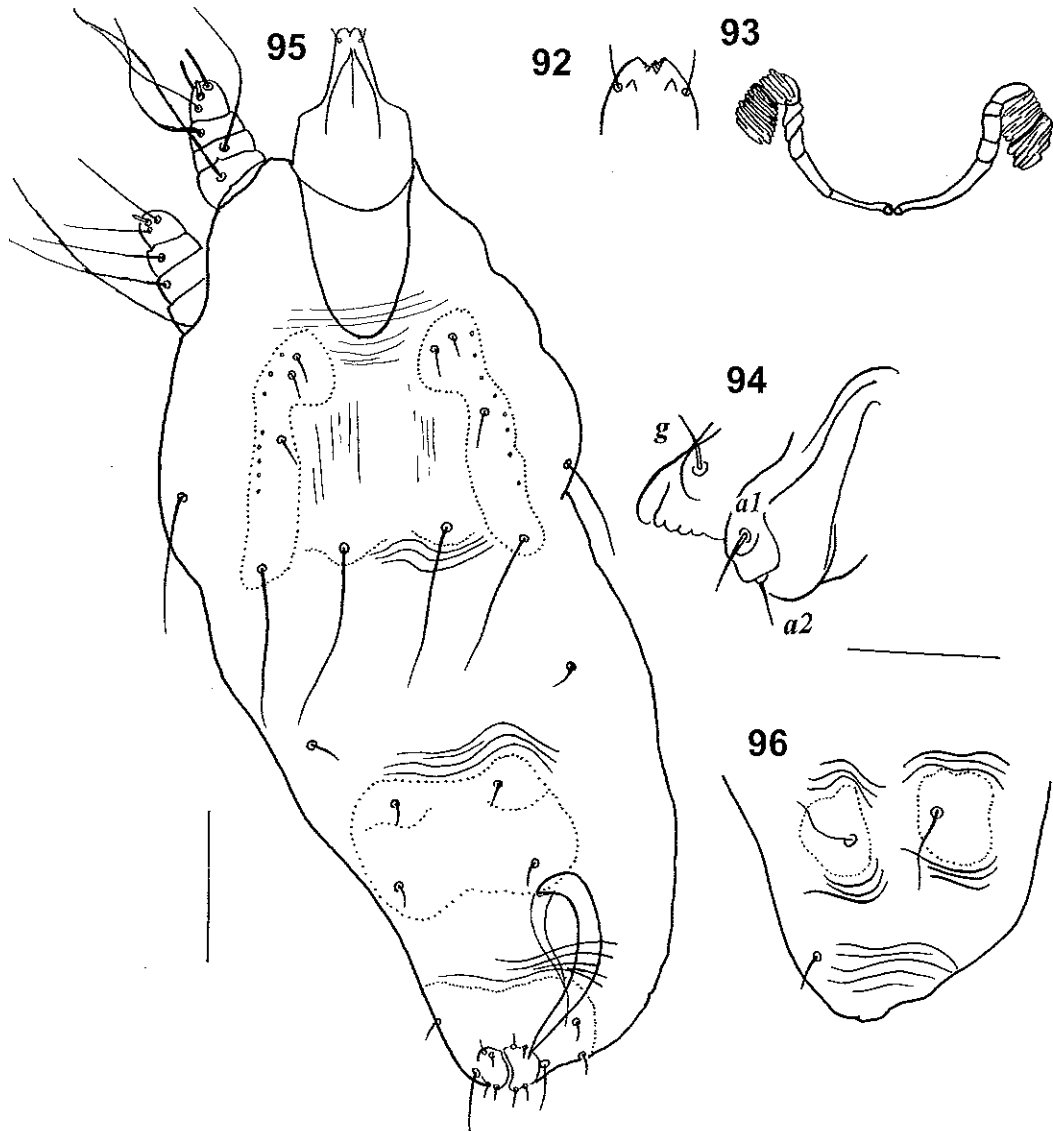
- Setae *pg2* 2 times shorter than *pg1*; setae *l5* with transversal striation (Fig. 115); setae *d4* situated on trabecules *P. phoeniculi* nov. spec.

1. *Picobia brotogeris* nov. spec.

Female, holotype (Figs. 90-94): length 540 (438 in paratype), width at level of setae *h* 168 (165). Hypostomal apex (Fig. 92) rounded, without ornament. Peritremes (Fig. 93): lateral branch with 4 chambers; longitudinal branch with two broad, striated basal chambers and one non-striated chamber. Dorsum (Fig. 90). Propodosomal plate developed, not divided. Hysterosomal and pygidial plates absent. Setae *vi*, *ve*, *sci* are knobbed; setae *sce*, *h*, *d1*, *d2*, *l1*, *l2* are serrate; *d4*, *d5*, *l4*, *l5* are smooth; *vi* lie behind at level of *ve*; distances *l1-d2* and *d2-l2* subequal. Length of setae: *vi* 27, *ve* 85, *sci* 92, *sce* 132, *h* 168, *d1* 179, *d2* 148, *d4* 22, *d5* 15, *l1* 135, *l2* 127, *l4* 33, *l5* 270 (292). Ventral idiosoma



Figs. 90-91 — *Picobia brotogeris* nov. spec. - Female in dorsal view (90) and in ventral view (91). Scale line 100 μm ,



Figs. 92-96 — *Picobia brotogeris* nov. spec. - Hypostomal apex of female in ventral view (92); peritreme of female (93); vulva (94); male in dorsal view (95); hysterosoma of male in ventral view (96). Scale lines: 100 μm (95-96), 20 μm (92-94).

(Fig. 91). Cuticular striations as in Fig. 91. Lobes absent. Setae *g1* thin. Length of setae: *pg1* 96, *pg2* 16, *pg3* 130, *g1* 10, *a1* and *a2* approximately 12. Legs. Dorsal setae of legs serrate; setae *sc* III-IV and all setae of coxae III-IV knobbed. Length of setae: *cxIII* 2 51, *cxIV* 2 59, *scIII* and *scIV* short, not extending beyond genua, *tc'III* and *tc'IV* approximately 22, *tc''III* and *tc''IV* approximately 56. Setae *a'*, *a''* of tarsi I-II with 2 tines, *a'* of tarsi III-IV stick-like, *a''* of tarsi III-IV microchaetae. Antaxial and paraxial members of claw pair III-IV almost subequal.

Male, paratype (Figs. 95-96): length 337, width 135. Length of setae: *sce* 49, *h* 42, *dl* 56, *d5* 15, *pg1* 22; *pg1* situated on small sclerotized plates; other setae are short, approximately 10.

Host and locality:

Holotype female from *Brotogeris jugularis cyanopterus* (Psittacidae), Upper Amazonia, Brazil. This bird died in the Zoo of Antwerp (coll. A. FAIN, 24. VI. 1966). *Paratypes*: 2 females, male and 2 larvae with the same data as in the holotype. Holotype and all paratypes in IRSNB. Holotype n^o 29041.

Differential diagnosis: *Picobia brotogeris* nov. spec. is closely related to *Picobia ramphastos* nov. spec. In females of both species, the hypostomal apex is rounded; the setae *d5* and *pg2* are short; the setae *scIII-scIV* and all setae of coxae III-IV are knobbed; the propodosomal shield is well developed and not divided; the setae *a' III-IV* longer than *a' III-IV* and the setae *tc'III*, *tc'IV* approximately 2

times shorter than $tc'''III$, $tc'''IV$. The new species is distinguished from *P. ramphastos* by following characters. In *P. brotogeris* nov. spec., the pygidial shield is absent; the setae vi situated behind at level of ve and 2-3 times longer than these setae; the distances $l1-d2$ and $d2-l2$ are subequal. In *P. ramphastos*, the pygidial shield is present; the setae vi situated anterior the level of ve and 1.5-2 times shorter than these setae; the distances $l1-d2$ is 2 times longer than $d2-l2$. It is possible, that one more species, *Picobia anthi* (FRITSCH, 1958) ex *Anthus trivialis* (Passeriformes: Motacillidae) from Germany (FRITSCH, 1958), also bears short setae $d5$. It is difficult to find out in the original figure how many pairs of long setae are present really on opisthosoma, one or two ($d5$, $l5$). Unfortunately, this species has never been recollected. The new species resembles *P. anthi* by the presence of well developed propodosomal shield, the short setae ve and the rounded hypostomal apex, but clearly differs from it by the absence of pygidial shield, the short setae $pg2$, the subequal distances $l1-d2$ and $d2-l2$. In *P. anthi*, the pygidial shield is present; the setae $pg2$ only 2-3 times shorter than $pg1$, the distance $d2-l2$ approximately 3-4 times longer than $l1-d2$.

Etymology: The name *brotogeris* refers to the generic name of the host.

2. *Picobia ramphastos* nov. spec.

Female, holotype (Figs. 97-101): length 551 (528-562 in 3 paratypes), width at level of setae h 168 (157-180). Hypostomal apex (Fig. 98) rounded, without ornament. Peritremes (Fig. 99): lateral branch with 4-6 chambers; longitudinal branch with two-three broad chambers, basal chamber striated. Dorsum (Fig. 97). Propodosomal plate well developed, not divided. Hysterosomal plate absent, pygidial plate present. Setae vi , ve , sci are knobbed; setae sce , h , $d1$, $d2$, $l1$, $l2$ are serrate; $d4$, $d5$, $l4$, $l5$ are smooth; vi lie anterior at level of ve ; distances $l1-d2$ 2 times shorter than $d2-l2$. Length of setae: vi 45 (45-47), ve 80 (78-90), sci 90 (78-96), sce 156 (170 in one paratype), h 168 164 (169-177), $d1$ 190 (202 in one paratype), $d2$ 119 (103 in one paratype), $d4$, $d5$ approximately 11 (15-22), $l1$ 179 (183-190), $l2$ 159 (146-168), $l4$ 45 (33-45), $l5$ 303 (281-303). Ventral idiosoma (Fig. 100). Cuticular striations as in Fig. 100. Lobes absent. Setae gl thin. Length of setae: $pg1$ 135 (110-146), $pg2$ 13 (13-18), $pg3$ 123 (128 in one paratype), gl , $a1$ and $a2$ approximately 11. Legs. Dorsal setae of legs are serrate; setae sc III-IV and all setae of coxae III-IV are knobbed. Length of setae: $cxIII$ 2 57 (67 in one paratype), $cxIV$ 2 117 (92-123), $scIII$ and $scxIV$ short, not extending beyond genua, $tc'''III$ and $tc'''IV$ approximately 22, $tc'''III$ and $tc'''IV$ approximately 56. Setae a' , a'' of tarsi I-II with 2 tines, a' of tarsi III-IV stick-like, a'' of tarsi III-IV possibly absent or microchaetae. Antiaxial and paraxial members of claw pair III-IV subequal.

Host and locality:

Holotype female from *Ramphastos sulfuratus* (Pici-

formes: Ramphastidae), Guatemala. This bird died in the Zoo of Antwerp (coll. A. FAÏN, 7. III. 1967). *Paratypes*: 5 females with the same data as for the holotype. Holotype and 4 females in IRSNB; 1 female in ZISP. Holotype n° 29042.

Differential diagnosis: *Picobia ramphastos* nov. spec. is closely related to *Picobia brotogeris* nov. spec. (see above) and *P. anthi*. The new species is distinguished from *P. anthi* by following characters. In *P. ramphastos*, the setae $pg2$ 8-10 times shorter than $pg1$, the setae vi 2 times shorter than setae ve . In *P. anthi*, the setae $pg2$ only 2-3 times shorter than $pg1$, the setae vi 5-7 times shorter than ve . *P. ramphastos* differs from *P. brotogeris* nov. spec., by the absence of pygidial shield, the short setae $pg2$, the subequal distances $l1-d2$ and $d2-l2$. In *P. brotogeris*, the pygidial shield is present; the setae $pg2$ only 2-3 times shorter than $pg1$, the distance $d2-l2$ approximately 3-4 times is longer than $l1-d2$.

Etymology: The name *ramphastos* refers to the generic name of host.

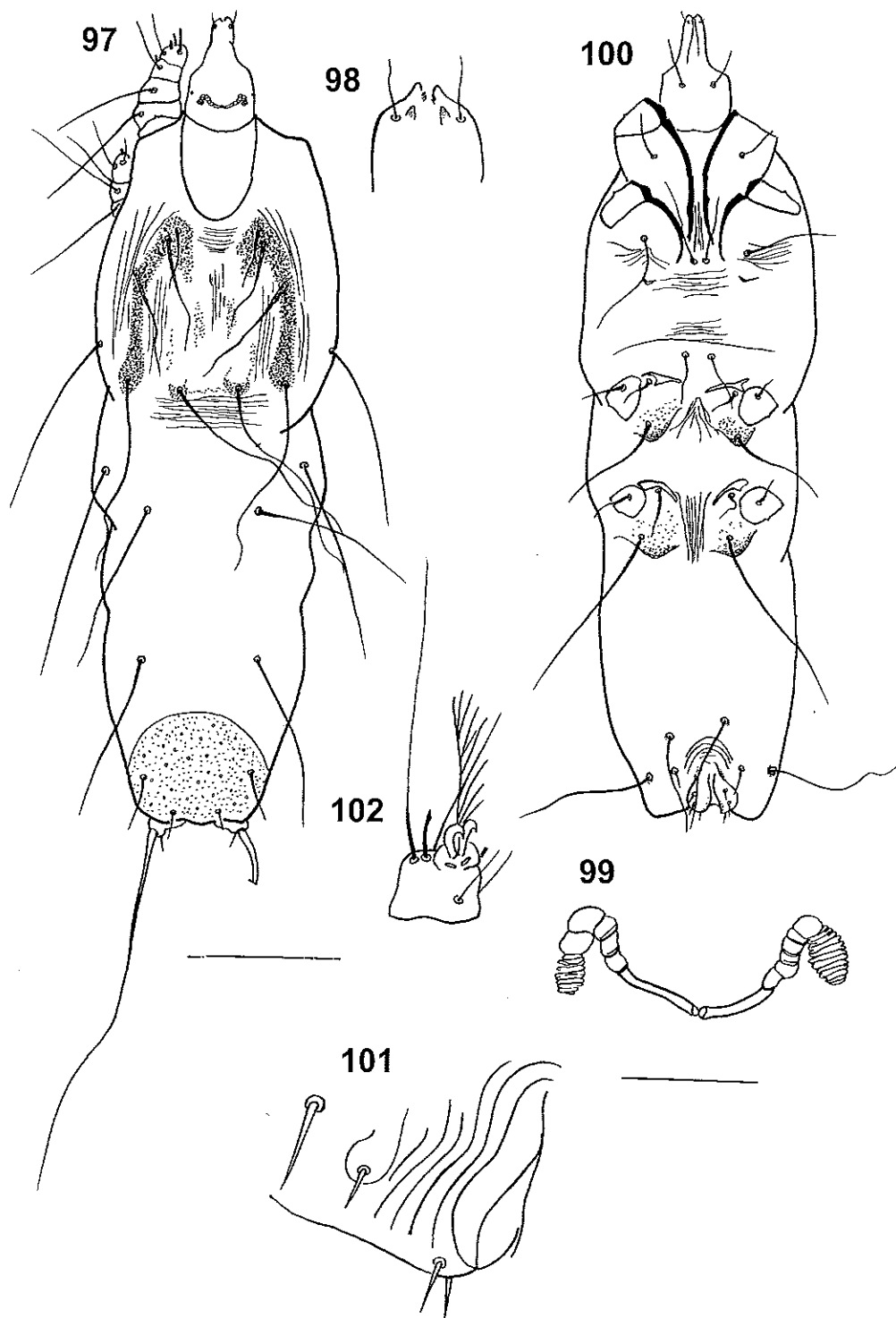
3. *Picobia alectoris* nov. spec.

Female, holotype (Figs. 103-108): length 843, width at level of setae h 225. Hypostomal apex (Fig. 104) truncate, with ornament. Peritremes (Fig. 105): lateral branch with 8 chambers, longitudinal branch with 9 chambers respectively. Dorsum (Fig. 103). Propodosomal plate divided. Hysterosomal and pygidial plates absent. Setae vi , ve , sci are knobbed; setae sce , h , $d1$, $d2$, $l1$, $l2$ are slightly serrate; $d4$, $d5$, $l4$, $l5$ are smooth; vi lie anterior at level of ve ; distances $l1-d2$ 1.5 times shorter than $d2-l2$. Length of setae: vi 112, ve 130, sci 146, sce 360, h 247, $d1$ 360, $d2$ 184, $d4$ 330, $d5$ 18, $l1$ 270, $l2$ 256, $l4$ 56, $l5$ 283. Ventral idiosoma (Fig. 106). Cuticular striations as in Fig. 106. Lobes absent. Setae gl are thin. Length of setae: $pg1$ 112, $pg2$ 90, $pg3$ 123, gl 38, $a1$, $a2$ approximately 49. Legs. Dorsal setae of legs are serrate; setae sc III-IV and cx III-IV 1 are smooth, cx III-IV 2 are slightly serrate. Length of setae: $cxIII$ 2 101, $cxIV$ 2 179, $scIII$ and $scxIV$ short, not extending beyond genua, $tc'''III$ and $tc'''IV$ subequal $tc'''III$ and $tc'''IV$. Setae a' , a'' of tarsi I-II with 2 tines, a' , a'' of tarsi III-IV stick-like. Antiaxial and paraxial members of claw pair III-IV subequal.

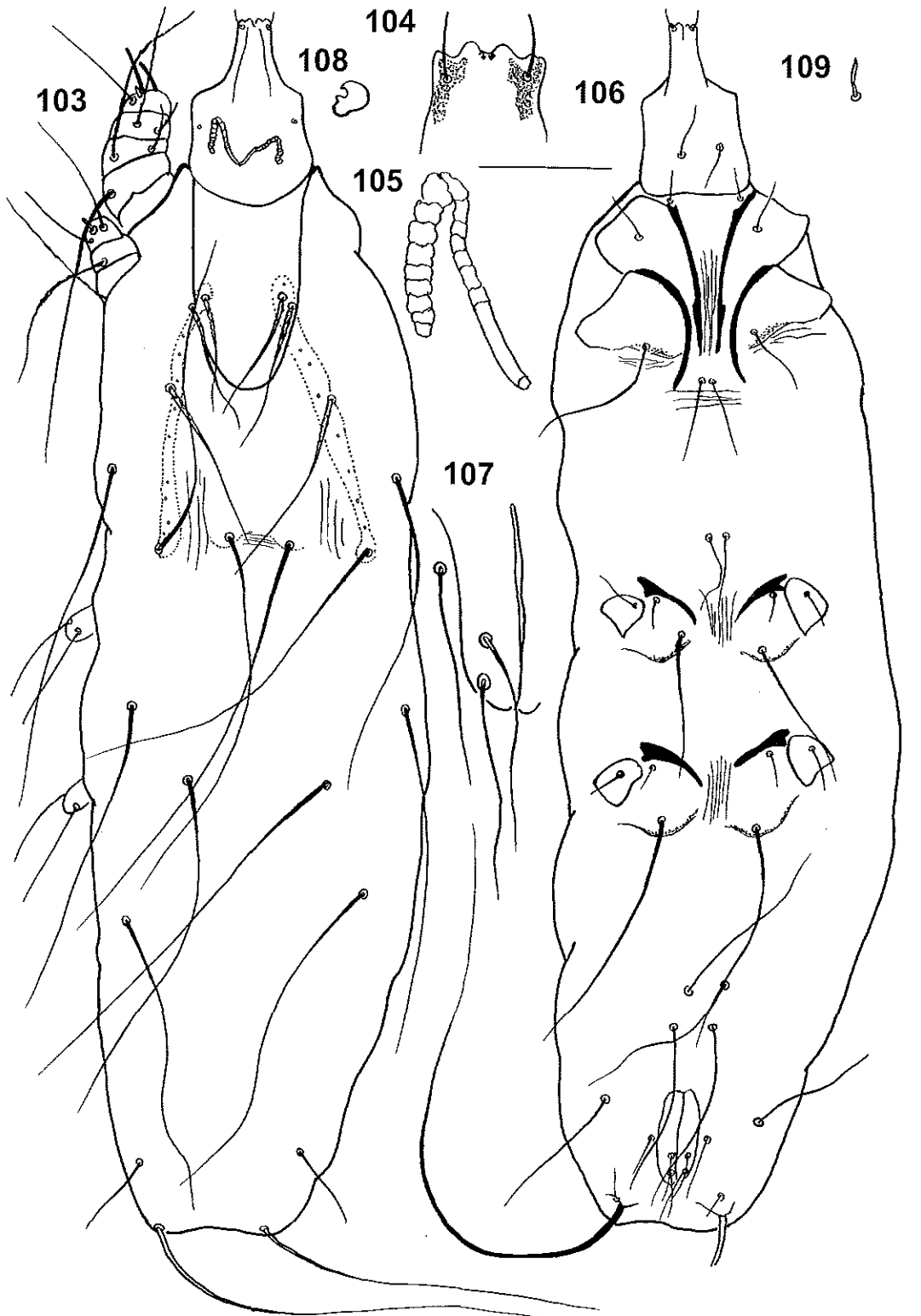
Host and locality:

Holotype female from *Alectoris* sp. (Galliformes: Phasianidae), Rwanda. (coll. A. FAÏN, X. 1955). Holotype in MRAC n° 187373.

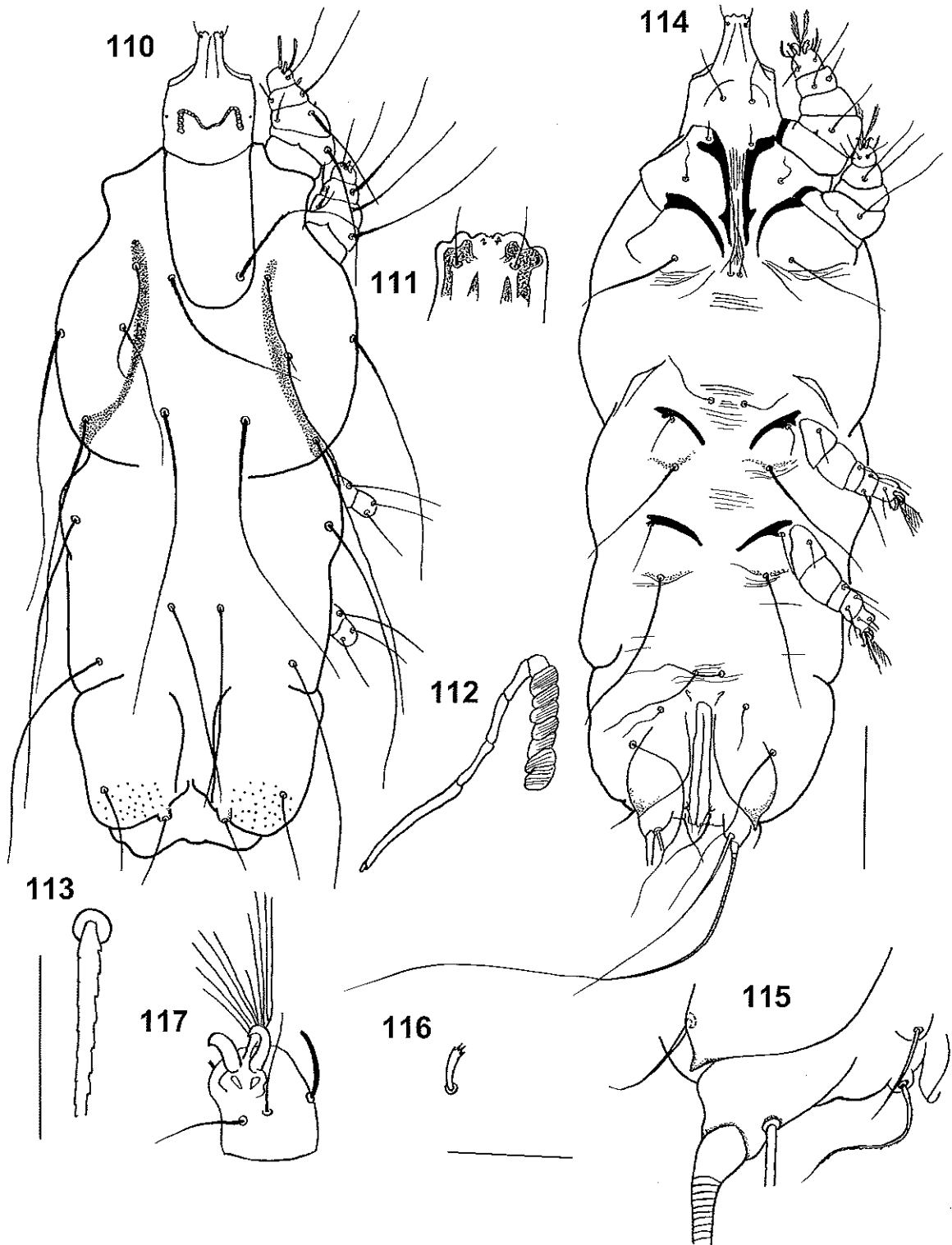
Differential diagnosis: *Picobia alectoris* nov. spec. is closely related to *Picobia zumpti* (LAWRENCE, 1959) ex *Streptopelia capicola* (Columbiformes: Columbidae) from South Africa (LAWRENCE, 1959). In females of both species, the propodosomal shield is divided; the hypostomal apex is truncate, the setae $d5$ short. The new species is



Figs. 97-102 — *Picobia ramphastos* nov. spec. - Female in dorsal view (97); hypostomal apex in ventral view (98); peritreme (99); female in ventral view (100); vulva (101); tarsus I in lateral view (102). Scale lines: 100 μm (97, 100), 20 μm (98-102).



Figs. 103-109 — *Picobia alectoris* nov. spec. - Female in dorsal view (103); hypostomal apex in ventral view (104); peritreme (105); female in ventral view (106); vulva (107), claw of tarsi I (108); seta a'' of tarsus I (109). Scale lines: 100 μ m (103, 106), 20 μ m (104-105, 107-109).



Figs. 110-117 — *Picobia phoeniculi* nov. spec. - Female in dorsal view (110); hypostomal apex in ventral view (111); peritreme (112); seta vi (113); female in ventral view (114); vulva and hysterosomal lobe (115); seta a'' of tarsus I (116); tarsus III in ventral view (117). Scale lines: 100 μm (110, 114), 20 μm (111-112, 115-117), 25 μm (113).

distinguished from *P. zumpti* by characters as follows. In *P. alectoris* nov. spec., the setae *d4* are long, approximately 6 times longer than *l4*, the setae *d2* are closer to *l1* than *l2*, setae *vi* and *ve* are subequal, the apices of setae *cxIV2* extend to level of setae *pg1*. In *P. zumpti*, the setae *d4* are short, 1.5 times shorter than *l4*; the setae *d2* are closer to *l2* than *l1*, setae *vi* 1.5 times shorter than *ve*, the apices of setae *cxIV2* not extend to level of setae *pg1*.

Etymology: The name *alectoris* refers to the generic name of host.

4. *Picobia phoeniculi* nov. spec.

Female, holotype (Figs. 110-117): length 596 (506 in paratype), width at level of setae *h* 225 (202). Hypostomal apex (Fig. 111) truncate, with ornament. Peritremes (Fig. 112): lateral branch with 4 chambers, longitudinal branch with 8 chambers. Dorsum (Fig. 110). Propodosomal plate divided. Hysterosomal and pygidial plates absent. Setae *vi*, *ve*, *sci*, *sce*, *h*, *d1*, *d2*, *l1*, *l2* are serrate; *d4*, *d5*, *l4* are smooth; setae *l5* transversally striated; *vi* situated at level of *ve*; distances *d2-l2* 2 times shorter than *l1-d2*. Length of setae: *vi* 126 (120), *ve* 90 (87), *sci* 135 (139), *sce* 202 (185), *h* 229 (225), *d1* 234 (229), *d2* 130, *d4* 49 (51), *d5* 153 (166), *l1* 247, *l2* 216, *l4* 72 (76), *l5* 430. Ventral idiosoma (Fig. 114). Cuticular striations as in Fig. 114. Small hysterosomal lobes present; setae *g1* thickened, situated on apices of hysterosomal lobes. Length of setae: *pg1* 67, *pg2* 31, *pg3* 139 (135), *g1* 15, *a1* 15 - smooth, *a2* 31 - serrate. Legs. Dorsal setae of legs serrate; setae *sc* III-IV and *cx III-IV 1* are smooth, *cx III-IV 2* are slightly serrate, *tc'''III* and *tc'''IV* subequal *tc'''III* and *tc'''IV*. Setae *a'*, *a''* of tarsi I-II with 2 times, *a'*, *a''* of tarsi III-IV stick-like. Antaxial and paraxial members of claw pair III-IV subequal.

Physogastric female, paratype: length 1175, width at level of setae *h* 281. Length of setae: *vi* 135, *ve* 108, *sci* 139, *sce* 234, *h* 247, *d1* 250, *d2?*, *d4?*, *d5?*, *l1* 234, *l2* 198, *l4?*, *l5?*, *pg1* 67, *pg2* 31, *pg3* 139 (135), *g1* 15, setae *a1* 15 smooth, *a2* 31 serrate. Legs. Dorsal setae of legs serrate; setae *sc* III-IV and *cx III-IV 1* smooth, *cx III-IV 2* slightly serrate, *tc'''III* and *tc'''IV* subequal *tc'''III* and *tc'''IV*. Setae *a'*, *a''* of tarsi I-II with 4-6 times, *a'*, *a''* of tarsi III-IV stick-like. Antaxial and paraxial members of claw pair III-IV subequal.

Host and locality:

Holotype female from *Phoeniculus purpureus ruwenzoriae* (Coraciiformes: Phoeniculidae), Rwanda. (coll. A. FAIN, XII. 1954). *Paratypes*: 2 females with the same data as in the holotype. Holotype and female paratype in MRAC; female paratype in ZISP. Holotype n° 187374.

Differential diagnosis: *Picobia phoeniculi* nov. spec. is related to *Picobia dryobatis* (FRITSCH, 1958) ex *Dendrocopus major* (Piciformes: Picidae) from Germany (FRITSCH, 1958) and *Sturnus vulgaris* (BOCHKOV & MIRONOV, 1998) from Moldavia and also *Picobia heeri* HAL-

LER, 1878 ex *Picus canus* (Piciformes: Picidae) from Switzerland (HALLER, 1878). The types of both these species are lost and not available for study (KETHLEY, 1970). It is possible that *P. dryobatis* is conspecific to *P. heeri* Haller, 1878 and specimens of *Picobia* ex *St. vulgaris* are a separate species. In females of *P. phoeniculi* and *P. dryobatis* (specimens ex *St. vulgaris*), the propodosomal shield is divided; the hypostomal apex is truncate, the setae *vi* lie at level of *ve*; the setae *d5* short, the pair of small hysterosomal lobes is present and thicker setae *g1* localized on apices of these lobes. The new species is distinguished from *P. dryobatis* by characters as follows. In *P. phoeniculi*, the setae *d4* are 3 times shorter than *d5*, the setae *pg2* are 2 times shorter than *pg1*, the setae *l5* are transversally striated, the setae *a2* are serrate. In *P. dryobatis*, the setae *d4* and *d5* are subequal, the setae *pg2* are slightly shorter than *pg1*, the setae *l5* and *a2* are smooth.

Etymology: The name *phoeniculi* refers to the generic name of the host.

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References

- BERLESE, A., 1887. Acari, Myriopoda and Scorpiones. *Padova*. 37: N 9, N 10.
- BOCHKOV, A.V., 1999. Mites of the family Myobiidae (Acari: Prostigmata) and their position in the system. *Abstract of the Ph.D. thesis. Zoological Institute RAS St. Petersburg*. 22 p. (In Russian)
- BOCHKOV, A.V. & MIRONOV, S.V., 1998. Quill mites of the family Syringophilidae Lavoipierre, 1953 (Acariformes: Prostigmata) parasitic on birds (Aves) of the fauna of the former USSR. *Acarina*. 6: 3-16.
- BOCHKOV, A.V. & MIRONOV, S.V., 1999. New quill mite species of the family Syringophilidae (Acari: Cheyletoidea) from the European part of Russia. *Acarina*. 7: 35-45.
- BOCHKOV, A.V., MIRONOV, S.V. & FAIN, A., 1999. Phylogeny and host-parasite relationships of the mite family Harpirhynchidae (Acari: Cheyletoidea). *Acarina*. 7: 69-87.
- CASTO, S.D., 1977. *Cuculiphilus lobatus* gen.n., sp. n. representing a new subfamily of quill mites (Acarina: Syringophilidae) from the groove-billed ani, *Crotophaga sulcirostris* (Cuculiformes: Cuculidae). *Southwestern Naturalist* 22: 169-176.
- CASTO, S.D., 1978. A new name for *Cuculiphilus* (Acarina: Syringophilidae). *Southwestern Naturalist* 23: 158.
- CASTO, S.D., 1979. A new syringophilid mite from the white-winged dove. *Texas Journal of Science* 31: 225-229.
- CASTO, S.D., 1980a. A new genus of the syringophilid mites from galliform birds in Texas. *Texas Journal of Science*. 32: 233-240.
- CASTO, S.D., 1980b. A new quill mite (Acarina: Syringophilidae) from the ground dove. *Southwestern Entomologist*. 5:1-5.

- CHIROV, P.A. & KRAVTSOVA, N.T., 1995. A new genus and new species of mites of the family Syringophilidae. *Parazitologiya*. 29: 370-379. (In Russian)
- CLARK, G.M., 1964. The acarina genus *Syringophilus* in North American bird. *Acarologia*. 6: 77-92.
- FAIN, A., 1973. Notes sur la nomenclature des poils idiosomaux chez les Myobiidae avec description de taxa nouveaux (Acarina: Trombidiformes). *Acarologia*. 15: 289-309.
- FAIN, A., 1979. Idiosomal and leg chaetotaxy in the Cheyletidae. *International Journal of Acarology*. 5: 305-310.
- FRITSCH, W., 1958. Die milbengattung *Syringophilus* Heller, 1880 (subordo Trombidiformes, fam. Myobiidae Megnin, 1877). *Zoologische Jahrbücher Systematik* 86: 227-234.
- HALLER, G., 1878. *Freyana* und *Picobia*. *Zeitschrift für wissenschaftliche Zoologie*. 30: 81-98
- JOHNSTON, D.E. & KETHLEY, J.B., 1973. A numerical phenetic study of the quill mites of the family Syringophilidae (Acari). *Journal of Parasitology*. 59: 520-530.
- KETHLEY, J.B., 1970. A revision of the family Syringophilidae (Prostigmata, Acarina). *Contributions of the American Entomological Institute*. 5: 1-76.
- KETHLEY, J.B., 1973. A new genus and species of quill mites (Acarina: Syringophilidae) from *Colinus virginianus* (Galliformes: Phasianidae) with notes on developmental chaetotaxy. *Fieldiana Zoology*. 65: P. 1-8.
- KETHLEY, J.B., 1982. Prostigmata. *Synopsis and classification of living organisms*. 2: 117-145.
- KETHLEY, J.B. & JOHNSTON, D.E., 1975. Resource tracking in birds and mammalian ectoparasites. *Entomological Society of America*. 9: 229-236.
- KUROCHIKIN, E.N., 1993. General Evolutionary Stages of the Class Aves. *Abstract of the Doctor of Biological Sciences Dissertation Thesis. Paleontological Institute RAS Moscow*. 65 p. (In Russian)
- LIU BAI-LI, 1988. On three species of quill mites from China (Acari: Syringophilidae). *Acta Zootaxonomica Sinica*. 13: 274-277.
- MOSS, W.W. & WOJCIK, J.F., 1978. Numerical taxonomic studies of the mite family Harpyrhyndidae (Acari: Cheyletoidea): the higher taxa. *Annals of the Entomological Society of America*. 72: 247-252.
- PHILLIPS, J.R. & NORTON, R.A., 1978. *Bubophilus ascalaphus* gen. and sp. n. (Acarina; Syringophilidae) from the quills of a great horned owl (*Bubo virginianus*). *Journal of Parasitology*. 64: 900-904.
- SKORACKI, M., 1999. New genus and species of Syringophilidae from Eurasian Reed-Warbler, *Acrocephalus scirpaceus* (Sylviidae: Passeriformes) (Acari: Prostigmata). *Genus*. 10: 155-162.
- VOLGIN, V.I., 1969. Acarina of the family Cheyletidae, world fauna. *Akad. Nauk. S. S. S. R. Zool. Inst.* 101: 1-439. (In Russian).

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