

DESCRIPTION OF FOUR NEW GENERA OF THE FEATHER MITE FAMILY
PTERONYSSIDAE Oudemans 1941 (ASTIGMATA: ANALGOIDEA) WITH
NOTES ON SYSTEMATICS OF THE FAMILY

ОПИСАНИЕ ЧЕТЫРЕХ НОВЫХ РОДОВ ПЕРЬЕВЫХ КЛЕЩЕЙ СЕМЕЙСТВА
PTERONYSSIDAE Oudemans 1941 (ASTIGMATA: ANALGOIDEA) С
ЗАМЕЧАНИЯМИ ПО СИСТЕМЕ СЕМЕЙСТВА

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ABSTRACT

The paper restores the family rank of the feather mite taxon Pteronyssidae Oudemans, 1941, which has been treated by most experts as a subfamily of the Avenzoariidae Oudemans, 1905, and provides a new formal diagnosis of this family. Brief references to general publications on the taxonomy and host associations of pteronyssid mites are given. Four new genera are established within the Pteronyssidae: *Micropteroherpus* gen. n. with the type species *Micropteroherpus benoiti* (Faccini et Atyeo, 1981) comb. n., *Dicrurobius* gen. n. with the type species *Dicrurobius monacrotrichus* (Gaud, 1952) comb. n., *Vanginyssus* gen. n. with the type species *Vanginyssus schizurus* (Gaud, 1952) comb. n., *Timalinyssus* gen. n. with the type species *Timalinyssus formosanus* sp. n. from *Actinodura morrisoniana* (Timaliidae). A new species group *nectariniae* is recognized within the genus *Pteronyssoides* Hull, 1931. One new species, *Pteronyssoides* (*P.*) *nectariniae* sp. n., is described from *Nectarinia afra* (Nectariniidae).

РЕЗЮМЕ

Для таксона Pteronyssidae Oudemans, 1941, обычно рассматриваемого в качестве одного из подсемейств в семействе Avenzoariidae Oudemans, 1905, обосновано восстановление его исходного таксономического ранга семейства и составлен новый формальный диагноз. Дан краткий обзор литературы по систематике и паразито-хозяйным связям перьевых клещей семейства Pteronyssidae. В семействе установлено четыре новых рода: *Dicrurobius* gen. n., типовой вид *Dicrurobius monacrotrichus* (Gaud,

1952) comb. n., *Micropteroherpus* gen. n., типовой вид *Micropteroherpus benoiti* (Faccini et Atyeo, 1981) comb. n., *Vanginyssus* gen. n., типовой вид *Vanginyssus schizurus* (Gaud, 1952) comb. n., *Timalinyssus* gen. n., типовой вид *Timalinyssus formosanus* sp. n., описанный с тимелии *Actinodura morrisoniana* (Timaliidae). В пределах рода *Pteronyssoides* Hull, 1931 выделена новая группа видов *nectariniae*. Новый вид *Pteronyssoides* (*P.*) *nectariniae* sp. n. описан с нектарницы *Nectarinia afra* (Nectariniidae).

INTRODUCTION

The present work provides the descriptions of four new genera of feather mites recovered in the course of general taxonomic studies of feather mites of the superfamily Analgoidea associated with Passeriformes and Piciformes [Mironov, 1985, 1989, 1990, 1992, 1993, Mironov Копиј, 1999, 2000]. All new taxa belong to the suprageneric taxon considered by the majority of recent experts as the subfamily Pteronyssinae Oudemans, 1941 within the family Avenzoariidae Oudemans, 1905 [Gaud, 1976; Atyeo, Gaud, 1981; Faccini, Atyeo, 1981, Mironov, 1989, 1991a, 1991c; Gaud, Atyeo, 1996]. Therefore, the additional goal of the present work is to substantiate the restoration of the family rank for the taxon Pteronyssidae.

The discussed taxon has been studied extensively in the taxonomy and biodiversity aspects. A careful generic revision was carried out by Faccini and Atyeo [1981]. A review of species associated with birds of the orders Piciformes and Passeriformes distributed in Europe and Northern Asia

was given by Mironov [1989]. Gaud and Mouchet [1959] described a vast number of the new species from Central Africa. Lately Gaud published a series of papers on the pteronyssid genera restricted to Piciformes of Africa [Gaud, 1988, 1989, 1990a, 1990b, 1991]. Atyeo and co-authors [Atyeo et al., 1987] reviewed the species associated with the Neotropical Capitonidae and Ramphastidae (Piciformes). Several new genera and species were described from birds of South-East Asia [Gaud, Petitot, 1948; Gaud, Corpuz-Raros, 1985; Mironov, 1992, 1993]. Finally, a key to all recently known genera was proposed by Gaud and Atyeo [1996]. A phylogenetic reconstruction at the generic level and the analysis of co-evolutionary relationships of these feather mites with birds were undertaken by Mironov [1991a, 1991b].

Despite numerous and intensive studies of this taxon during the past sixty years, and its obvious morphological differences from typical avenzoariid mites [Atyeo, Gaud, 1981; Mironov, 1991a, 1991c; Gaud, Atyeo, 1996], it still formally retains in the family Avenzoariidae. Therefore, it is expedient to give herein a brief historical taxonomic account of this taxon, restore its family status and provide with a modern formal diagnosis.

MATERIAL AND METHODS

The material used in the present study was mainly recovered in the collection of the late professor Dr. J. Gaud (Université de Nice, France), part of which is recently deposited in the collections of the Zoological Institute of the Russian Academy of Sciences (St. Petersburg, Russia), and received for examination from the feather mite collections of the University of Georgia (Athens, USA) and the National Museum of Bloemfontein (Free State, South Africa).

The descriptions of new genera and species follow standard formats proposed by Faccini and Atyeo [1981] with minor additions concerning terms of hysteronotal shields in females [Mironov, 1992]. The idiosomal chaetotaxy follows that of Giffiths e.al. [1990], and the leg chaetotaxy is that of Atyeo and Gaud [1966]. All measurements are given in micrometers (μm). Scientific and common names of birds follow the checklist of Howard and Moor [1991].

Abbreviations given in the collection numbers of type materials examined or described in the course of the present study indicate the institute, where the specimens were mounted on microscopic slides and primarily deposited. As some old collec-

tions were redeposited from one museum to another, in each case concerning a type material, its recent place of deposition is specified at the end of the "Material" section. Abbreviations: NMB — National Museum of Bloemfontein (Free State, Republic of South Africa), NU — Nebraska State University (Lincoln, USA), ZISP — Zoological Institute, Russian Academy of Sciences (St. Petersburg, Russia), ZMUM — Zoological Museum, University of Michigan (Ann Arbor, USA).

NOTES ON SYSTEMATICS OF PTERONYSSIDAE

In the primary suprageneric system of feather mites, the genus *Pteronyssus* Robin, 1877 [Robin, Megnin, 1877], the type genus of the taxon in question, was placed into the section Pterolichae of the Sarcoptiformes plumicoles or «subfamily Analgesinae» [Trouessart, 1885, 1916]. In the course of principal reformation of the taxonomic systems of the Acari and properly feather mites, Oudemans [1905] created the family Avenzoariidae, which originally included the genus *Avenzoaria* Oudemans, 1905 only. Later, Oudemans [1941] assigned the genus *Pteronyssus* to this family and proposed for the first time the name Pteronyssidae to replace the family name Avenzoariidae. This author supposed that the oldest generic name should serve as a basis for the family name. Other acarologists did not accept this replacement because it was incorrect in terms of nomenclature. At that moment it has not been noticed that by this formal act Oudemans has actually created a new valid taxon of the family rank with the type genus *Pteronyssus*.

Dubinina [1953] did not consider the Avenzoariidae (*sensu* Oudemans) as a true taxon and scattered its genera among several suprageneric taxa of the family Pterolichidae. At the same time this author had created a new subfamily Pteronyssinae Dubinina, 1953 within the family Analgesidae. Among 7 genera included in that subfamily, only the genera *Pteronyssus* and *Pteronyssoides* Hull, 1931 actually belonged to the pteronyssid mites in recent sense.

Gaud [1976] restored the validity of the family Avenzoariidae and recognized two subfamilies: Avenzoariinae Oudemans, 1905 and Pteronyssinae Oudemans, 1941. Thus, the family, created by Oudemans as an incorrect taxonomic reformation and rejected by other experts, was restored in the rank of the subfamily.

Further, Atyeo and Gaud [1981] revised the generic composition of the Avenzoariidae and its

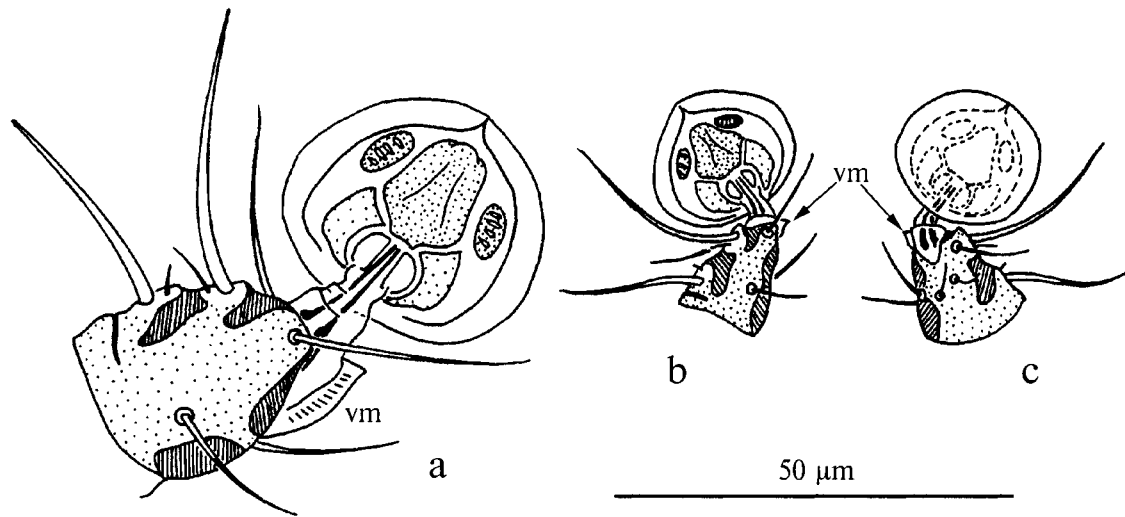


Fig. 1. Tarsi I of mites of the family Pteronyssidae: a — *Pteronyssoides striatus*, dorsal view; b — *Hyonyssus anacestus*, dorsal view, c — same, ventral view, ad — ambulacral disc, vm — ventral membrane.

general host associations. These experts proposed its subdivision into five subfamilies: Avenzoariinae Oudemans, 1905 and Hemifreyaninae Atyeo et Gaud, 1981 associated with Charadriiformes; Bonnetellinae Atyeo et Gaud, 1981, associated with Anseriformes, Ciconiiformes, Falconiformes, Pelecaniformes and Procellariiformes; Hyonyssinae Atyeo et Gaud, 1981 associated with African Piciformes and some Passeriformes; and Pteronyssinae associated with Coraciiformes, Piciformes and Passeriformes. Based on the structure of ambularal discs, Atyeo and Gaud [1981] arranged these subfamilies into two distinct natural groups. In three subfamilies occurring on shore- and seabirds (Avenzoariinae, Bonnetellinae, Hemifreyaninae), the lateral sclerites have a granular texture and the sclerite margin toward the disc edge is thin and weakly defined. On a contrary, in the subfamilies Pteronyssinae and Hyonyssinae, the lateral sclerites appear thick and have a few large lacunae and well-defined external margins. Finally, in the monograph on the feather mites of the world, these authors [Gaud, Atyeo, 1996] have synonymized Hyonyssinae with Pteronyssinae, but retained the latter taxon as a subfamily of the Avenzoariidae.

Morphological and phylogenetic analyses carried out in the frames of our systematic studies of the family Avenzoariidae [Mironov, 1991a, 1991c, 1995, 1998; Mironov, Dabert, 1999] have shown that the taxon Pteronyssinae in a broad sense (Pteronyssinae + Hyonyssinae *sensu* Gaud and Atyeo) represents a monophyletic sister clade of the branch uniting three avenzoariid subfamilies restricted to aquatic birds. These studies pointed

out that this taxon differs from other avenzoariid subfamilies not only by the structure of lateral sclerites, but by the specific structure of the ambulacral stalk on tarsus I, which possesses a longitudinal ventral membrane. This membrane is always present in these mites. It greatly varies in size among different pteronyssid genera, from a little spine-like processus (*Hyonyssus* Atyeo et Gaud, 1981) to a long membrane being about three quarters of the tarsal length (*Pteronyssoides* Hull, 1931, *Pteroherpis* Gaud, 1981) (Fig. 1 a–c). As it was recovered [Gaud, Atyeo, 1978; Atyeo, 1979], structures of pretarsi in astigmatid mites provide most important diagnostic characters for mite taxa of the family and superfamily ranks. As for the ventral membrane on tarsi I occurring in the pteronyssid mites, it is the unique structure among all superfamilies of feather mites. This membrane is not comparable with membranous spine- or manchette-like ventral processes on tarsi I, II in such families as Analgidae, Psoroptoididae, and Xolalgidae (Analgoidea). In these families, the membranous structures are ventral derivatives of properly tarsal segments and not a part of enlarged ambulacral stalk.

Based on unique characters and other distinguishing features of the Pteronyssinae Oudemans, 1941 [*sensu* Mironov, 1991a, 1991b, 1991c; Gaud, Atyeo, 1996] and taking in attention their specificity in host associations, it is expedient to consider this taxon as a distinct family. Formally, it is a restoration of the original rank of this taxon, despite its generic composition since 1941 has been significantly reformed and enlarged.

FAMILY PTERONYSSIDAE OUDEMANS, 1941

Pteronyssidae Oudemans, 1941: 177.

Pteronyssinae Dubinin, 1953: 35 (part).

Pteronyssinae (*sensu* Oudemans): Gaud, 1976: 26; Atyeo, Gaud, 1981: 343; Faccini, Atyeo, 1981: 24–25; Mironov: 1989: 97; 1991a: 291; Gaud, Atyeo, 1996: 58–59.

Hyonyssinae Atyeo, Gaud, 1981: 343; Faccini, Atyeo, 1981: 24; Gaud, 1989: 231.

Type genus: *Pteronyssus* Robin, 1877.

Analoid mites of medium size, 300–500. With 1 or 0 vertical setae *vi*; complement of dorsohyster-onotal setae always lacking setae *hl*, rarely absent setae *cl*, *dl*, *el*, idiosomal setae usually hair-like. Ambulacral discs large, diameter comparable to length of tarsi I, II, central sclerite large, about half of disc diameter, heavily sclerotized, usually with indentate anterior end; lateral sclerites ovate, with well-defined external margins and few lacunae. Condilophore guide well-developed. Ambulacral stalk cone-like, significantly shorter than the disc. On tarsi I, ventrobasal part of ambulacral stalk enlarged and stretching along ventral surface of segment; enlarged ventral part of ambulacral stalk with longitudinal membrane (Fig. 1a). Articulations of all leg segments movable, no fused segments present. Tarsi and tibiae I, II without ventral apophyses. Complement of leg chaetom almost maximal for Analgoidea, solenidion $\sigma 2$ absent in certain genera; chaetom formula (solenidia in brackets): I: 1–1–2(1 or 2)–1(1)–8(2), II: 1–1–2(1)–1(1)–8(1), III: 1–0–0(1)–1(1)–6*, IV: 0–0–0–1(1)–5.

Male. Opisthosoma variable in form, lobes usually short and bluntly rounded or rectangular, rarely not expressed. Posterior end of opisthosoma variable in structure: with narrow membrane along terminal cleft and lobar margins (Fig. 7 a, b); without membranes (Fig. 9 a, b); with extending paired or unpaired membranous processes (Fig. 2 a, b). Epiandrium usually present. Anal discs always present, without indentation. Legs III hypertrophied. Setae *d*, *e* of tarsi IV as little cylindrical discs. Polymorphism of males weakly expressed, in general size only.

Female. Posterior end of opisthosoma usually rounded (Fig. 3 a), rarely with a pair of short tongue-like lobes (Fig. 10 a). Structure of dorsal hysteronotal shields greatly variable among differ-

ent genera, represented by entire shield or complex of 2–9 paired and unpaired fragments. Epigynium large, bow-like or rectangular, well sclerotized, situated in anterior part of hysterosoma, usually separated from coxal sclerites (Fig. 3 b).

Hosts. The representatives of the family are distributed on different families of the Piciformes and Passeriformes and one genus, *Cleyastobius* Gaud, 1981, occurs on the Coraciiformes, namely on the wooden hoopoes Phoeniculidae.

Taxonomic composition. According to the present concept the family counts 22 genera, including 4 new genera described below, and about 130 species.

***Dicrurobium* Mironov gen.n.**

Type species: *Pteronyssus monacrotrichus* Gaud, 1952 by original designation.

Both sexes. Epimerites I fused, Y-shaped, sternum about 1/4 of total length of epimerites. Seta *vi* present. Prodorsal shield encompassing setae *cl*, not fused with scapular shields. Setae *c2* hair-like, short. Setae *c3* lanceolate, short. Setae *dp2* of palps bifid. Setae *ba* of tarsus I hair-like. Solenidion $\sigma 1$ longer than $\omega 1$ on legs I. Ventral membrane of tarsus I long, about 3/4 of segment length. All surface of coxal fields I, II striated.

Male. Opisthosomal lobes wide and short, with truncate posterior margin, posterior end of opisthosoma blunt or slightly concave. Posterior margin of lobes with narrow membrane, lateral angles with a pair of acute spine-like membranous processes (Fig. 2 a, 3 c). Supranal concavity long, but not extending to level of hysteronotal gland openings *gl*. Setae *c2* on medial margins of humeral shields or close to them. Setae *ps1* anterior to setae *h3*. Hysteronotal shield without internal sclerotized ridges. Coxal fields III open. Transventral sclerite present, wide, V-shaped, its posterior angle fused with epiandrium. Tips of epiandrium partly encompassing genital apparatus. Anal discs circular, large. Adanal shields represented by small irregular sclerites anterior to anal slit and around setae *ps3*. Adanal membranes present. Tarsus III elongated, with acute apical process (Fig. 3 d). Setae *r* equal or slightly longer than tarsus III.

Female. Idiosoma moderately elongate. Set of hysteronotal shields: central hysteronotal shield usually fused with pair of lateral opisthosomal

* Atyeo and co-authors [Atyeo, Gaud, 1981; Faccini, Atyeo, 1981] noted the variability of ventral seta number on tarsi III (three or one) among some species of the genus *Hyonyssus*. However these data were not confirmed in a recent publication [Gaud, Atyeo, 1996]. Possibly the variations were observed in aberrant specimens.

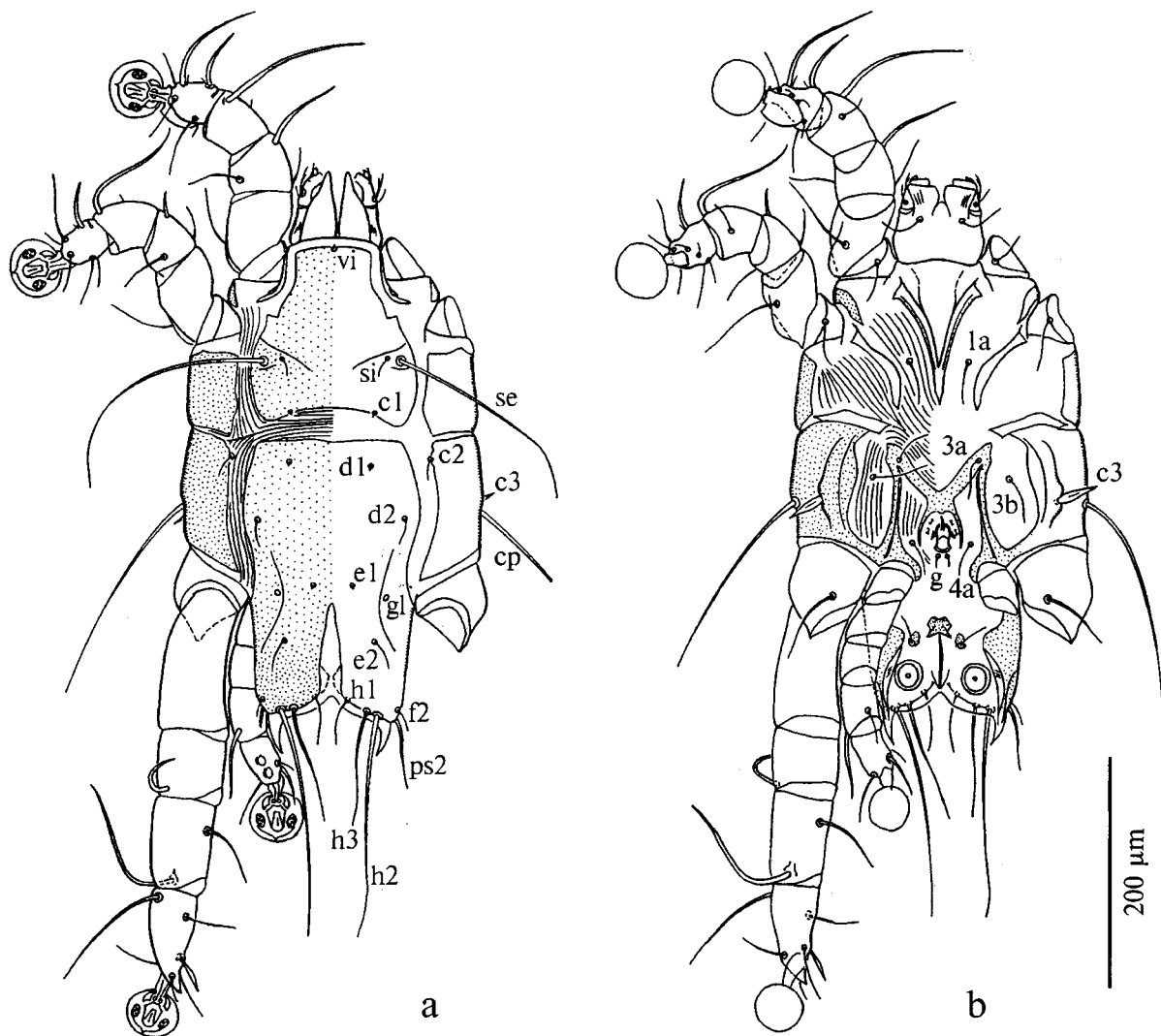


Fig. 2. *Dicrurobium monacrotrichus*, male: a — dorsal view, b — ventral view.

shields into large sclerite as inverted Y; entire small pygidial shield occupying posterior end of opisthosoma (Fig. 3 a). Hysteronotal gland openings *gl* on striated tegument. Epigynium almost rectangular, with small lateral spines (Fig. 3 b).

Differential diagnosis. This genus corresponds to the *monacrotrichus* species group recognized by Faccini and Atyeo [1981] in the genus *Pteroherpus* Gaud, 1981. As the latter genus is a complex, the new genus is compared herein with the typical species of *Pteroherpus* arranged into the *hoplophorus* group. The males of the genus *Dicrurobium* well discernible from those of *Pteroherpus* by having the truncate opisthosomal lobes, acute membranous extensions in lateral angles of these lobes, open coxal fields III and acute apex of tarsus III (Fig. 2 a, b, 3 c, d); the females differ by having a large shield as inverted Y in the medial part of hysterosoma, and entire pygidial shield (Fig. 3 a). In males of the genus *Pteroherpus*, the opisthosom-

al lobes are rounded and clearly separated by small terminal cleft, the membranes on the posterior margin of lobes are never extended into spine-like processes, coxal fields III are closed, and tarsus III has a bidentate apex. In the females of this genus, the set of hysteronotal shields is greatly variable, consists of 3–9 fragments, but the pygidial shield is always paired and the opisthosomal shields are commonly free from anterior fragments and represented by two pairs of sclerites (lateral and medial ones); the pygidial shield is always paired.

The genus includes one species from the drongos *Dicrurus* (Dicruridae).

1. *Dicrurobium monacrotrichus* (Gaud, 1952) comb.n.

Figs. 2, 3.

This species was originally described within the genus *Pteronyssus* [Gaud, 1952] and further included into the genus *Pteroherpus* [Faccini, Atyeo,

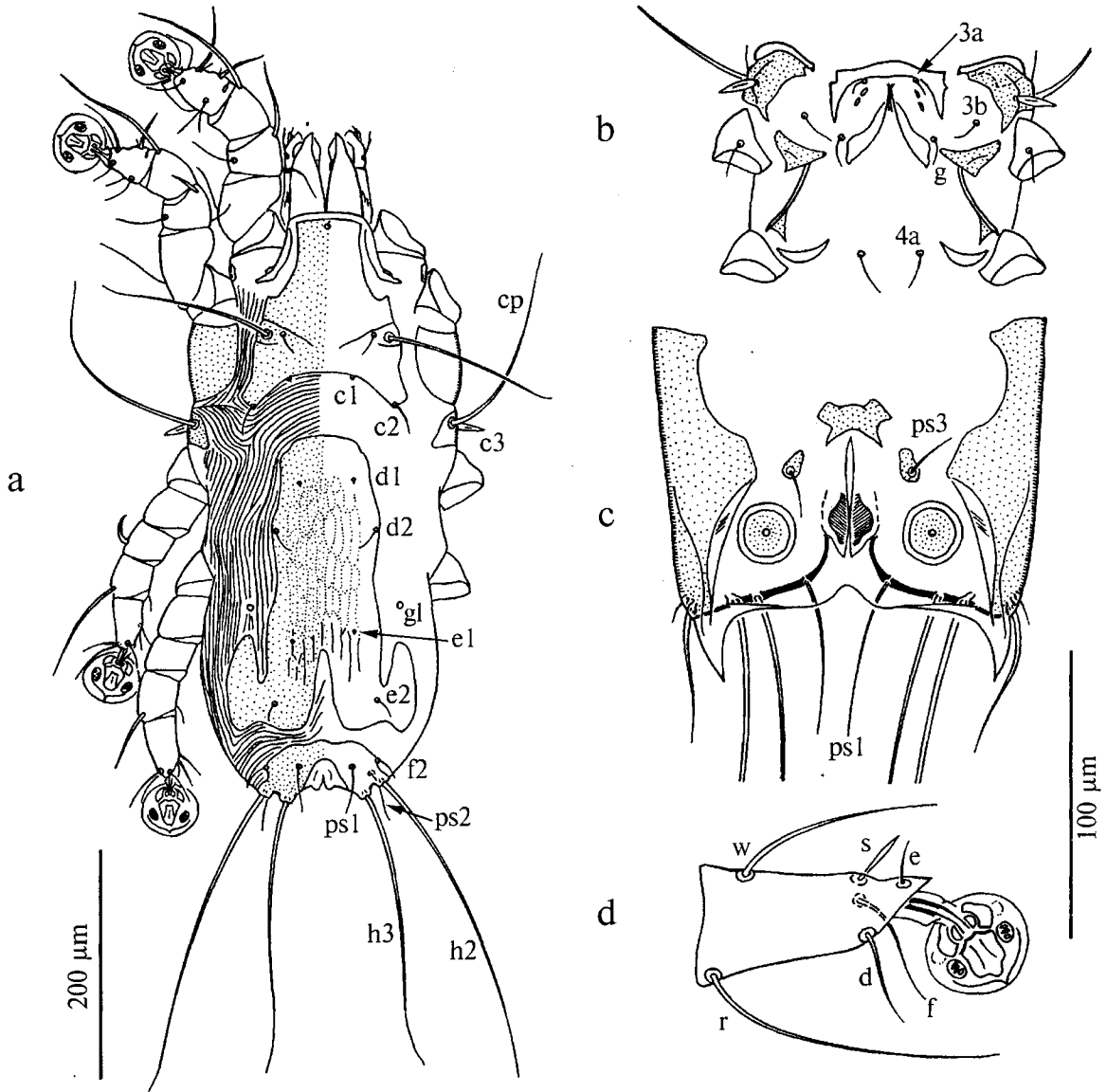


Fig. 3. *Dicrurobius monacrotichus*: a — female, dorsal view, b — egg opening and adjacent coxae, c — opisthosoma of male, ventral view, d — tarsus III of male, dorsal view.

1981]. The material from the type host, the crested drongo *Dicrurus forficatus*, was available for the present study. Faccini and Atyeo [1981] reported that they found this mite species on various species of the genus *Dicrurus*. They suggested that it was a species complex, but did not provide the host list. Therefore, it is possible to expect that the genus *Dicrurobius* would include a number of closely related species.

Material. Male, female from *D. f. forficatus*, Mt. d'Ambre, Majunga prov. Madagascar, 22 October 1930, A.L. Rand and R. Archbold coll.; 2 males from *D. f. potior*, Ile d'Anjouan, Comore Isls., 19 September 1906, P.N. Naidoo coll.

Micropteroherpus Mironov gen.n.

Type species: *Pteroherpus benoiti* Faccini et Atyeo, 1981 by original designation.

Both sexes. Epimerites I fused Y-like, sternum about 1/3–1/2 of total length of epimerites. Seta *vi* present. Prodorsal shield not encompassing setae *c1*, not fused with scapular shields. Setae *c2* relatively long, about half of idiosomal width. Setae *c3* lanceolate, short. Setae *dps* of palpa bifid. Setae *ba* of tarsus I hair-like. Solenidion *σ1* longer than *ω1* on legs I. Ventral membrane of tarsus I long, about 3/4 of segment length. All surface of coxal fields I, II striated.

Male. Opisthosomal lobes well-developed, small, widely separated by terminal cleft, with a

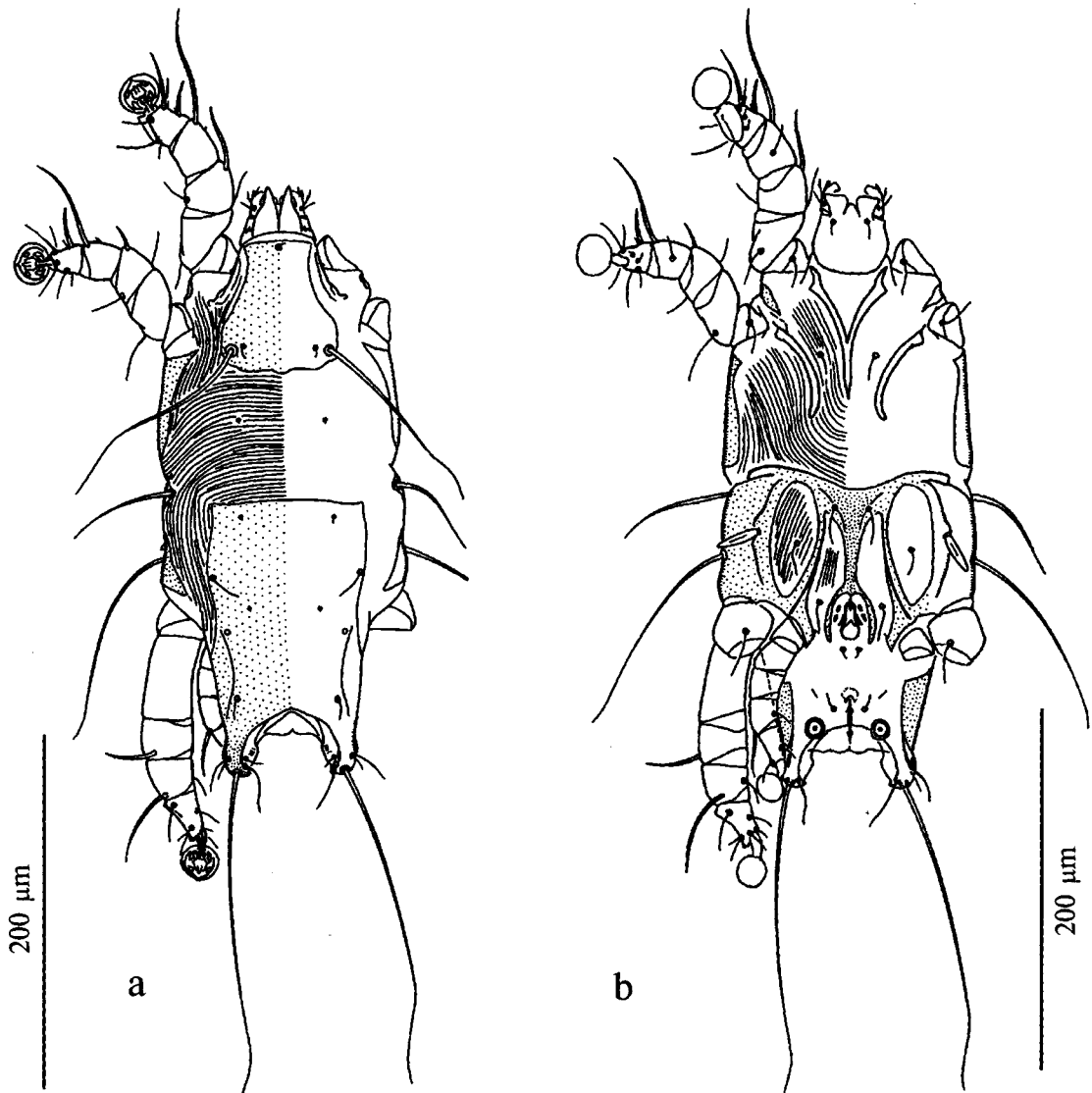


Fig. 4. *Micropteroherpus benoiti*, male: a — dorsal view, b — ventral view.

little subapical spine near bases of setae *h3*. Interlobar membrane present on internal margins of lobes. Terminal cleft ovate or semicircular, 1.5–3 times wider than lobe width. Supranal concavity not expressed, fused with terminal cleft (Figs. 4, 5 c, d, 6 b, e). Setae *c2* in anterior angle of humeral shields. Setae *ps1* anterior to setae *h3*. Hysteronotal shield without internal sclerotized ridges. Coxal fields III closed. Transventral sclerite present, Y-shaped, with very long posterior branch fused with epiandrium. Branches of epiandrium encompassing genital apparatus. Anal discs circular, small. Adanal shields absent. Narrow adanal membranes present. Tarsus III with bidentate apical process and dorsobasal ridge. Setae *r* shorter than tarsus III (Fig. 5 e).

Female. Idiosoma narrow, greatly elongated. Set of hysteronotal shields: central hysteronotal shield usually ovate in form; a pair of lateral opistho-

somal shields and entire pygidial shield situated in posterior quarter of hysterosoma (Figs. 5 a, 6 c, g). Hysteronotal gland openings *gl* on striated tegument. Epigynum almost rectangular, with acute lateral spines (Fig. 5 b).

Differential diagnosis. The genus corresponds to the *benoiti* species group formerly recognized in the genus *Pteroherpis* [Faccini, Atyeo, 1981]. The males of the genus *Micropteroherpus* differ from typical species of *Pteroherpis* by having widely separated narrow opisthosomal lobes with interlobar membrane on their medial margins (Figs. 5 c, d, 6 b, e). The females are distinguished by having the central hysteronotal shield ovate in form, one pair of small opisthosomal shields situated in posterior one quarter of opisthosoma, unpaired pygidial shield, and opening *gl* situated on striated tegument (Figs. 5 a, 6 c, g). In males of the genus *Pteroherpis* (*hoplopho-*

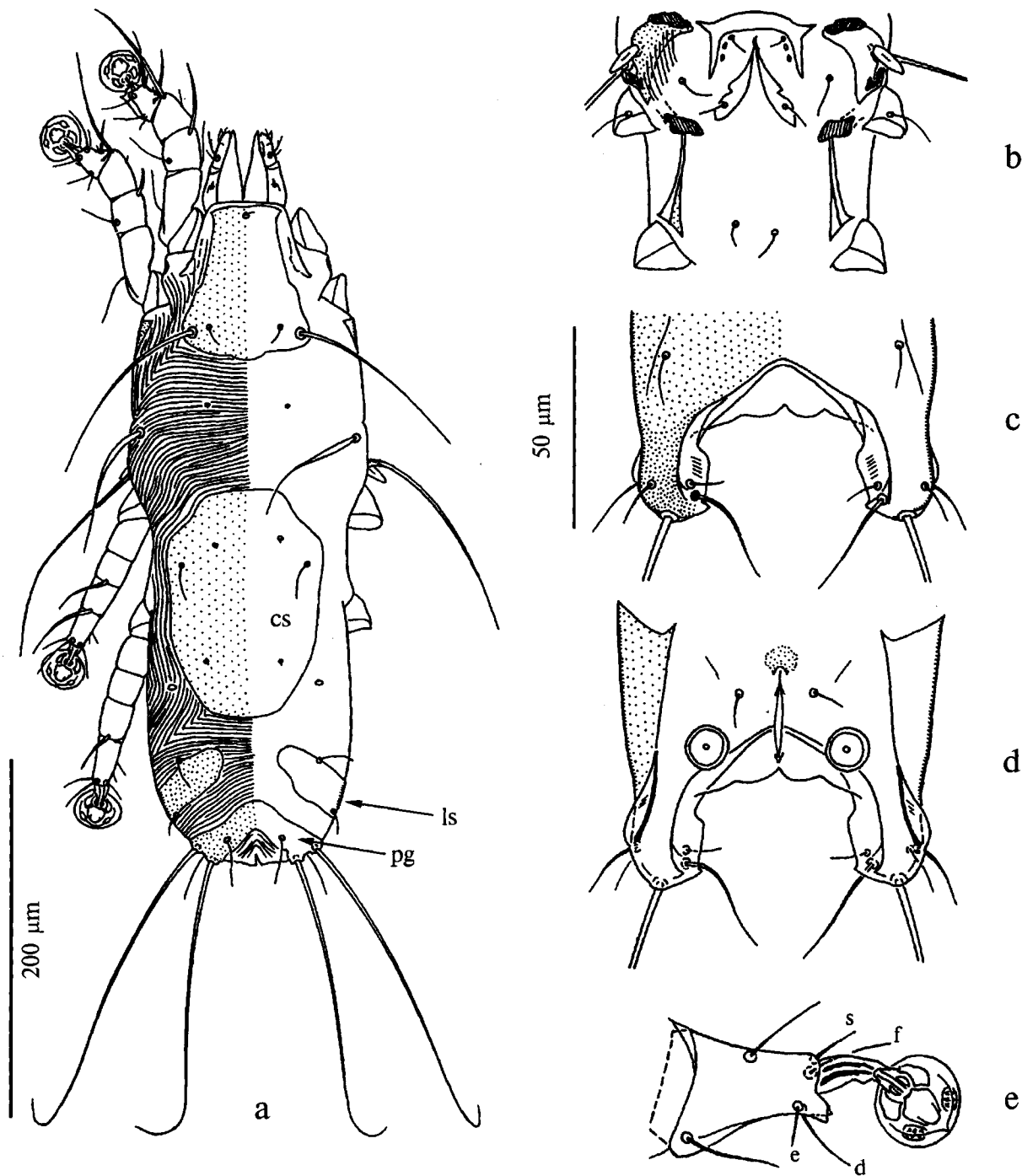


Fig. 5. *Micropteroherpus benoiti*: a — female, dorsal view, b — egg opening and adjacent coxae, c — opisthosoma of male, dorsal view, d — opisthosoma of male, ventral view, e — tarsus III of male, dorsal view. cs — central shield, ls — lateral opisthosomal shield, pg — pygidial shield.

rus species group), the opisthosomal lobes are wide and bluntly rounded, separated by narrow V- or U-shaped cleft, medial and terminal margins of lobes with entire narrow membrane. In females of this genus, the central hysteronotal shield is generally rectangular, the opisthosomal shields are usually represented by two pairs and sometimes fused with the central shield, the pygidial shield is paired, and openings *gl* are situated on shields.

The genus includes 3 species associated with passerines of the genera *Cisticola* and *Orthotomus* (Sylviidae).

KEY TO SPECIES OF MICROPTEROHERPUS

Males

1. Opisthosomal lobes divergent, widely separated, terminal cleft 3 times wider than lobe width excluding membranes (Fig. 4, 5 c, d) *M. benoiti*

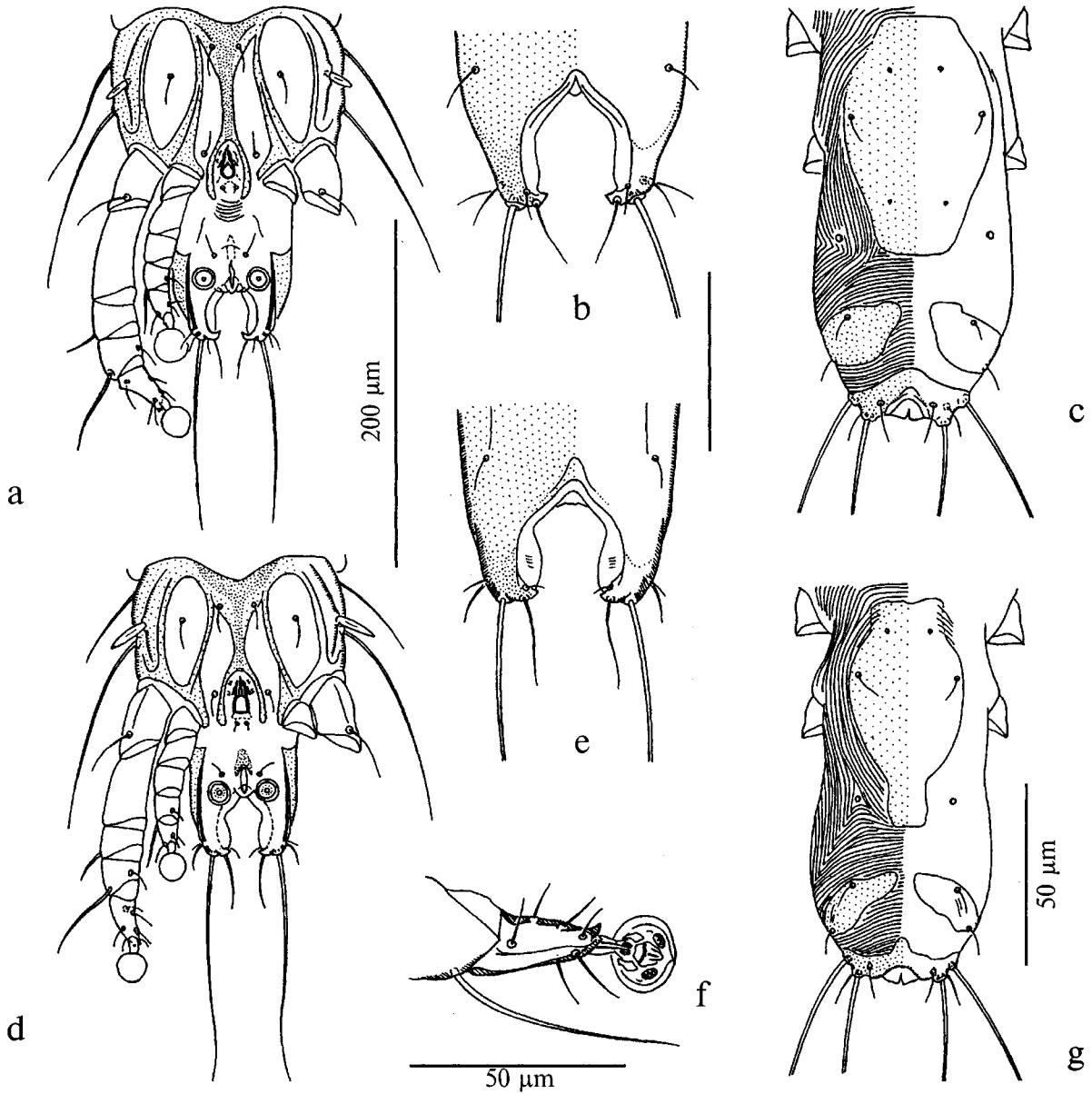


Fig. 6. Mites of the genus *Micropteroherpus*: a — *Micropteroherpus cisticolae*, hysterosoma of male, ventral view, b — same, opisthosoma of male, dorsal view, c — same, hysterosoma of female, dorsal view, d — *M. orthotomi*, hysterosoma of male, ventral view, e — same, opisthosoma of male, dorsal view, f — same, tarsus III of male, dorsal view, g — same, hysterosoma of female, dorsal view.

- Opisthosomal lobes slightly convergent, terminal cleft 1.5–2 times wider than lobes (Fig. 6 b)..... 2
- 2. Interlobar membrane not enlarged in posterior part, length of transventral sclerite along median line 65–70 (Fig. 6 a, b)..... *M. cisticolae*
- Interlobar membrane enlarged in posterior part, length of transventral sclerite about 50–55 (Fig. 6 d, e)..... *M. orthotomi*

- 2. Lateral opisthosomal shields as irregular plates, approximately equal in length and width (Fig. 6 c)..... *M. cisticolae*
- Lateral opisthosomal shields as oblique narrow plates (Fig. 5 a)..... *M. benoiti*

1. *Micropteroherpus benoiti*
(Faccini et Atyeo, 1981) comb. n.

Figs. 4, 5.

The female of this species was originally described as a female of *Pteroherpis aciaepiginius* (Gaud, 1964) collected from the siffling cisticola *Cisticola brachyptera* from Congo [Gaud, 1964].

Females

- 1. Central hysteronotal shield in form of ping-pong paddle (Fig. 6 g)..... *M. orthotomi*
- Central hysteronotal shield ovate, without posterior extension (Fig. 5 a)..... 2

Faccini and Atyeo [1981] based on the type material and additional collections from the type host recognized this fact and proposed a new name for this species.

Material. Male, female from *Cisticola brachyptera isabellina*, Buzi, Mozambique, 3 September 1961, F. Zumpt coll.

**2. *Micropteroherpus cisticolae*
(Mironov et Kopij, 2000) comb. n.**

Fig. 6 a–c.

As the previous species, *M. cisticolae* is associated with African warblers of the genus *Cisticola* [Mironov, Kopij, 2000]. Females of these species are quite similar (Figs. 5 a, 6 c), however the male in *M. cisticolae* resembles much more that of *M. orthotomi* (Fig. 6 a, d).

Material. Holotype male (NMB 00287), paratype 3 males, 2 females from the wing-snapped cisticola *Cisticola ayresii*, Smiley Valley Farm, Free State, South Africa, 13 May 1989, A. Berruti coll. Holotype, paratype — NMB, paratypes — ZISP.

**3. *Micropteroherpus orthotomi*
(Mironov, 1992) comb. n.**

Fig. 6 d–g.

This species is known from the long-tailed tailorbirds *Orthotomus sutorius* from Vietnam [Mironov, 1992].

Material. Holotype male (ZISP 4138), paratype 3 males, 6 females from *O. sutorius*, Hanoi, Vietnam, 2 August 1989, S.V. Mironov coll. Holotype, paratypes — ZISP.

***Vanginyssus* Mironov gen.n.**

Type species: *Pteronyssus schizurus* Gaud, 1952 by original designation.

Both sexes. Epimerites I fused V-like. Seta *vi* present. Prodorsal shield not encompassing setae *c1*, not fused with scapular shields. Setae *c2* short, hair-like. Setae *c3* lanceolate, short. Setae *dp2* of palp bifid. Setae *ba* of tarsus I hair-like. Ventral membrane of tarsus I long, about 3/4 of segment length. Solenidion $\sigma 1$ longer than $\omega 1$ on legs I. All surface of coxal fields I, II striated.

Male. Opisthosomal lobes large, tongue-like or short and bluntly rounded. Terminal cleft well-developed, variable in form, semioval or triangular. Medial and terminal margins of lobes with entire membrane. Supranal concavity narrow and long, usually extending to level of openings *gl* and setae *e1* (Fig. 7a). Setae *c2* on medial margins of humeral shields. Setae *ps1* anterior to setae *h3*.

Hysteronotal shield without internal sclerotized ridges. Coxal fields III closed. Transventral sclerite present, U-shaped with divergent branches, fused with epiandrium. Tips of epiandrium short, not encompassing genital apparatus. Anal discs circular, small. Adanal shield represented by sclerite of irregular form, situated anterior to anal slit (Figs. 7 b, 8 c). Adanal membranes present. Tarsus III short, with short claw-like apical process. Setae *r* shorter or equal to length of tarsus III (Fig. 8 d).

Female. Idiosoma moderately elongate. Set of hysteronotal shields: central hysteronotal shield rectangular in form; a pair of lateral opisthosomal shields triangular or ovate in form; a pair of little pygidial shields around bases of macrochaetae *h2*, *h3* (Fig. 8 a). Hysteronotal gland openings *gl* on striated tegument. Epigynium almost rectangular, with small acute lateral processes (Fig. 8 b).

Differential diagnosis. The genus *Vanginyssus* is closely related to the *Pteroberpus* and differs by having characters as follows: in both sexes, the epimerites I are fused V-likely; in males, the transventral sclerite is U-shaped with divergent branches, the supranal concavity extending to level of openings *gl* and setae *e1*, tarsus III with claw-like apex; in females, the openings *gl* situated on striated tegument. In both sexes of the genus *Pteroberpus*, the epimerites I are fused Y-likely; in males, the transventral sclerite is Y-shaped, supranal concavity not extending to level of setae *e1*, tarsus III with bidentate apex (*hoploporus* group) or with straight apical spine (*Pteroberpus dentilobus* Mironov, 1992); in females, the openings *gl* are situated on sclerotized areas, commonly on the opisthosomal shields.

The genus includes one described species from the vanga shrikes of the genus *Leptopterus* (Vangidae).

1. *Vanginyssus schizurus* (Gaud, 1952) comb. n.

Figs. 7, 8.

This species is known from the chabert vanga *Leptopterus chabert* from Madagascar [Gaud, 1952; Faccini, Atyeo, 1981].

Material. 2 males, 2 females from *Leptopterus ch. chabert*, Monombo, SE Madagascar, 3 October 1929, A.L. Rand and R. Archbold coll.

***Timalinyssus* Mironov gen.n.**

Type species: *Timalinyssus formosanus* sp.n.

Both sexes. Epimerites I free. Seta *vi* present. Prodorsal shield not encompassing setae *c1*, usually fused with scapular shields. Setae *c2* hair-like, short. Setae *c3* long, enlarged in basal part. Setae

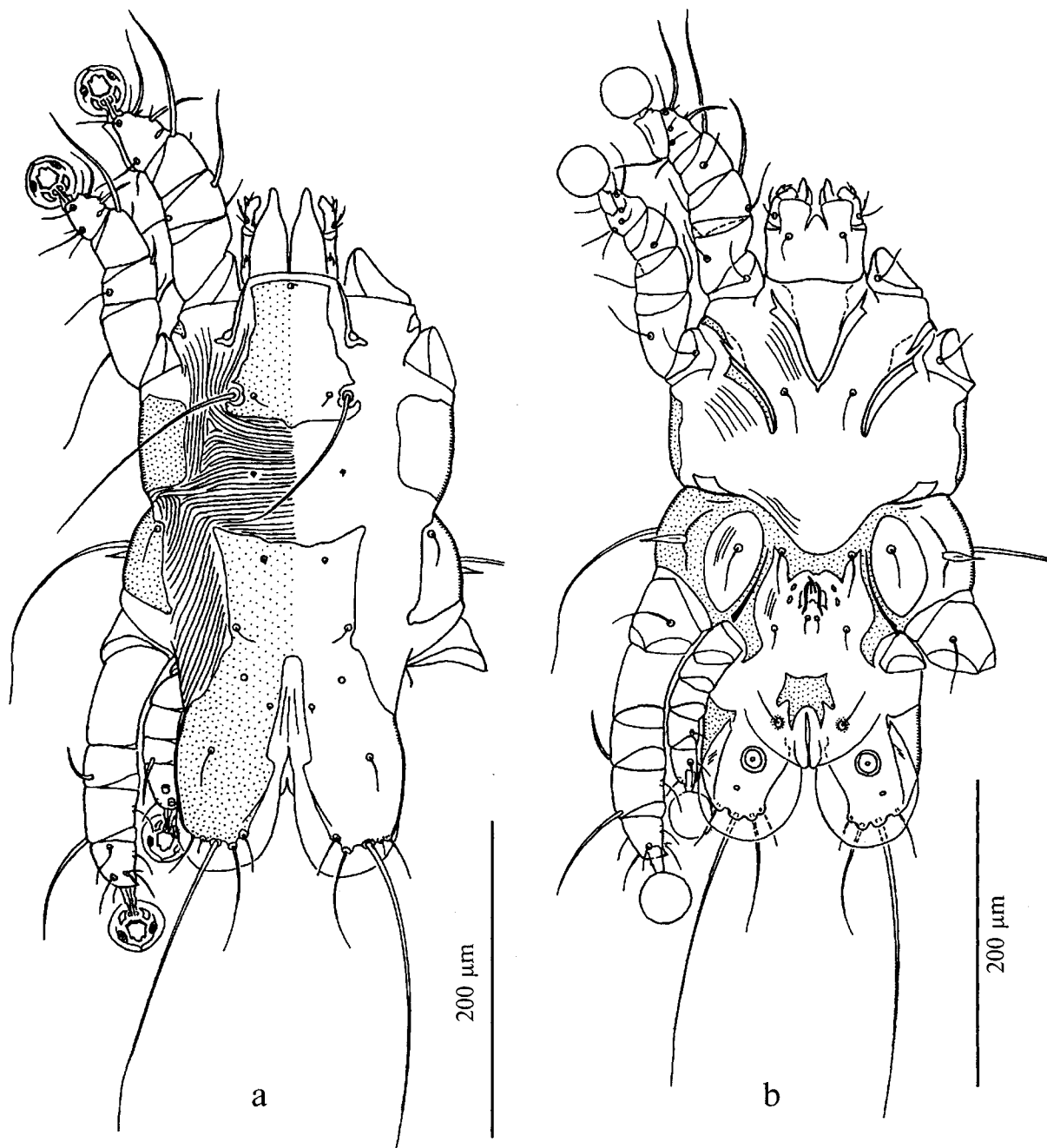


Fig. 7. *Vanginyssus schizurus*, male: a — dorsal view, b — ventral view.

dp2 of palps simple, setiform. Setae *ba* of tarsus I hair-like. Ventral membrane of tarsus I long, about 3/4 of segment length. Solenidium $\sigma 1$ longer than $\omega 1$ on legs I. All surface of coxal fields I, II striated.

Male. Opisthosomal lobes small, with acute medial angle. Terminal cleft small, rectangular or semiovate, membranes on lobar margins absent (Figs. 8 a, 9 c, d). Supranal concavity short, weakly marked. Setae *c2* on medial margins of humeral shields. Setae *ps1* anterior to setae *h3*. Hysteronotal shield without internal sclerotized ridges. Coxal fields III open. Transventral sclerite absent or represented by V-like sclerite, its posterior angle fused

with epiandrium. Length and form of epiandrium variable. It completely encompasses the genital apparatus (Fig. 9 b) or does not extend to its apex (Fig. 11 b). Anal discs ovate, large. Adanal shield as inverted Y, with posterior branches enclosing anal field and anal discs (Figs. 10 d, 12 c). Adanal membranes absent. Tarsus III elongated, with acute apical processus. Setae *r* of tarsus III very long, represented by macrochaetae (Figs. 10 e, 12 d).

Female. Opisthosoma moderately elongate, with a pair of tongue-like lobes, terminal cleft rectangular, longer than wider. Hysterosoma with entire hysteronotal shield spreading from level of

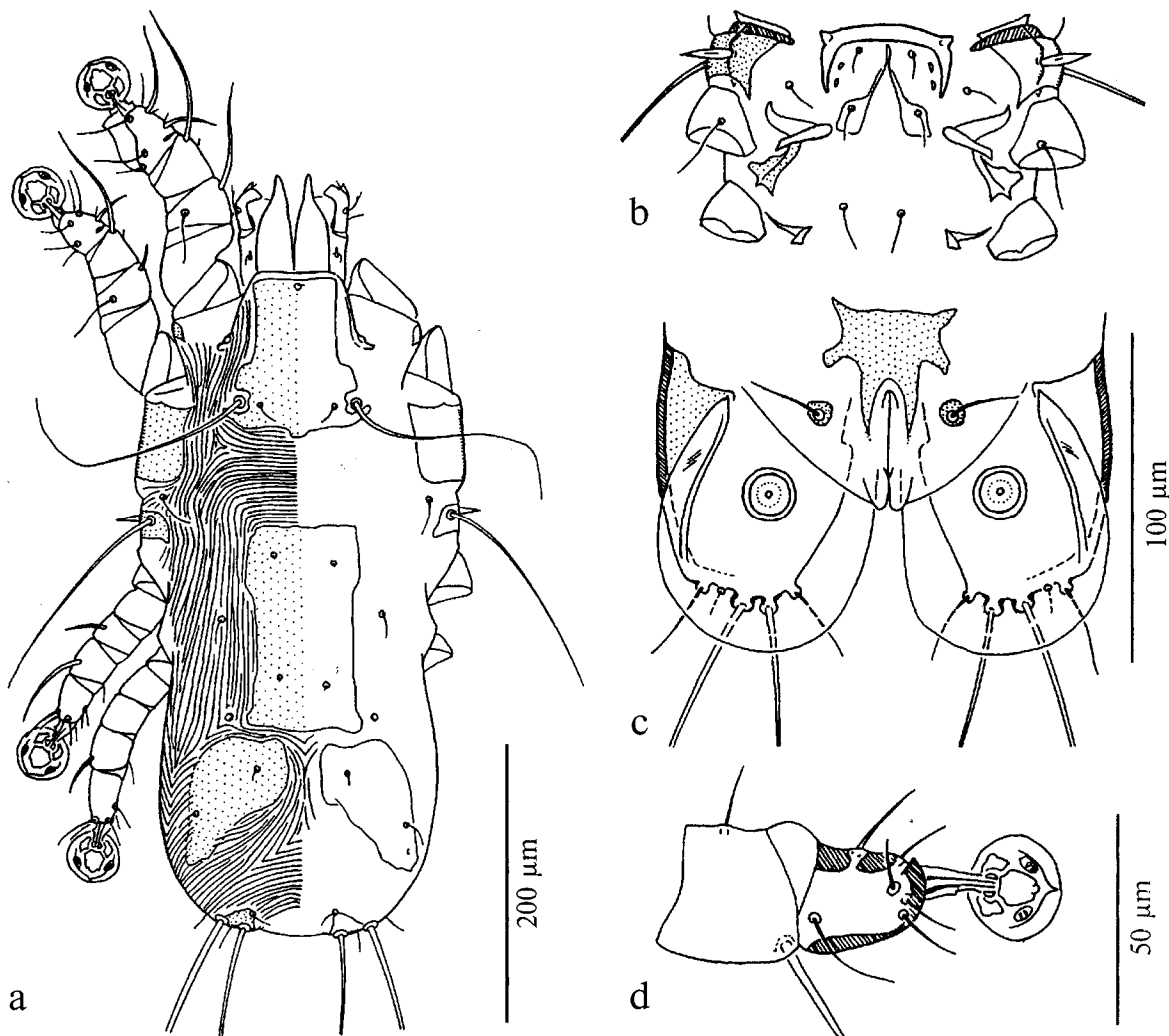


Fig. 8. *Vanginyssus schizurus*: a — female, dorsal view, b — egg opening and adjacent coxae, c — opisthosoma of male, ventral view, d — tarsus III of male, dorsal view.

humeral shields to opisthosomal lobes. Hysteronotal gland openings *gl* on striated tegument (Figs. 10 a, 12 a). Epigynium bow-like or semicircular (Fig. 10 b).

Differential diagnosis. The genus *Timalinyssus* is closely related to the genus *Mouchetia* Gaud, 1961 and differs from that genus by having the characters as follows. In both sexes, the prodorsal shield is fused with the scapular shields; in males, the tarsus III is cone-like with acute apex; in females, the opisthosomal lobes are long and separated by narrow terminal cleft. In the genus *Mouchetia*, the prodorsal shield is always separated from scapular shields, in males, the tarsus III with bidentate apex, in females, the opisthosomal lobes are short, semicircular and widely separated, thus the distance between them exceeds 2–3 times the width of lobes [Gaud, 1961; Mironov, 1990].

The genus includes 2 species associated with the babblers of the genera *Actinodura* and *Leiotrix* (Timaliidae).

KEY TO SPECIES OF TIMALINYSSUS

1. In male: transventral sclerite absent, epiandrium encompassing genital apparatus, setae *ps2* setiform, seta *d* of tarsus III represented by macrochaeta comparable in length with seta *r* (Figs. 9 b, 10 c–e). In female: terminal cleft 40–45 in width, anterior part of hysteronotal shield without lateral extensions (Fig. 10 a) *T. formosanus* sp.n.
- In male: transventral sclerite V-shaped, epiandrium not encompassing genital apparatus, seta *ps2* narrow lanceolate, seta *d* of tarsus III hair-like, shorter than segment (Figs. 11 b, 12 b–d). In female: terminal cleft 14–20 in width, anterior part of hysteronotal shield with rounded lateral extensions (Fig. 12 a) *T. oliferae*

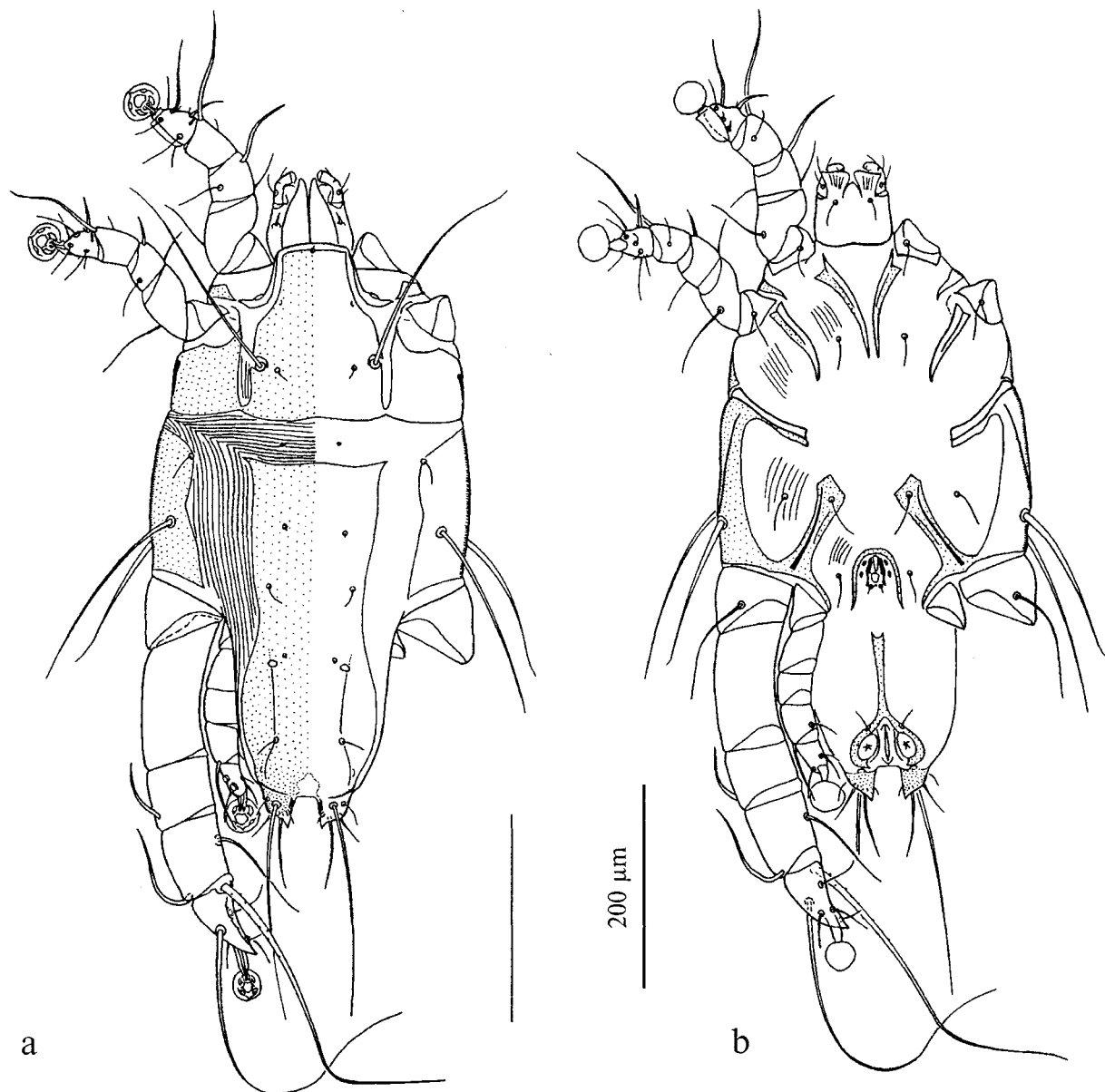


Fig. 9. *Timalinyssus formosanus*, male: a — dorsal view, b — ventral view.

1. *Timalinyssus formosanus* Mironov sp.n.

Figs. 9, 10.

Male (holotype). Length of idiosoma 560, width of idiosoma 305, length of hysterosoma 389 (idiosomal size of 3 paratypes 538–578×285–330). Prodorsal shield: length 170, width 124, distance between bases of setae *se* 109, posterior margin almost straight, lateral margins with small incisions anterior to setae *se*, posterior angles of shield fused with scapular shields (Fig. 9a). Setae *c2* short, hair-like, about 20 in length, situated on medial margin of humeral shields. Setae *c3* slightly enlarged in basal part and hair-like in apical part, about 150 in length, 4 in width. Hysteronotal shield: length 345, width at anterior margin 121, anterior angles acute,

anterior margin slightly sinuous. Dorsal setae *e1* situated anterior to openings *gl*. Distance between prodorsal and hysteronotal shields along median line 51. Opisthosomal lobes small, with acute medial angle and rounded lateral angle. Terminal cleft almost rectangular, slightly divergent posterior, supranal concavity open; margins of cleft without membrane, length of cleft 27, distance between lobar apices (medial angles of lobes) 31 (in paratypes 24–28×27–37). Setae *h2* situated at base of lobes, setae *h3* on their terminal margin, setae *h2* 2.5 times longer than *h3*, setae *ps2* setiform. Distance between setae and openings: *d2:e2* 143, *d2:gl* 73, *e1:gl* 7, *h3:h3* 46. Transventral sclerite absent, epigynium as wide inverted U, 60×51 in size,

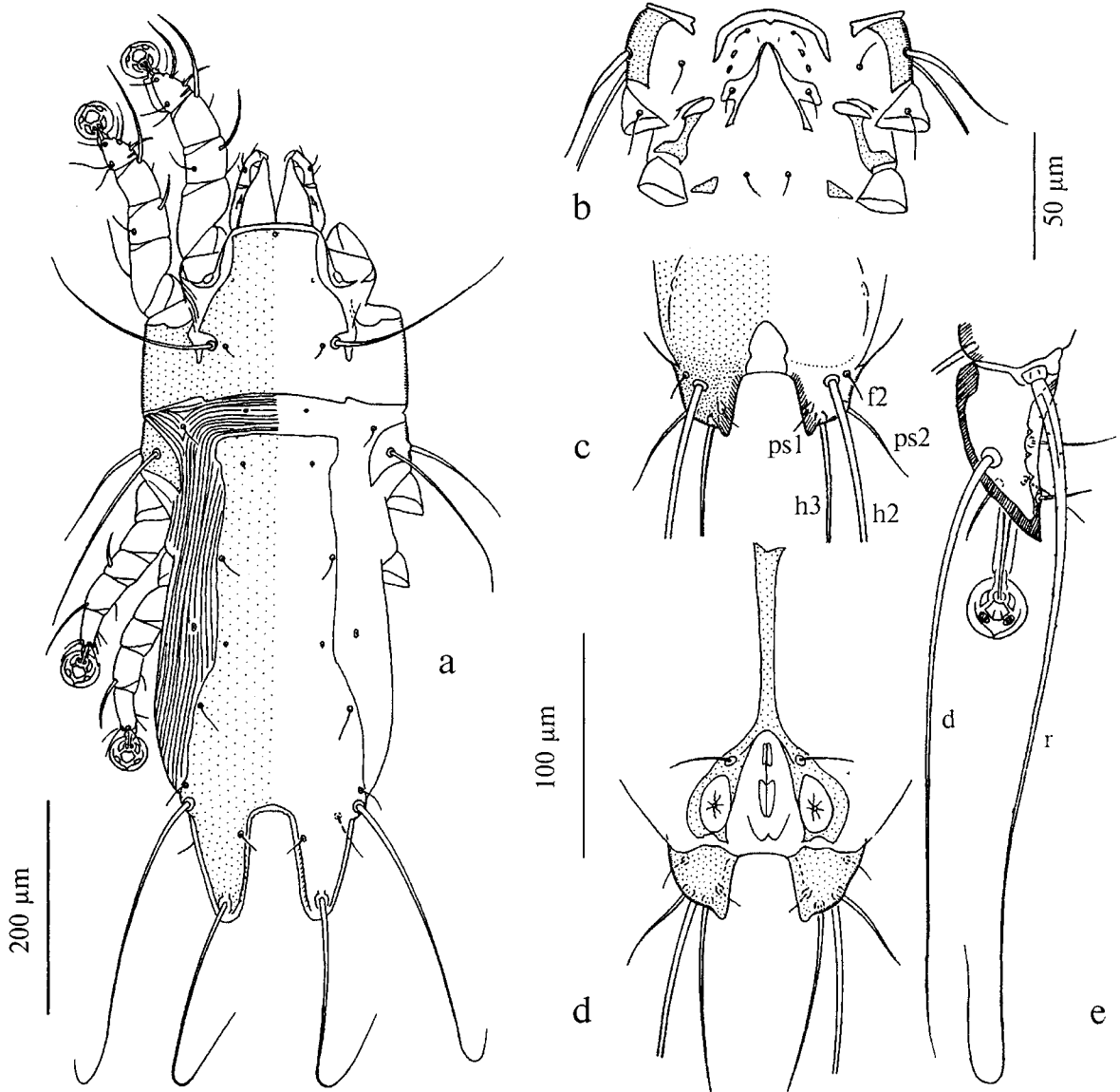


Fig. 10. *Timalinyssus formosanus*: a — female, dorsal view, b — egg opening and adjacent coxae, c — opisthosoma of male, dorsal view, d — opisthosoma of male, ventral view, e — tarsus III of male, dorsal view.

completely encompassing genital apparatus, tips of epigynum extend beyond the level of setae *g* (Fig. 9 b). Genital apparatus 24×15 . Setae *4a* at level of midlength of genital apparatus. Adanal shield as long inverted Y, 78 in length along median line (Fig. 10 d). Anal discs ovate, 24×15 . Tarsus III 97 in length, with dorsal row of 3–4 small teeth, macrochaeta *r* with little sparse teeth in basal part, setae *d* represented by macrochaeta about two thirds of macrochaeta *r*, other setae hair-like, shorter than segment (Fig. 10 e).

Female (paratype). Length of idiosoma 645, width of idiosoma 246, length of hysterosoma 468 (idiosomal size in 4 paratypes: $626\text{--}655 \times 245\text{--}270$). Prodorsal shield: lateral margins of shield posterior to level of setae *se* fused with scapular shields, free

lateral margins with little incision anterior to base setae *se*, posterior margin straight, length of shield 112, setae *se* separated by 116 (Fig. 11 a). Setae *c2* short, hair-like, about 15 in length, situated on striated tegument. Setae *c3* slightly enlarged in basal part, about 110 in length, 3.5 in width. Hysteronotal shield 221 in length, 109 in width. Setae *d1*, *d2*, *e1*, *e2*, *f2* situated on the shield. Terminal cleft with slightly divergent margins, 92 in length, 42 in width in anterior part ($87\text{--}95 \times 40\text{--}45$ in other paratypes). Distances between setae and openings: *d1*:*d2* 85, *d2*:*e2* 140, *d2*:*gl* 70, *gl*:*e1* 12, *h3*:*h3* 92. Epigynum bow-like, 39 in length, 95 in width 95, ($39\text{--}44 \times 95\text{--}107$ in other paratypes) (Fig. 10 b).

Differential diagnosis. The male of *Timalinyssus formosanus* is readily distinguishable from

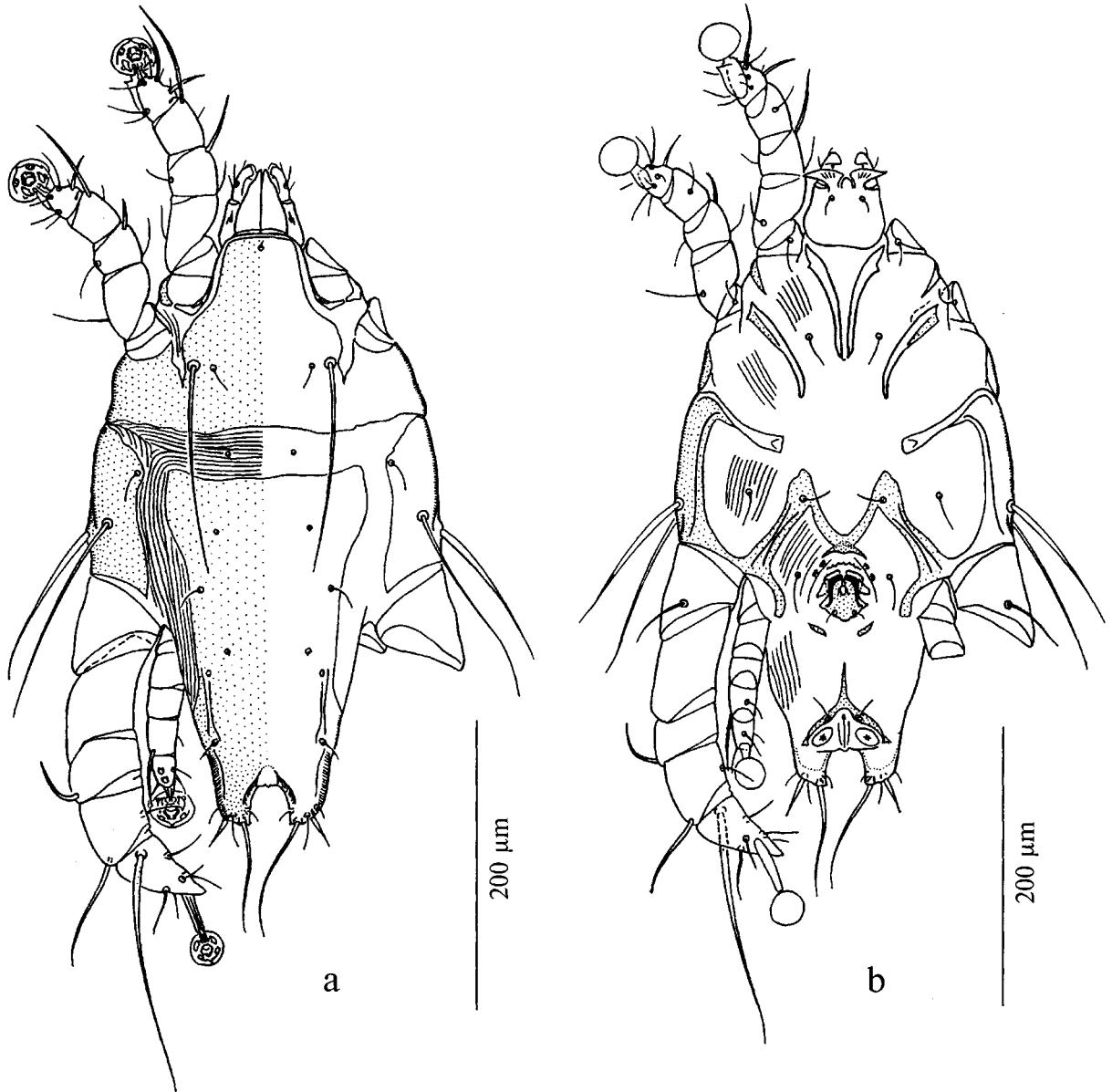


Fig. 11. *Timalinyssus oliferae*, male: a — dorsal view, b — ventral view.

that of the second species of the genus, *T. oliferae*, by having a number of characters as follows: the transventral sclerite absent, epandrium as inverted U encompassing genital apparatus, macrochaetae *h2* are significantly longer than *h3*, setae *ps2* setiform, the tarsus III with a dorsal ridge carrying 3–4 small teeth, setae *d* of this segment represented by macrochaetae (Fig. 9 b, 10 c–e). In males of *T. oliferae*, the transventral sclerite is V-shaped, epandrium short bow-like, not extending to apex of genital apparatus, setae *h2* hair-like, very short, setae *ps2* narrow lanceolate, tarsus III with one rounded dorsal tooth, setae *d* shorter than segment (Figs. 11 b, 12 b–d). Females of these species are rather similar by general appearance, but *T. formosanus* is significantly larger (length of idiosoma 625–655), terminal cleft about 40–45 in width, and

hysteronotal shield without extending anterior angles (Fig. 10 a). In females of *T. oliferae* the length of idiosoma varies within 520–580, terminal cleft 14–20 in width, and hysteronotal shield with extending rounded anterior angles (Fig. 12 a).

Material. Holotype male (NU 14157), paratype 2 males, 4 females from the formosans barwing *Actinodura morrisoniana*, Yuan Feng, Nanton, Taiwan, 27 April 1967, coll. unknown. Holotype, paratype — ZMUM, paratypes — ZISP.

2. *Timalinyssus oliferae* (Mironov, 1990) comb. n.

Figs. 12, 13.

This species was originally described from the silver-eared mesia *Leiotrix argentaurus* from Vietnam [Mironov, 1990].

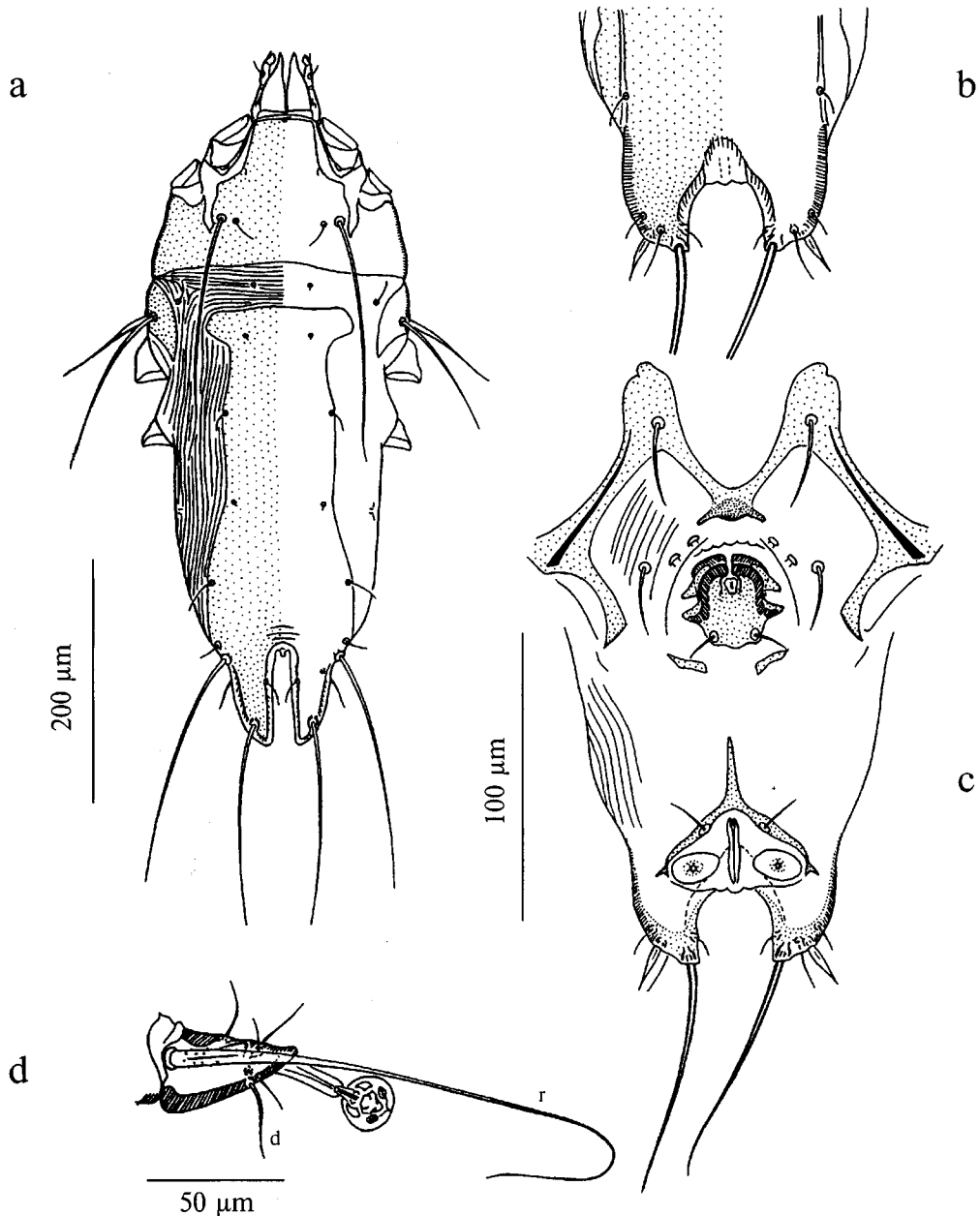


Fig. 12. *Timalinyssus oliferae*: a — female, dorsal view, b — opisthosoma of male, dorsal view, c — opisthosoma of male, ventral view, d — tarsus III of male, dorsal view.

Material. Holotype male (ZISP 3712), paratype 8 males, 9 females from *Leiotrix argentaurus*, Tam Dao, Vin Fu prov., Northern Vietman, 2.09.1989, S.V. Mironov coll. Holotype and paratypes — ZISP.

***Pteronyssoides* Hull, 1931**

Up to date, the genus *Pteronyssoides* included 13 species [Faccini, Atyeo, 1981; Mironov, 1989; Mironov, Kopij, 2000]. Mites of this genus were known from birds of various passerine families distributed mainly in the Old World (Dicruridae, Estrildidae, Fringillidae, Motacillidae, Nectariniidae, Paridae, Ploceidae, Pycnonotidae, Timalii-

dae). The majority of described species belongs to the nominal subgenus; and a group of four species associated with the Pycnonotidae and Timaliidae is arranged into the subgenus *Holonyssoides* [Mironov, 1993].

Species group *nectariniae*

Within the subgenus *Pteronyssoides* s.str., a new species described below and *Pteronyssoides* (*P.*) *garioui* Gaud et Mouchet, 1959 represent a distinct species group, which has the diagnostic characters as follows. In males, the setae *w*, *s* of tarsi III are lanceolate, rest of tarsal setae are setiform, adanal shield absent, adanal membranes present,

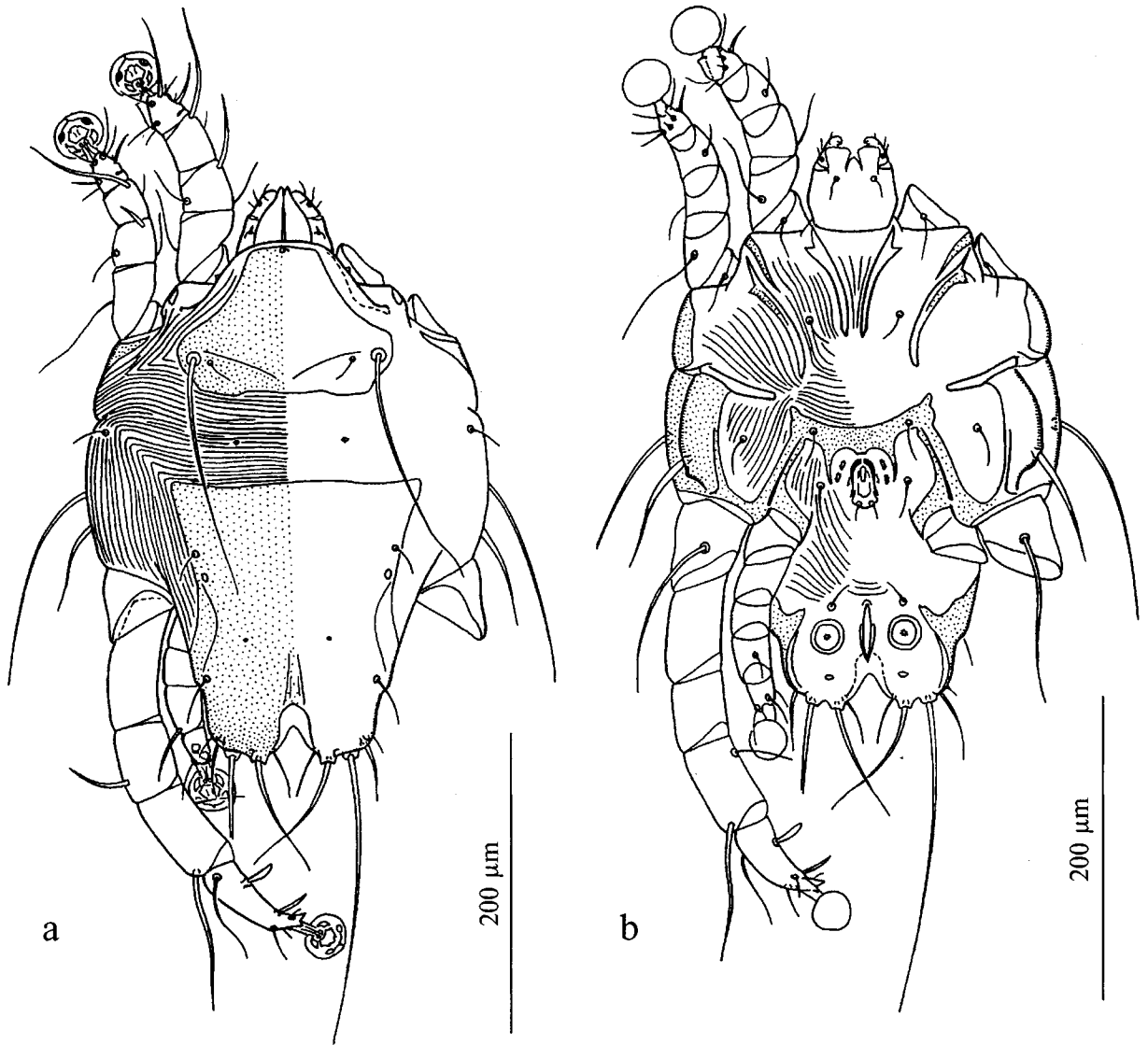


Fig. 13. *Pteronyssoides nectarinae*, male: a — dorsal view, b — ventral view.

lateral margin of opisthosomal lobes with obliterated ledge (Figs. 13 b, 14 c, d); in females, the posterior quarter of hysterosoma is covered with an entire shield or three separate fragments (pygidial shield and pair of opisthosomal shields). This species group is specific to the sunbirds Nectariniidae.

1. *Pteronyssoides (Pteronyssoides) nectarinae* Mironov, sp.n.

Figs. 13, 14.

Male (holotype). Length of idiosoma 340, width of idiosoma 251, length of hysterosoma 220 (idiosomal size of paratype male 340×246). Prodorsal shield: length 102, width 141, distance between bases of setae *se* 117, posterior margin slightly concave, lateral margins without incisions, area between scapular setae with very wide V-shaped furrow (Fig. 13 a). Setae *c2* short, hair-like, about 30 in length, situated on striated tegument. Setae *c3*

slightly enlarged in basal part and hair-like in apical part, 75–80 in length, 2.5 in width. Hysteronotal shield: length 182, width at anterior margin 160, anterior angles acute, anterior margin slightly concave. Dorsal setae *d1* absent, setae *e1* greatly reduced, situated posteriad to openings *gl*. Distance between prodorsal and hysteronotal shields along median line 58. Opisthosomal lobes short and wide, posterior margin rounded, with slightly extending bases of setae *h2*, *h3*. Terminal cleft small V-shaped; supranal concavity open posteriorly; margins of cleft with very narrow membrane, length of cleft including concavity 36, length of proper cleft 19. Distances between setae and openings: *d2:e2* 87, *d2:gl* 20, *h3:h3* 58. Transventral sclerite 12 in length along median line. Tips of epandrium partly encompassing genital apparatus, extending to its midlevel (Fig. 13 b). Genital apparatus 24 in length, 12 in width. Setae *4a* at midlevel of genital appara-

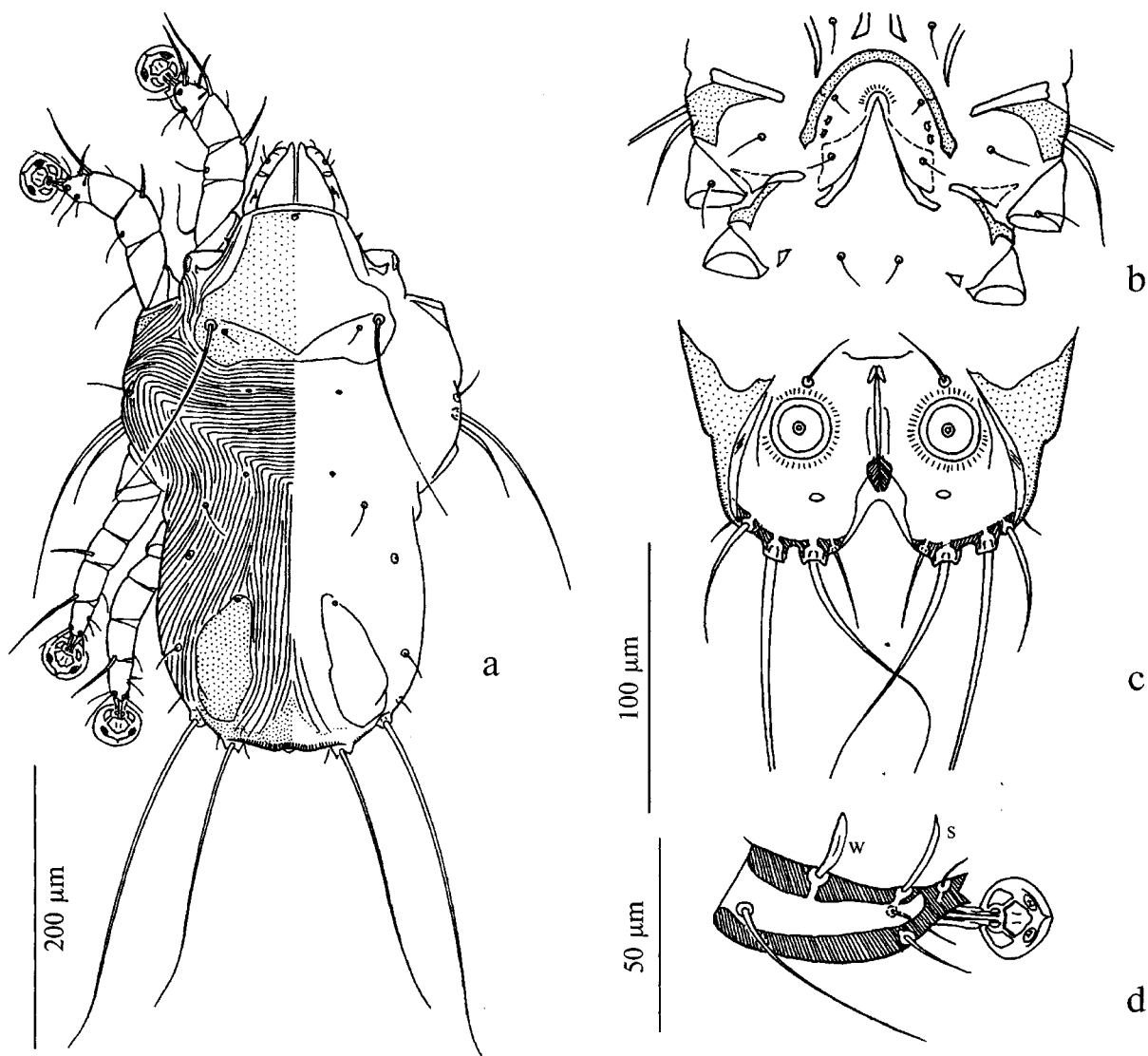


Fig. 14. *Pteronyssoides nectarinae*: a — female, dorsal view, b — egg opening and adjacent coxae, c — opisthosoma of male, ventral view, d — tarsus III of male, dorsal view.

tus. Adanal shield absent, opisthoventral shields present, adanal membranes narrow (Fig. 14 c). Diameter of anal discs 21. Tarsus III with two apical teeth, 66 in length, setae *w* lanceolate, setae *s* narrow lanceolate, setae *r* hair-like, shorter than segment (Fig. 14 d).

Female (paratype). Length of idiosoma 375, width of idiosoma 230, length of hysterosoma 256 (idiosomal size in 4 paratypes: 375–395×230–255). Prodorsal shield as in male, length 112, width 143, setae *se* separated by 116. Setae *c2* short, hair-like, about 25 in length, situated on striated tegument. Setae *c3* slightly enlarged in basal part, with hair-like apex, about 50 in length, 3.5 in width. Arrangement of hysteronotal shields: pair of lateral opisthosomal shields and single pygidial shield (Fig. 14 a). Opisthosomal shields longitudinal, ovate in form, about 70–80×35–40. Pygidial shield small, triangu-

lar, with unclear borders, not extending by anterior angle to level of setae *e2*. Setae *d1* present, setae *e1* situated on anterior ends of opisthosomal shields, setae *d1*, *d2*, *e2*, *f2* and openings *gl* on striated tegument. Distances between setae and openings: *d1*:*d2* 40, *d2*:*e2* 85, *d2*:*gl* 22, *gl*:*e1* 27, *h3*:*h3* 78. Epigynum bow-like, 66 in length, 95 in width (58–73×95–104 in other paratypes) (Fig. 14 b).

Differential diagnosis. Males of *Pteronyssoides* (*P.*) *nectarinae* and *P.* (*P.*) *garioui* described ex *Anthreptes fraseri camerounensis* from Cameroon [Gaud, Mouchet, 1959] are very similar and can be distinguished by the structure of transventral sclerite only. In *P.* (*P.*) *nectarinae*, the transventral sclerite is two times shorter than the width of epiandrium (Fig. 13 b). In *P.* (*P.*) *garioui*, the transventral sclerite fused with epiandrium forms an almost square plate. Females of these species

differ quite well. The females of a new species have a pair of lateral opisthosomal shields ovate in form and an unpaired pygidial shield (Fig. 14 a). In the females of *P. garioui*, the dorsal shields in the posterior part of hysterosoma are represented by an entire shield, anterior end of which includes the setae *e1*, and has a narrow incision between bases of these setae.

Material. Holotype male (NMB 00368), paratype 1 male and 5 females form the greater double-collared sunbird *Nectarinia afra*, Lydenburg, South Africa, 19.06.1989, D.H. de Stewart coll. Holotype, paratypes — NMB, paratypes — ZISP.

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