A review of picobiine mites (Acari: Syringophilidae: Picobiinae) parasitising African birds

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Abstract: A fauna of quill mites of the subfamily Picobiinae (Acari: Syringophilidae) associated with African birds is revised. Two new monotypic genera are proposed, *Gunabopicobia* gen. n. for *Picobia zumpti* Lawrence, 1959 and *Lawrencipicobia* gen. n. for *Picobia poicephali* Skoracki et Dabert, 2002. These new genera differ from other genera of the subfamily by the following features: in females of *Gunabopicobia*, propodonal setae *vi* are situated anterior to the level of setae *ve*; the narrow lateral propodonal shields bear bases of setae *vi*, *ve*, *si* and *se*; the bases of setae *1a–1a* are coalesced; the genital setae and the opisthosomal lobes are absent; the leg I with full set of solenidia and apodemes I are devoid of the thorn-like protuberances in the middle part. In females of *Lawrencipicobia*, the bases of setae *1a–1a* are not coalesced; the propodonal shield is entire; the genital setae are present; legs I are with full set of solenidia. Additionally, two new species belonging to *Picobia* Haller, 1878 are described, *Picobia illadopsae* sp. n. parasitising *Illadopsis rufipennis* (Sharpe) (Passeriformes: Pellorneidae) in Kenya and *Picobia phoenicuri* sp. n. infecting *Phoenicurus moussieri* (Olphe-Galliard) in Tunisia. The following species are redescribed, *Columbiphilus alectoris* (Fain, Bochkov et Mironov, 2000), *Lawrencipicobia poicephali* (Skoracki et Dabert, 2001) comb. n. and *Picobia phoeniculi* (Fain, Bochkov et Mironov, 2000). The key to the genera of the Picobiinae is provided.

Keywords: ectoparasites, taxonomy, quill mites, *Lawrencipicobia*, *Gunabopicobia*

Mites of the subfamily Picobiinae Johnston et Kethley, 1973, like other syringophilids (Acariformes: Syringophilidae) are permanent and highly specialized ectoparasites of birds inhabiting the feather quills, where they live and reproduce. These mites are mono- or oligoxenous parasites associated with birds of different orders throughout the world. At present, this subfamily includes 6 genera and 47 species, *Calamincola* Casto, 1977 (one species), *Columbiphilus* Kivganov et Sharafat, 1995 (4), *Neopicobia* Skoracki, 2011 (10), *Picobia* Haller, 1878 (26, including 3 species as *incertae sedis*); *Pseudopicobia* Skoracki, Scibek et Sikora, 2012 (3), and *Rafapicobia* Skoracki, 2011 (3) (see Table 1).

The picobiine mites parasitising African birds are still insufficiently explored. Nowadays, only 12 species belonging to 4 genera are known from African avian hosts (Table 2). Most of them (9 species) represent monoxenic parasites, whereas only two, *Neopicobia zumpti* (Lawrence, 1958) and *Picobia oritis* Skoracki, Antczak et Riepert, 2009 have been recorded from closely related hosts (from one genus), and only one, *Picobia phoeniculi* Fain, Bochkov et Mironov, 2000, from hosts

belonging to two families of the same avian order (Table 2).

In this paper, we review all data on picobiines parasitising African birds and two new genera are proposed. Additionally, two new species belonging to the genus *Picobia* Haller, 1878 are described from *Illadopsis rufipennis* (Sharpe) (Passeriformes: Pellorneidae) in Kenya and *Phoenicurus moussieri* (Olphe-Galliard) in Tunisia, and three species are redescribed. The key to the genera of the Picobiinae is also provided.

MATERIALS AND METHODS

Specimens from the type-series of all available species have been examined. They were loaned from collections deposited in different museums and institutions (listed below). Material was examined under an Olympus BH-2 light microscope with differential interference contrast (DIC) optics. Drawings were made with the aid of a drawing attachment. All measurements are given in micrometres. Measurements (ranges) of paratypes are given in brackets following data on holotype. In the descriptions below, the idiosomal setation follows Grandjean (1939) as adapted for Prostigmata by Kethley (1990). The nomenclature of leg chaetotaxy follows that proposed by Grandjean (1944).

Table 1. Quill mite genera of the subfamily Picobiinae Johnston et Kethley, 1973 and their host associations.

Mite genus	No. of species	Host order	Host families	Distribution	Main references
<i>Calamincola</i> Casto, 1977	1	Cuculiformes	Cuculidae	North America	Casto 1977
<i>Columbiphilus</i> Kivganov et Sharafat, 1995	2	Galliformes	Phasianidae	Africa, Asia, Europe	Fain et al. 2000, Skoracki 2011, Skoracki and Sikora 2011, Skoracki et al. 2001
<i>Gunabopicobia</i> gen. n.	1	Columbiformes	Columbidae	Asia	Kivganov and Sharafat 1995, Skoracki 2011
	1	Pteroclidiformes	Pteroclididae	Africa	Skoracki and O'Connor 2010
	1	Columbiformes	Columbidae	Africa, North America	Lawrence 1959, Bochkov et al. 2005, present paper
	1	Columbiformes	Columbidae	Africa	Skoracki and Dabert 2002, present paper
<i>Lawrencipicobia</i> gen. n.	1	Psittaciformes	Psittacidae	Africa	Skoracki and Magowski 2001, Skoracki and Glowska 2008, Skoracki et al. 2008, 2010, Skoracki 2011
<i>Neopicobia</i> Skoracki, 2011	9	Passeriformes	Acanthizidae, Cardinallidae, Fringillidae, Locustellidae, Meliphagidae, Motacillidae, Prunellidae, Troglodytidae	Europe, North America, Australia, Asia	Skoracki et al. 2008
<i>Picobia</i> Haller, 1878	1	Psittaciformes	Psittacidae	Australia	Skoracki et al. 2008
	22	Passeriformes	Acrocephalidae, Aegithalidae, Alaudidae, Cettidae, Corcoracidae, Corviidae, Fringillidae, Hirundinidae, Leiothrichidae, Muscicapidae, Nectarinidae, Panuridae, Paradisaecidae, Pellorneidae, Ploceidae, Pycnonotidae, Sturnidae, Sylviidae, Troglodytidae	Europe, Asia, Australia, Africa	Bochkov et al. 2000, Skoracki and Kiljan 2002, Skoracki and Hebda 2004, Skoracki et al. 2004, 2008, 2009, Glowska et al. 2007, 2012, Skoracki and Glowska 2008, Glowska and Skoracki 2011, Skoracki 2011, Sikora et al. 2012, present paper
	1*	Psittaciformes	Psittacidae	South America	Fain et al. 2000
	1*	Charadriiformes	Laridae	North America	Skoracki et al. 2010
	2	Piciformes	Picidae	Europe, North America	Skoracki et al. 2010, Skoracki 2011
	1	Coraciiformes	Phoeniculidae, Upupidae	Africa	Fain et al. 2000, present paper
<i>Pseudopicobia</i> Skoracki, Scibek et Sikora, 2012	3	Piciformes	Bucconidae	South America	Skoracki et al. 2012a
<i>Rafapicobia</i> Skoracki, 2011	3	Passeriformes	Funariidae, Mimidae, Muscicapidae	Europe, North America, South America	Sikora et al. 2011, Skoracki 2011, Skoracki and Solarczyk 2012

* *incertae sedis* species.

The morphological terminology follows Skoracki (2011). The scientific names of the birds follow Clements et al. (2012). Specimen depositories and reference numbers are cited using the following abbreviations: AMU – Adam Mickiewicz University, Department of Animal Morphology, Poznan, Poland; IP-CAS – Institute of Parasitology, Biology Centre of the Academy of Sciences of the Czech Republic, České Budějovice, Czech Republic; NMSA – Natal Museum, Pietermaritzburg, South Africa; RBINS – Royal Belgian Institute of Natural Science, Brussels, Belgium; RMCA – Royal Museum for Central Africa, Tervuren, Belgium; UMICH – Museum of Zoology, University of Michigan, USA; ZISP – Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia; ZSM – Bavarian State Collection of Zoology, Munich, Germany.

RESULTS

Family **Syringophilidae** Lavoipierre, 1953

Subfamily **Picobiinae** Johnston et Kethley, 1973

Genus ***Columbiphilus*** Kivganov et Sharafat, 1995

Columbiphilus – Kivganov and Sharafat 1995: 82; Skoracki 2011: 373. *Picobia* – Bochkov and Mironov 1998: 15.

Type species: *Columbiphilus khushalkhani* Kivganov et Sharafat, 1995 by original designation.

Diagnosis

Female. *Gnathosoma*. Hypostomal apex rounded or truncate. Peritremes with clearly visible chambers in lateral and medial branches. Movable cheliceral digits edentate on distal tip. *Idiosoma*. Propodonal setae smooth or beaded. Propodonal setae arranged 2–2–2 or 2–1–1–2, setae *vi* situated anterior to level of setae *ve*. Propodonal shield divided into two lateral shields bearing bases of setae *vi*, *ve*, *si* and *se*, unpaired medial shield present or absent. Hysteronotal and pygidial shields absent. Alveoles of setae *1a–1a* coalesced. Pseudanal setal series represented by two pairs. Genital setal series with one pair. Aggenital series with three pairs of setae. Aggenital and genital plates absent. Genital and opisthosomal lobes absent. *Legs*. Apodemes of legs I divergent without thorn-like protuberances in middle part. Legs with full set of solenidia. Physogastric female campanulliform in outline.

Male. Features as in females except: propodonal shield not divided, long-sleeved shirt-like; hysteronotal and pygidial shields present; each of genital and aggeni-

Table 2. Mites of the subfamily Picobiinae Johnston et Kethley, 1973 parasitising African birds.

Mite species	Host species	Host family	Host order	Distribution	References
<i>Columbiphilus</i> Kivganov et Sharafat, 1995					
<i>C. alectoris</i> (Fain, Bochkov et Mironov, 2000)	<i>Alectoris</i> sp.	Phasianidae	Galliformes	Rwanda	Fain et al. 2000, Skoracki 2011, present paper
<i>C. pteroclesi</i> (Skoracki et O'Connor, 2010)	<i>Pterocles senegallus</i> (Linnaeus)	Pteroclididae	Pteroclidiformes	Egypt	Skoracki and O'Connor 2010, Skoracki 2011
	<i>Pterocles coronatus</i> Lichtenstein	Pteroclididae	Pteroclidiformes	Egypt	Skoracki and O'Connor 2010, Skoracki 2011
<i>Gunabopicobia</i> gen. n.					
<i>G. zumpti</i> (Lawrence, 1958) comb. n.	<i>Streptopelia capicola</i> (Sundevall)	Columbidae	Columbiformes	South Africa	Lawrence 1959, Kethley 1970
	<i>Streptopelia senegalensis</i> (Linnaeus)	Columbidae	Columbiformes	South Africa	Skoracki and Dabert 2002, present paper
<i>Lawrencipicobia</i> gen. n.					
<i>L. poicephali</i> (Skoracki et Dabert, 2002) comb. n.	<i>Poicephalus senegalus versteri</i> Finsch	Psittacidae	Psittaciformes	Cameroon	Skoracki and Dabert 2002, present paper
<i>Picobia</i> Haller, 1878					
<i>P. cichladusa</i> Skoracki, Solarczyk et Sikora, 2012	<i>Cichladusa arquata</i> Peters	Muscicapidae	Passeriformes	Tanzania	Skoracki et al. 2012b
<i>P. dinemellia</i> Glowska et Skoracki, 2011	<i>Dinemellia dinemelli</i> (Ruppell)	Ploceidae	Passeriformes	Tanzania	Glowska and Skoracki 2011
<i>P. echo</i> Skoracki, Solarczyk et Sikora, 2012	<i>Cossypha heuglini</i> Hartlaub	Muscicapidae	Passeriformes	D.R. Congo	Skoracki et al. 2012b
<i>P. illadopsae</i> sp. n.	<i>Illadopsis rufipennis</i> (Sharpe)	Pellorneidae	Passeriformes	Kenya	present paper
<i>P. myrmecocichla</i> Skoracki, Solarczyk et Sikora, 2012	<i>Myrmecocichla arnotti</i> (Tristram)	Muscicapidae	Passeriformes	Tanzania	Skoracki et al. 2012b
<i>P. oritis</i> Skoracki, Antczak et Riepert, 2009	<i>Cyanomitra oritis</i> (Reichenov)	Nectariniidae	Passeriformes	Cameroon	Skoracki et al. 2009
	<i>Cyanomitra olivacea</i> (Smith)	Nectariniidae	Passeriformes	Kenya	Skoracki et al. 2011
<i>P. phoeniculi</i> Fain, Bochkov et Mironov, 2000	<i>Phoeniculus purpureus</i> (Miller)	Phoeniculidae	Coraciiformes	Rwanda	Fain et al. 2000, present paper
	<i>Upupa epops africana</i> Bechstein	Upupidae	Coraciiformes	Tanzania	present paper
<i>P. phoenicuri</i> sp. n.	<i>Phoenicurus moussieri</i> (Olphe-Galliard)	Muscicapidae	Passeriformes	Tunisia	present paper

tal setal series represented by two pairs; aggenital plate present; apodemes I parallel.

Habitat, host range and distribution. Members of this genus occupy quills of body feathers of birds from three orders, Columbiformes (Columbidae), Galliformes (Phasianidae) and Pteroclidiformes (Pteroclididae), and they were recorded from the Palaearctic and Ethiopian regions (Skoracki 2011). In Africa, picobiines of this genus are associated with galliform and pteroclidiform birds.

Species included. Among four described species in this genus, the African fauna comprises two of them, *C. alectoris* and *C. pteroclesi*.

Columbiphilus alectoris (Fain, Bochkov et Mironov, 2000)

Figs. 1, 2

Picobia alectoris – Fain et al. 2000: 65, figs. 103–109; Skoracki et al. 2004: 164. *Columbiphilus alectoris* – Skoracki 2011: 374.

Picobia alectoris was described by Fain et al. (2000) based on female found on unidentified chukar species, *Alectoris* Kaup in Rwanda. Recently, Skoracki (2011) has moved this species to *Columbiphilus*. Below we give a redescription of this species based on the type material housed in the RBINS.

Redescription

Female (holotype). Total body length 915. *Gnathosoma*. Hypostomal apex truncate. Infracapitulum apunctate. Each medial branch with seven chambers, each lateral branch with ten chambers, borders between these chambers clearly visible. Stylophore 290 long. *Idiosoma*. Propodonal shield divided into two lateral shields, punctate near bases of setae *ve* and *si*, and large apunctate medial shield. Propodonal setae *vi*, *ve* and *si* lightly beaded. Length ratio of setae *vi* : *ve* : *si* – 1 : 1.3 : 1.7. Setae *c1* and *se* located at same transverse level. Setae *d1* situated equidistant to setae *d2* and *e2*. Setae *f1* 7.4 times longer than *f2*. Setae *h2* 18 times longer than *h1*. Aggenital setae *ag1* situated anterior to level of setae *ag2*, bases of both pair of setae situated in longitudinal row. Length ratio of setae *ag1* : *ag2* : *ag3* – 1 : 1 : 1.3. Setae *ps2* slightly (1.2 times) longer than setae *ps1* and *g1*. Setae *g1* hair-like. *Legs*. Antaxial and paraxial members of claw pair of legs III and IV unequal in size and shape. Setae *tc'''III–IV* slightly (1.3 times) longer than *tc'''III–IV*. Setae *3c* about 4.6 times longer than *3b*. Setae *4c* 6 times longer than *4b*. Coxal fields I–IV well developed, apunctate. *Lengths of setae*: *vi* 110, *ve* 140, *si* 185, *se* 330, *c1* 390, *c2* 315, *d1* 345, *d2* 330, *e2* 285, *f1* 445, *f2* 60, *h1* 20, *h2* 360, *ps1* 40, *ps2* 50, *g1* 40,

Fig. 1. *Columbiphilus alectoris* (Fain, Bochkov et Mironov, 2000), female from *Alectoris* sp. **A** – dorsal view; **B** – ventral view.

ag1 140, *ag2* 140, *ag3* 180, *l'RIII* and *l'RIV* 35, *tc'III–IV* 55, *tc''III–IV* 70, *3b* 35, *3c* 160, *4c* 215.

Male. Unknown.

Type material examined: Female holotype from *Alectoris* sp. (Galliformes: Phasianidae); Rwanda, October 1955, coll. A. Fain. Type material is deposited in the RBINS (Reg. No. RBINS 187373).

***Columbiphilus pteroclesi* (Skoracki et O'Connor, 2010)**

Picobia pteroclesi – Skoracki and O'Connor 2010: 27, figs. 78–88. *Columbiphilus pteroclesi* – Skoracki 2011: 379.

This species was originally described in the genus *Picobia* based on material found on two sandgrouse species

in Egypt, *Pterocles senegallus* (Linnaeus) and *P. coronatus* Lichtenstein (Pteroclidiformes, Pteroclididae). Later on, Skoracki (2011) moved this species to the genus *Columbiphilus*.

Diagnosis

Female. Hypostomal apex rounded, with shoulders, flanked by pair of small hypostomal teeth. Each medial branch of peritremes with 6–7 chambers, each lateral branch with 10–11 chambers. Propodonal shield divided into two lateral and unpaired medial shields. Length ratios of setae *vi* : *ve* : *si* – 1 : 1.6–1.8 : 1.9–2.2; *f1* : *f2* – 1 : 1.6; *ag1* : *ag2* : *ag3* – 2 : 1 : 2. Setae *vi*, *ve* and *si* smooth.

Fig. 2. *Columbiphilus alectoris* (Fain, Bochkov et Mironov, 2000), female from *Alectoris* sp. **A** – hypostomal apex; **B** – peritreme; **C** – propodonal seta *ve*; **D** – vulva; **E** – tarsus III in ventrolateral view; **F** – solenidia of leg I.

Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape. Physogastric form unknown.

Male. Hypostomal apex rounded, with shoulders, without hypostomal teeth. Each medial branch of peritremes with 6–7 chambers, each lateral branch with 10–11 chambers. Propodonal shield divided into two lateral and unpaired medial shields. Length ratios of setae *vi* : *ve* : *si* – 1 : 1.7–2 : 2–2.2; *e2* : *d1* : *d2* – 1 : 2.8–3 : 2.2–2.9; *f2* : *h2* 1 : 7–8; *ag1* : *ag2* 1.2 : 1. Hysteronotal shield entire. Aggenital plate entire, concave on posterior margin.

Type material examined: Female holotype and ten female and three male paratypes from spotted sandgrouse *Pterocles senegallus* (Pteroclidiformes: Pteroclididae); Egypt, Red Sea Governate, Wadi el Metuli, 45 km. E, 31 January 1983, coll. H. Touharny and S.M. Goodman. Type material is deposited in the UMich (BMOC 83–0307–33), AMU (Reg. No. AMU–SYR.424) and ZISP (Reg. No. ZISP–AVB 011–2908–049).

Additional material examined: 24 females, one male, and two tritonymphs from crowned sandgrouse *Pterocles coronatus* (Pteroclididae); Egypt, Red Sea Governate, Bir Beida, 6.5 km. West Quseir, 4 February 1983, coll. S.M. Goodman and I. Helmy. Mite material is deposited in the UMich (BMOC 83–0307–43), AMU (Reg. No. AMU–SYR.425) and ZISP (Reg. No. ZISP–AVB011–2908–050).

Genus *Gunabopicobia* gen. n.

Type and only species: *Picobia zumpti* Lawrence, 1959

Diagnosis

Female. *Gnathosoma*. Hypostomal apex ornamented by pair of shoulders. Peritremes M-shaped with clearly visible chambers in lateral and medial branches. Mov-

able cheliceral digits edentate on distal tip. Stylophore rounded posteriorly. *Idiosoma*. Dorsal propodonal setae smooth. Six pairs of propodonal setae present, arranged 2–1–1–2, setae *vi* situated anterior to level of setae *ve*. Propodonal shield divided into two narrow shields bearing bases of setae *vi*, *ve*, *si* and *se*, and large medial shield. Hysteronotal and pygidial shields absent. Setae *d1* situated slightly closer to *e2* than to *d2*. Alveoles of setae *1a–1a* coalesced. Pseudanal setal series represented by two pairs. Genital setae absent. Aggenital series with three pairs of setae. Aggenital and genital plates absent. Genital and opisthosomal lobes absent. *Legs*. Apodemes I slightly divergent without thorn-like protuberances in middle part. Legs with full complement of solenidia. Physogastric form unknown.

Male. Features as in females except: hypostomal apex truncate; hysteronotal shield not fused to pygidial shield; genital and aggenital series represented by two pairs of setae, each; aggenital plate present.

Etymology. The generic epithet ‘*Gunabopicobia*’ derives from the African god, Gunab, the creator of a rainbow.

Differential diagnosis. *Gunabopicobia* gen. n. is morphologically similar to *Picobia* Haller, 1878. In females of both genera, each branch of peritremes has clearly visible chambers, the movable cheliceral digit is edentate on distal tip, the alveoles of setae *1a–1a* are coalesced and the legs I are with full complement of solenidia. The new genus differs from *Picobia* by the features as follows: in females of *Gunabopicobia*, propodonal setae *vi* are situated anterior to level of setae *ve*; narrow lateral propodonal shields bearing bases of setae *vi*, *ve*, *si* and *se*; genital setae are absent; and apodemes I are devoid of

Fig. 3. *Gunabopicobia zumpti* (Lawrence, 1959), female from *Streptopelia senegalensis*. **A** – dorsal view; **B** – hypostomal apex; **C** – anterior part of body in ventral view; **D** – opisthosoma in ventral view; **E** – solenidia of leg I; **F** – tarsus III; **G** – peritreme. Scale bars: A, C, D = 50 µm; B, E–G = 20 µm.

thorn-like protuberances in the middle part. In females of *Picobia*, propodonotal setae *vi* and *ve* are situated in the same transverse level; narrow lateral propodonotal shields bearing bases of setae *ve*, *si* and *se*; genital series represented by one pair of setae; and apodemes I are with thorn-like protuberances in the middle part.

Habitat, host range and distribution. Members of this genus occupy quills of body feathers of columbiform birds in the Ethiopian and Nearctic regions (Table 1).

Species included. Monotypic genus.

Gunabopicobia zumpti

(Lawrence, 1959) comb. n.

Fig. 3

Syringophilus zumpti – Lawrence 1959: 425, fig. 5. *Picobia zumpti*, Kethley 1970: 65, fig. 37; Skoracki and Dabert

2002: 144; Skoracki et al. 2004: 171; Bochkov et al. 2005: 122, figs. 1–3. *Neopicobia zumpti* – Skoracki 2011: 384.

This species was originally described based on a female collected on ring-necked dove *Streptopelia capicola* (Sundevall) in South Africa (Lawrence 1959). In 1970, Kethley re-examined its holotype deposited in the Natal Museum (South Africa) and placed this species into the genus *Picobia*. He also depicted the holotype but without any redescription. Later on, Skoracki and Dabert (2002) recorded this species based on female material from another dove species *Streptopelia senegalensis* (Linnaeus) in South Africa. In 2005, Bochkov et al. redescribed and figured this species based on female and male materials from rock pigeon *Columba livia* Gmelin in the United States (Bochkov et al. 2005).

Fig. 4. *Lawrencipicobia poicephali* (Skoracki et Dabert, 2002), female from *Poicephalus senegalus versteri*. **A** – dorsal view; **B** – ventral view.

Diagnosis

Female. Hypostomal apex truncate, with shoulders without hypostomal teeth. Each medial branch of peritremes with 2–3 chambers, each lateral branch with 10–11 chambers. Propodonotal shield divided into two lateral and unpaired medial shields. Length ratios of setae $vi : ve : si - 1 : 2.7 : 3.9$; $e2 : d1 : d2 - 1 : 2 : 4$; $f2 : h2 - 1 : 12.5$; $ag1 : ag2 : ag3 - 1 : 1 : 3$. Setae vi , ve and si lightly beaded or smooth. Antaxial and paraxial members of claw pair of legs III and IV unequal in size and shape.

Male. Hypostomal apex truncate, without hypostomal teeth. Each medial branch of peritremes with 2–3 chambers, each lateral branch with 10–11 chambers. Propodo-

notal shield divided into two lateral and unpaired medial shields. Length ratio of setae $vi : ve : si - 1 : 2.7 : 3.9$; $e2 : d1 : d2 - 1 : 2 : 4$; $f2 : h2 - 1 : 12.5$; $ag1 : ag2 - 1.2 : 1$. Hysteronotal shield entire. Aggenital plate entire.

Type material (not examined): Female holotype from ring-necked dove *Streptopelia capicola* (Columbiformes: Columbidae); South Africa, Cape Province, Colesberg. Holotype is deposited in the NMSA.

Additional material examined: Four females from laughing dove *Streptopelia senegalensis* (Columbiformes: Columbidae); South Africa, Brakkloof, October 1963, collector unknown. Mite material is deposited in the RMCA (Reg. No. RMCA 188.546).

Fig. 5. *Lawrencipicobia poicephali* (Skoracki et Dabert, 2002) from *Poicephalus senegalus versteri*. Female (A–D). **A** – apodemes I and II; **B** – opisthosoma in ventral view; **C** – solenidia of leg I; **D** – peritreme. Male (E) from the same host species. **E** – opisthosoma in dorsal view. Scale bars: A, B, E = 50 µm; C, D = 20 µm.

Comparative material: Two females and one male from rock pigeon *Columba livia* (Columbiformes: Columbidae); United States, Illinois, Ford Co., near Paxton, July 1999, coll. D. Clayton and B. Moyer. Mite material is deposited in the ZISP (Reg. No. ZISP-AVB011–2908–048).

Genus: *Lawrencipicobia* gen. n.

Type species: *Picobia poicephali* Skoracki et Dabert, 2002.

Diagnosis

Female. *Gnathosoma.* Hypostomal apex flat, without ornamentation. Peritremes M-shaped with clearly visible chambers in lateral and medial branches. Movable cheliceral digits edentate on distal tip. Stylophore rounded posteriorly. *Idiosoma.* Six pairs of propodonal setae present, arranged 2–1–1–2, setae *vi* situated anterior to level of setae *ve*. Propodonal shield entire, bearing bases of setae *vi*, *ve*, *si*, *cl* and *se*. Hysteronotal shield variable. Setae *d1* situated slightly closer to *e2* than to *d2*. Pygidial shield present. Alveoles of setae *1a–1a* not coalesced. Pseudanal series represented by two pairs of setae. Genital series represented by one pair of minute setae. Aggenital setal series with three pairs. Aggenital and genital plates absent. Genital and opisthosomal lobes absent. *Legs.* Apodemes I slightly divergent with small thorn-like protuberances in middle part. Legs with full complement of solenidia. Physogastric form unknown.

Male. Features as in females except: hypostomal apex slightly tapering; hysteronotal shield present, not fused to pygidial shield; genital and aggenital setal series represented by two pairs, each; aggenital plate variable.

Etymology. The generic epithet refers to the prominent acarologist, Dr. R.F. Lawrence, from Natal Museum, Pietermaritzburg, South Africa.

Differential diagnosis. This new genus is morphologically similar to *Rafapicobia* Skoracki, 2011. In females of both genera, the peritremes are M-shaped and have clearly visible chambers in the lateral and medial branches; dorsal setae are beaded; propodonal setae are arranged 2–1–1–2, and setae *vi* are situated anterior to level of setae *ve*; the pygidial shield is present; alveoles of setae *1a–1a* are not coalesced; the pseudanal series is represented by two pairs of setae; the genital series is represented by one pair of minute setae; the genital plate and genital lobes are absent. *Lawrencipicobia* gen. n. differs from *Rafapicobia* by the following characters: in females of *Lawrencipicobia*, the apodemes I are with thorn-like protuberances in middle part; legs I are with full complement of solenidia. In females of *Rafapicobia*, apodemes I are without thorn-like protuberances in middle part; legs I are without solenidia *phi* on tibiae I.

Host range and distribution. Mites of this genus occupy quills of body feathers of parrots and are known only from the Ethiopian region.

Species included. Monotypic genus.

Lawrencipicobia poicephali

(Skoracki et Dabert, 2002) comb. n.

Figs. 4–6

Picobia poicephali – Skoracki and Dabert 2002: 143, figs. 16–24; Skoracki et al. 2004: 17; Skoracki 2011: 329, as *incertae sedis*.

Fig. 6. *Lawrencipicobia poicephali* (Skoracki et Dabert, 2002), male from *Poicephalus senegalus versteri*. **A** – dorsal view; **B** – ventral view.

This species was originally described as *Picobia poicephali* Skoracki et Dabert, 2002 based on material collected from a subspecies of Senegal parrot, *Poicephalus senegalus versteri* Finsch (Psittaciformes, Psittacidae) in Cameroon. In 2011, Skoracki included this species into *incertae sedis* species group. Below, we give a redescription of this species based on type material housed in the RMCA.

Redescription

Female (holotype). Total body length 885. *Gnathosoma*. Hypostomal apex flat. Each medial branch of peritremes with 5–7 chambers, each lateral branch with 8–10 chambers. Stylophore 205 long. *Idiosoma*. Propodonal shield entire, punctate near setal bases *ve* and *si*. Length ratio of setae *vi* : *ve* – 1 : 1.3. Setae *se* situated slightly anterior to level of setae *c1*. All idiosomal setae except terminal setae (*d4*, *d5*, *14* and *15*) beaded. Two small hysteronotal shields around bases of setae *d1* present. Pygid-

ial shield with indistinct anterior margin, apunctate, bearing bases of setae *f1* and *f2*. Setae *g1* short and thin. Two pairs of short pseudanal setae situated terminally. Aggenital setae *ag1* situated anterior to *ag2*. Setae *ag1* and *ag3* subequal in length, both 5.5 times longer than *ag2*. *Legs*. All coxal fields well sclerotized, apunctate. Apodemes I weakly divergent, not fused to apodemes II; apodemes III and IV invisible. Dorsal and lateral setae of legs I and II beaded, remaining setae smooth. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape. Tarsal setae *tc'* and *tc''* of legs III and IV subequal in length. *Lengths of setae*: *vi* 85, *ve* 110, *si* 140, *d2* 255, *h2* 480, *h1* 20, *d1* 210, *f2* 115, *f1* 60, *g1* 10, *ps1* and *ps2* 10, *l'RIII* 30, *l'RIV* 25, *ag1* 220, *ag2* 40, *ag3* 220, *3b* 45.

Male (one paratype). Total body length 680. *Gnathosoma*. Hypostomal apex truncate. Each medial branch of peritremes with five chambers, each lateral branch with nine chambers. Stylophore 160, long. *Idiosoma*: Propodonal shield entire, with concave anterior margin, punc-

tate near bases of setae *ve* and *si*. Setae *si* twice as long as *vi* and *ve*. Hysteronotal shield deeply concave on anterior margin, bearing bases of setae *d1* and *e2*. Setae *d2* 8.7 times longer than *d1* and *e2*. Apunctate pygidial shield bearing bases of setae *f2* and *h2*. Two narrow aggenital plates situated above bases of aggenital setae *ag1*. Setae *ag1* 1.4 times longer than *ag2*. All idiosomal setae smooth. *Legs*. All coxal fields well sclerotized, apunctate. Dorsal and lateral setae of legs I and II beaded, remaining setae smooth. Tarsal setae *tc'* and *tc''* of legs III and IV subequal in length. Setae *3c* about three times longer than *3b*. *Length of setae*: *vi* 10, *ve* 10, *si* 20, *c2* > 105, *se* 230, *d2* 130, *e2* 15, *c1* 230, *d1* 15, *f2* 15, *ag1* 105, *ag2* 75, *l'RIV* 15, *3b* 20, *3c* 65.

Type material examined: Female holotype and one male paratype from a subspecies of Senegal parrot *Poicephalus senegalus versteri* (Psittaciformes: Psittacidae); Cameroon, Galim, 21 August 1971, coll. F. Puylaert. Type material is deposited in the RMCA (Reg. No. RMCA 145.441).

Genus: ***Picobia*** Haller, 1878

Type species: *Picobia heeri* Haller, 1878

Diagnosis

Female. *Gnathosoma*. Hypostomal apex variable. Peritremes with clearly visible chambers in lateral and medial branches. Movable cheliceral digits edentate on distal tip. *Idiosoma*. Propodonal setae arranged 2–2–2 or 2–1–1–2, setae *vi* and *ve* situated at same transverse level. Propodonal shield divided into two narrow shields bearing bases of setae *ve*, *si* and *se*, unpaired shield between these shields present or absent. Hysteronotal shield absent. Pygidial shield present or absent. Bases of setae *1a–1a* coalesced. Pseudanal series represented by two pairs of setae. Genital setal series with one pair. Aggenital series with three pairs of setae. Aggenital plate absent. Genital plate present or absent. Genital lobes present or absent. Opisthosomal lobes absent. *Legs*. Apodemes parallel with thorn-like protuberances in middle part. Legs with full complement of solenidia. Physogastric form worm-shaped outline.

Male. Features as in females except: hysteronotal and pygidial shields present, genital and aggenital setal series represent by two pairs, each; aggenital plate present.

Habitat, host range and distribution. Mites of this genus occupy quills of body feathers and are associated with birds from five orders, Charadriiformes, Coraciiformes, Passeriformes, Piciformes and Psittaciformes (Table 1). They are known from all zoogeographical regions except Antarctica (Skoracki 2011). In Africa, these mites were found on passeriform and coraciiform birds (listed in Table 2).

Species included. This genus includes 25 species (Skoracki et al. 2012c) and African fauna comprises seven

of them: *P. cichladusa*, *P. dinemellia*, *P. echo*, *P. myrmecocichla*, *P. oritis* and *P. phoeniculi*. In addition, two new species are described below.

Picobia cichladusa Skoracki, Solarczyk et Sikora, 2012

Picobia cichladusa – Skoracki et al. 2012: 124, figs. 1–9.

This species has recently been described based on material found on muscicapid host species, *Cichladusa arquata* Peters (Passeriformes: Muscicapidae) in Tanzania. No other data are available since the original description.

Diagnosis

Female. Hypostomal apex rounded, without shoulders. Each medial branch of peritremes with 3–4 chambers, each lateral branch with seven chambers. Movable cheliceral digit edentate in posterior part. Podomers of palps densely punctate. Propodonal shield divided into two narrow lateral and single oval median shields. Length ratios of setae *vi* : *ve* : *si* – 1.3 : 1 : 1.3; *f1* : *f2* : *h1* – 1 : 1.4 : 1.4–1.5; *ag1* : *ag2* : *ag3* – 1.3 : 1 : 2. Setae *vi*, *ve* and *si* lightly beaded. Pygidial shield entire. Aggenital setae *ag1* situated anterior to level of setae *ag2*. Genital plate present. Genital setae filiform, situated on genital lobes. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape.

Male. Hypostomal apex rounded. Each medial branch of peritremes with three chambers, each lateral branch with 7–8 chambers. Propodonal shield divided into two narrow lateral and unpaired oval shields. Length ratios of setae *vi* : *ve* : *si* – 1.3 : 1 : 1.3; *d1* : *e2* : *d2* – 1 : 1 : 9; *f2* : *h2* – 1 : 15; *ag1* : *ag2* – 1.8 : 1. Hysteronotal shield entire, bearing bases setae *d1* and *e2*. Two aggenital plates present, bearing bases of setae *ag1* on posterior margin.

Type material examined: Female holotype (non-physogastric form) and paratypes: one female (non-physogastric form), two females (physogastric form), one male, two nymphs from collared palm-thrush *Cichladusa arquata* (Passeriformes: Muscicapidae); Tanzania, Soga, 16 July 1960, coll. Th. Andersen. Type material is deposited in the ZSM (Reg. No. ZSM 20112002) and AMU (Reg. No. AMU–SYR.371).

Picobia dinemellia Glowska et Skoracki, 2011

Picobia dinemellia – Glowska and Skoracki 2011: 64, figs. 6–18.

This species has recently been described based on material found on ploceid host species, *Dinemellia dinemelli* (Ruppell) (Passeriformes: Ploceidae) in Tanzania (Glowska and Skoracki 2011).

Diagnosis

Female. Hypostomal apex rounded with shoulders. Each medial branch of peritremes with five chambers, each lateral branch with 9–10 chambers. Movable cheliceral digit edentate in posterior part. Propodonal shield

divided into two narrow lateral shields and small oval median fragment. All propodonotal setae lightly beaded. Length ratios of setae $vi : si - 1 : 1.5$; $fl : f2 - 1 : 1$; $h1 : fl - 1 : 2.7$; $ag1 : ag2 - 2 : 1$. Pygidial shield entire. Aggenital setae $ag1$ situated anterior to level of setae $ag2$. Setae $g1$ short and thin, situated on genital lobes. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape.

Male. Hypostomal apex rounded. Each medial branch of peritremes with four chambers, each lateral branch with six chambers. Propodonotal shield entire. Setae ve situated anterior to setae vi . Length ratios of setae $vi : ve - 1 : 1.4$; $d2 : e2 - 5.3 : 1$; $f2 : h2 - 1 : 13$; $ag1 : ag2 - 4.3 : 1$. Hysteronotal shield entire, bearing bases of setae $d1$ and $e2$. Two aggenital plates present, bearing bases of setae $ag1$ on posterior margin.

Type material examined: Female holotype, three physogastric female paratypes and one male paratype from white-headed buffalo-weaver *Dinemellia dinemelli* (Passeriformes: Ploceidae); Tanzania, no other data. All type material is deposited in the AMU (Reg. No. AMU-SYR.426).

Picobia echo Skoracki, Solarczyk et Sikora, 2012

Picobia echo – Skoracki et al. 2012b: 126, figs. 10–21.

This species has recently been described based on material found on muscicapid bird species, *Cossypha heuglini* Hartlaub in Tanzania (Skoracki et al. 2012).

Diagnosis

Female. Hypostomal apex rounded, without shoulders. Each medial branch of peritremes with 4–5 chambers, each lateral branch with 6–8 chambers. Movable cheliceral digit edentate in posterior part. Podomers of palps densely punctate. Propodonotal shield divided into two narrow lateral and single oval median shields. Propodonotal setae lightly beaded. Length ratios of setae: $vi : ve : si - 1 : 1 : 1.4$; $fl : h1 : f2 - 1 : 1 : 2$; $ag1 : ag2 : ag3 - 1.4 : 1 : 2$. Pygidial shield entire. Aggenital setae $ag1$ situated anterior to level of setae $ag2$. Genital plate present. Genital setae filiform, situated on genital lobes. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape.

Male. Hypostomal apex rounded. Each medial branch of peritremes with 3–4 chambers, each lateral branch with 7–8 chambers. Propodonotal shield divided into two narrow lateral and one unpaired oval shields. Bases of setae vi and ve situated at same transverse level. Length ratios of setae $vi : ve : si - 1 : 1 : 1.1$ – 1.2 ; $d2 : d1 : e2 - 7 : 1 : 1$; $h2 : f2 - 13 : 1$; $ag1 : ag2 - 1.3$ – $1.8 : 1$. Hysteronotal shield entire. Two aggenital plates present, situated close to each other, bearing bases of setae $ag1$.

Type material examined: Female holotype (non-physogastric form) and paratypes: four females (physogastric form), two males, two nymphs and one larva from white-

browed robin-chat *Cossypha heuglini* (Passeriformes: Muscicapidae); D. R. Congo, South Kivu Prov., Bukavu, 7 August 1969, coll. P. Kunkel. Type material is deposited in the ZSM (Reg. No. ZSM 20112010) and AMU (Reg. No. AMU-SYR.372).

Picobia eremophila Skoracki, 2011

Picobia eremophila see Skoracki 2011: 363, Figs. 272–274.

This species has recently been described based on material found on alaudid bird species *Eremophila bilopha* (Temminck) (Passeriformes: Alaudidae) in Egypt.

Diagnosis

Female. Hypostomal apex rounded, with shoulders. Each medial branch of peritremes with 2–3 chambers, each lateral branch with 6–8 chambers. Movable cheliceral digit dentate in posterior part. Propodonotal shield divided into two narrow lateral shields, medial shield absent. Setae vi located slightly posterior to level of setae ve . Length ratios of setae $vi : ve : si - 1.5$ – $1.7 : 1 : 1.9$ – 2 ; $fl : f2 - 1 : 1.2$; $fl : h1 - 1 : 5.4$; $ag1 : ag2 : ag3 - 1 : 1 : 1.2$ – 1.5 . Propodonotal setae lightly beaded. Pygidial shield entire. Aggenital setae $ag1$ situated anterior to level of setae $ag2$. Genital setae long and hair-like. Genital lobes absent. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape.

Male. Hypostomal apex with pair of minute, blunt-ended protuberances. Each medial branch of peritremes with three chambers, each lateral branch with eight chambers. Propodonotal shield entire, bearing bases of setae vi , ve , si and se . Setae vi situated posteriorly to level of setae ve . Length ratios of setae $vi : ve : si - 1.2 : 1 : 1.8$; $d2 : d1 : e2 - 3.8 : 1 : 1$; $ag1 : ag2 - 1.3 : 1$. Hysteronotal shield divided longitudinally, bearing bases of setae $d1$ and $e2$. Aggenital plate entire, bearing bases of setae $ag1$.

Type material examined: Female holotype and two female paratypes (physogastric forms) and one male paratype from Temminck's lark *Eremophila bilopha* (Passeriformes: Alaudidae); Egypt, no other data. Material is deposited in the AMU (Reg. No. AMU-SYR.273).

Picobia illadopsae sp. n.

Figs. 7–9

Description

Female (holotype and three paratypes, measurements of the latter in parentheses). Total body length 600 (555–570). *Gnathosoma*. Infracapitulum sparsely punctate. Each medial branch of peritremes with eight chambers, each lateral branch with four striated chambers. Stylophore 170 (160) long. *Idiosoma*. Pair of narrow propodonotal shields sparsely punctate near bases of setae ve and si . Unpaired medial shield absent. Length ratio of setae $vi : ve : si - 1 : 1 : 1.3$ – 1.5 . Bases of setae vi situated slightly posterior to level of setae ve . Setae vi , ve and si lightly beaded. Setae se situated posterior to level of setae $c1$.

Fig. 7. *Picobia illadopsae* sp. n., female (Reg. No. AMU-SYR.427/1) from *Illadopsis rufipennis*. A – dorsal view; B – ventral view.

Hysteronotal shield absent. Pygidial shield well sclerotized covered by minute punctuations. Setae *f1* 1.4 times longer than *h1*. Setae *f2* 1.5–1.7 times longer than *f1*. Bases of aggenital setae *ag1* situated near anterior margin of genital plate and slightly posterior to level of setae *ag2*. Length ratio of setae *ag1* : *ag2* : *ag3* 1.4–1.5 : 1 : 1.5–1.8. Large genital plate covered by minute punctations. Setae *ps2* and *g1* subequal in length, both slightly shorter than *ps1*. Genital setae *g1* situated on small genital lobes. All coxal fields well sclerotized and punctate. Setae *3c* about 3.0–3.4 times longer than *3b*. *Legs*. Antaxial and paraxial members of claw pair of legs III and IV unequal in size and shape. Setae *tc'''III–IV* 1.3–1.5 times longer than *tc'''III–IV*. *Lengths of setae*: *vi* 75 (75–80), *ve* 70 (75–80), *si* 115 (105), *se* 190 (180–190), *c1* 190 (175–185), *c2* 180 (170–180), *d1* 210 (190–200), *d2* 190 (180–190), *e2* 170 (160–185), *f1* 55 (50–65), *f2* 95 (95–100), *h1* 40 (40), *h2* 390, *ag1* (85–90), *ag2* 65 (55–65), *ag3* 110 (100–110),

ps1 35 (35), *ps2* 30 (25–30), *g1* 30 (25–30), *tc'''III–IV* 40 (50–60), *tc'''III–IV* 55 (65–70), *l'RIII* 20 (20), *l'RIV* 20 (20), *3b* (25–30), *3c* (85–90).

Physogastric female (five paratypes). Physogastric form vermiform outline.

Male (four paratypes). Total body length 425–440. *Gnathosoma*. Each medial branch of peritremes with seven chambers, each lateral branch with four striated chambers. Stylophore 100 long. *Idiosoma*. Pair of narrow propodonotal shields sparsely punctate near bases of setae *ve* and *si*; unpaired medial shield absent. Length ratio of setae *vi* : *ve* : *si* – 1 : 1 : 1.5–1.8. Bases of setae *vi* situated slightly posterior to level of setae *ve*. Setae *vi*, *ve* and *si* lightly beaded. Setae *se* situated posterior to level of setae *c1*. Hysteronotal shield entire, with concave anterior margin, punctate laterally. Pygidial shield apunctate. Bases of aggenital setae *ag1* situated at posterior margin of weakly sclerotized genital plate. Setae *ag1* 2.6–2.7

Fig. 8. *Picobia illadopsae* sp. n., female (Reg. No. AMU-SYR.427/1) from *Illadopsis rufipennis* (A–F). **A** – hypostomal apex; **B** – peritreme; **C** – propodonal seta; **D** – genito-anal region; **E** – solenidia of leg I; **F** – tarsus III in ventrolateral view. Male (G–I) (Reg. No. AMU-SYR.427/6) from the same host species. **G** – hypostomal apex; **H** – peritreme; **I** – genito-anal region.

times longer than *ag2*. All coxal fields well sclerotized and punctate. Setae *3c* about twice as long as *3b*. *Lengths of setae*: *vi* 45, *ve* 40–50, *si* 75, *se* 100–120, *c1* 140, *c2* 120–135, *d1* 15–20, *d2* 100–115, *e2* 15–20, *f2* 10–15, *h2* 200, *ag1* 40–60, *ag2* 15–25.

Type host: Pale-breasted illadopsis *Illadopsis rufipennis* (Sharpe) (Passeriformes: Pellorneidae).

Locality: Kenya, Kakamega, Buyangu, Udo's Campsite, 0°21'11"N, 34°51'50"E, 1598 m a.s.l., 7 April 2011, coll. W. Wamiti.

Type material: Female holotype (non-physogastric form) and paratypes: three females (non-physogastric form), five females (physogastric form) and four males. All type material is deposited in the AMU (Reg. No. AMU-SYR.427/1–8) except one female (physogastric form) and one male in the IPCAS; one female (non-physogastric form), one female (physogastric form) and one male in ZISP (Reg. No. ZISP AVB011–2908–040).

Etymology: The specific epithet '*illadopsae*' is adopted from the generic name of the host – *Illadopsis*.

Differential diagnosis. This new species is morphologically similar to *P. cetti* Skoracki, 2011 found on Cetti's warbler *Cettia cetti* (Temminck) (Passeriformes: Cettiidae) (Skoracki 2011). In females of both species, aggenital setae *ag1* and *ag2* are situated at the same transverse level; the genital lobes are well developed and bear genital setae; setae *vi*, *ve* and *si* are lightly beaded; the genital plate is densely punctate; the pygidial shield is

divided longitudinally, antaxial and paraxial members of the claw pair of legs III and IV are unequal in size and not similar in shape. This new species differs from *P. cetti* by the following characters: in females of *P. illadopsae*, the propodonal medial shield is absent; all coxal fields are densely punctate; each medial branch of the peritremes has eight chambers and the chambers in the lateral branches are distinctly striated. In females of *P. cetti*, the propodonal medial shield is present; all coxal fields are apunctate; each medial branch of the peritremes has two chambers, and the chambers in the lateral branches are not striated.

Picobia myrmecocichla Skoracki, Solarczyk et Sikora, 2012

Picobia myrmecocichla – Skoracki et al. 2012b: 132, figs. 22–32.

This species has recently been described based on material found on muscicapid bird *Myrmecocichla arnotti* (Tristram) in Tanzania.

Diagnosis

Female. *Gnathosoma*. Hypostomal apex rounded, without shoulders. Movable cheliceral digit edentate posteriorly. Each medial branch of peritremes with 5–6 chambers; each lateral branch with seven chambers. Podomers of palps densely punctate. Propodonal shield divided into two narrow lateral shields, median shield re-

Fig. 9. *Picobia illadopsae* sp. n., male (Reg. No. AMU-SYR.427/6) from *Illadopsis rufipennis*. A – dorsal view; B – ventral view.

duced to small sclerite or absent. Length ratios of setae *vi* : *ve* : *si* – 1.4–1.6 : 1 : 1.4–1.6; *fl* : *hl* : *f2* – 1 : 1 : 2–2.3; *ag1* : *ag2* : *ag3* – 2 : 1 : 2.7. Bases of setae *vi* situated slightly posterior to level of setae *ve*. Dorsal setae of idiosoma and legs lightly beaded. Pygidial shield entire. Aggenital setae *ag1* situated anterior to level of setae *ag2*. Genital plate present. Genital setae filiform, situated on genital lobes. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape.

Male. Hypostomal apex rounded. Each medial branch of peritremes with three chambers, each lateral branch with 7–8 chambers. Propodonotal shield not divided, long-sleeved shirt-like. Length ratios of setae *vi* : *ve* : *si* – 1.2–1.3 : 1 : 1.4–1.5; *d2* : *dl* : *e2* – 8–10 : 1 : 1; *f2* : *h2* – 1 : 15; *ag1* : *ag2* – 1 : 1. Propodonotal setae lightly beaded. Bases of setae *vi* situated slightly posterior to level of setae *ve*. Hysteronotal shield entire. Two aggenital plates present, bases of setae *ag1* situated near these plates.

Type material examined: Female holotype (non-physogastric form) and paratypes: one female (non-physogas-

tric form), two females (physogastric form), two males, one nymph from white-headed black-chat *Myrmecocichla arnotti* (Passeriformes: Muscicapidae); Tanzania, 10 September 1963, coll. Th. Andersen. Type material is deposited in the ZSM (Reg. No. ZSM 20112011) and AMU (Reg. No. AMU-SYR.375).

Picobia oritis Skoracki, Antczak et Riebert, 2009

Picobia oritis – Skoracki et al. 2009: 133, figs. 15–25; Skoracki et al. 2011: 40.

This species was described based on material found on nectariniid host species, *Cyanomitra oritis* (Reichenow) (Passeriformes: Nectariniidae) in Cameroon (Skoracki et al. 2009). Later on, Skoracki et al. (2011) recorded this species on closely related host species, *C. olivacea* (Smith), in Kenya.

Diagnosis

Female. Hypostomal apex rounded, without shoulders. Each lateral branch of peritremes with three chambers,

Fig. 10. *Picobia phoeniculi* Fain, Bochkov et Mironov, 2000, female from *Phoeniculus purpureus*. **A** – dorsal view; **B** – ventral view.

each longitudinal branch with seven chambers. Movable cheliceral digit with cuticular processes in posterior part. Propodonotal shield divided into two narrow shields, medial shield absent. Length ratios of setae $vi : ve : si - 1 : 1 : 1$; $fl : f2 - 1 : 2$; $ag1 : ag2 : ag3 - 1.1-1.3 : 1 : 1.6-2.2$. Setae vi , ve and sci strongly beaded. Pygidial shield divided longitudinally. Bases of setae $ag1$ and $ag2$ situated at same transverse level. Genital setae filiform, situated on short genital lobes. Antaxial and paraxial members of claw pair of legs III and IV unequal in size and shape.

Male. Unknown.

Type material examined: Female holotype and four female paratypes (non-physogastric form) from Cameroon sunbird *Cyanomitra oritis* (Passeriformes: Nectariniidae); Cameroon, North-Western Province, Bamenda Highlands, Mendongbuo, 06°05'N, 10°18'E, 2200 m a.s.l., coll. J. Riegert. Type material is deposited in the AMU (Reg.

No. AMU-SYR.228), ZISP (Reg. No. ZISP AVB011-2908-004) and RMCA (Reg. No. RMCA 190394).

Additional material examined: Two females (physogastric form) from eastern olive sunbird *Cyanomitra olivacea* (Smith) (Nectariniidae); Kenya, Arabuko-Sokoke Forest, Gede, Tree House Nature Trail, 3°17'S, 39°55'E, 39 m a.s.l., 16 December 2010, coll. M. Hromada and W. Wamiti. All material is deposited in the AMU (Reg. No. AMU-SYR.288).

Picobia phoeniculi

Fain, Bochkov et Mironov, 2000

Figs. 10–12

Picobia phoeniculi – Fain et al. 2000: 69, figs. 110–117; Skoracki et al. 2004: 168; Skoracki 2011: 328.

This species was described based on female material found on coraciiform bird species, *Phoeniculus purpureus* (Miller) (Coraciiformes: Phoeniculidae) in Rwanda (Fain

Fig. 11. *Picobia phoeniculi* Fain, Bochkov et Mironov, 2000, female from *Phoeniculus purpureus*. **A** – hypostomal apex; **B** – peritremes; **C** – genito-anal region; **D** – tarsus III in ventrolateral view; **E** – propodonal seta *ve*; **F** – solenidia of leg I.

et al. 2000), and to this time there were no other data since the original description. Below, we give a redescription of this species based on the type material (females and males) deposited in the RBINS. Additionally, a new locality and new host record for *P. phoeniculi* are listed.

Redescription

Female (two paratypes). Total body length 645. *Gnathosoma*. Hypostomal apex rounded, with shoulders. Movable cheliceral digit edentate in posterior part. Each medial branch with five chambers, each lateral branch with 6–7 chambers. Stylophore 245 long. *Idiosoma*. Propodonal shield divided into two narrow lateral and single median shield, all sclerites punctate. Length ratio of setae *vi* : *ve* : *si* – 1.4 : 1 : 1.4. Setae *vi* situated slightly posterior to level of setae *ve*. Setae *vi*, *ve* and *si* lightly beaded. Setae *se* and *c1* situated at same transverse level or setae *c1* located slightly anterior to level of setae *se*. Hysteronotal shield absent. Setae *d2* slightly (1.2 times) longer than *e2*. Pygidial shield well developed, punctate, covered also ventral side. Setae *f2* 1.5–1.9 times longer than *f1*. Setae *h1* 2.1–2.5 times longer than *f2*, and 3.0–4.5 times longer than *f1*. Aggenital setae *ag1* situated anterior to level of setae *ag2*. Length ratio of setae *ag1* : *ag2* : *ag3* – 3.3 : 1 : 4.8. Genital plate present, apunctate. Setae *ps2* 2.3–3.3 times longer than *ps1*. Pair of short and filiform genital setae situated on genital lobes. All coxal fields well sclerotized, apunctate. Setae *4c* 3.3 times longer than *4b*. *Legs*. Antaxial and paraxial members of claw pair of legs III and IV equal in size and shape. Setae *tc'* and *tc''* of legs III and IV subequal in length. *Lengths of setae*: *vi* 140, *ve* 100, *si* 145, *se* 230–245, *c1* 280, *c2* 250, *d2*

260, *e2* 190–215, *f1* 35–55, *f2* 65–85, *h1* 160–175, *h2* 480, *ag1* 100, *ag2* 30, *ag3* 145–160, *g1* 20, *ps1* 15–20, *ps2* 50, *tc'III–IV* 65–70, *tc''III–IV* 70–75, *l'RIII* 35, *l'RIV* 30, *3b* 30–35, *3c* 100–115.

Physogastric female (one paratype). Body, vermiform outline, 1305 long.

Male (one paratypes). Total body length 535–580. *Gnathosoma*. Hypostomal apex flat. Stylophore 125–130 long. Each medial branch of peritremes with four chambers, each lateral branch with 8–9 chambers. *Idiosoma*. Propodonal shield, divided into two narrow lateral shields and single oval shield median shield; all sclerites punctate. Length ratio of setae *vi* : *ve* : *si* – 1.1–1.2 : 1 : 1.4–1.6. Bases of setae *ve* situated slightly anterior to level of *vi*. Setae *c1* situated slightly anterior to level of setae *se*. Hysteronotal shield well developed, entire, apunctate, bearing bases of setae *d1* and *e2*. Setae *d2*, *c1*, *c2* and *se* subequal in length, all about 11–14 times longer than *d1* and *e2*. Setae *d1* situated closer to *e2* than to *d2*. Pygidial shield apunctate. Aggenital plate entire, deeply concave on posterior margin, apunctate, bearing bases of setae *ag1* on posterior margin. Setae *ag1* 3.7 times longer than *ag2*. All coxal fields well sclerotized, apunctate. *Legs*. Setae *tc'III–IV* and *tc''III–IV* subequal in length. *Lengths of setae*: *vi* 95–105, *ve* 85, *si* 120–135, *se* 150–160, *c1* 150–180, *c2* 150–160, *d1* 10–15, *d2* 155–170, *e2* 10–15, *f2* 10, *h2* 250–270, *ag1* 55, *ag2* 15, *tc'III–IV* and *tc''III–IV* 40, *l'RIII* and *l'RIV* 20, *3b* 20, *3c* 55.

Type material examined: Female holotype, two female paratypes (non-physogastric form), one female paratype (physogastric form) and two male paratypes from green woodhoopoe *Phoeniculus purpureus* (Coraciiformes:

Fig. 12. *Picobia phoeniculi* Fain, Bochkov et Mironov, 2000, male from *Phoeniculus purpureus*. **A** – dorsal view; **B** – ventral view.

Phoeniculidae); Rwanda, December 1954, coll. A. Fain. All type material is deposited in the RBINS (Reg. No. RBINS 187374).

Additional material examined: One female (non-physogastric form), two females (physogastric form), one nymph from African subspecies of Eurasian hoopoe *Upupa epops africana* Bechstein (Coraciiformes: Upupidae), Tanzania, Manyara, Iraku, July 1911, coll. Kattwinkel. Mite material is deposited in the AMU (Reg. No. AMU-SYR.351B).

Picobia phoenicuri sp. n.

Figs. 13–15

Description

Female (holotype and one female paratype, physogastric form). Total body length 1095. *Gnathosoma*. Infracapitulum apunctate. Each medial branch of peritremes with

4–5 chambers, each lateral branch with 8–9 chambers. Stylophore (160) long. *Idiosoma*. Pair of narrow propodotal shields sparsely punctate near bases of setae *ve* and *si*; unpaired medial shield oval in shape, punctate. Length ratio of setae *vi* : *ve* : *si* – 1.3 : 1 : 1.4–1.6. Bases of setae *vi* and *ve* situated at same transverse level. Setae *vi*, *ve* and *si* lightly beaded. Setae *se* situated posterior to level of setae *c1*. Hysteronotal shield absent. Pygidial shield well sclerotized covered by minute punctuations. Setae *fl* and *h1* subequal in length. Setae *f2* about twice as long as *fl*. Bases of aggenital setae *ag1* situated near anterior margin of genital plate and anterior to level of setae *ag2*. Length ratio of setae *ag1* : *ag2* : *ag3* – 1.6 : 1 : 2. Large genital plate covered by minute punctuations. Setae *ps1* 1.4–1.6 times longer than *ps2* and *g1*. Genital setae situated on genital lobes. All coxal fields well sclerotized and apunctate. Setae *3c* about twice as long as *3b*. *Legs*. Antaxial and paraxial members of claw pair of legs III

Fig. 13. *Picobia phoenicuri* sp. n., female (Reg. No. AMU-SYR.393/1) from *Phoenicurus moussieri*. **A** – dorsal view; **B** – ventral view.

and IV equal in size and shape. Setae *tc'''III–IV* slightly (1.2 times) longer than *tc'''III–IV* or both pairs subequal in length. *Lengths of setae*: *vi* 115 (125), *ve* 90 (100), *si* 140 (140), *se* 205 (195), *c1* 205 (205), *c2* 190 (190), *d1* 190 (180), *d2* 220 (200), *e2* 150 (145), *f1* 35 (30), *f2* 65 (60), *h1* 30 (30), *h2* 300 (295), *ag1* 65 (65), *ag2* (40), *ag3* 85 (85), *ps1* 40 (35), *ps2* 25 (25), *g1* 25 (25), *tc'''III–IV* 40 (50–60), *tc'''III–IV* 55 (65–70), *l'RIII* 20 (20), *l'RIV* 20 (20), *3b* 30 (35), *3c* 60 (70).

Male (two paratypes). Total body length 425–435. *Gnathosoma*. Each medial branch of peritremes with four

chambers, each lateral branch with 6–7 chambers. Stylophore 105 long. *Idiosoma*. Pair of narrow propodonal shields sparsely punctate near bases of setae *ve* and *si*. Unpaired medial shield present. Length ratio of setae *vi* : *ve* : *si* – 1 : 1 : 1. Bases of setae *vi* and *ve* located at same transverse level. Setae *vi*, *ve* and *si* lightly beaded. Setae *se* situated posterior to level of setae *c1*. Hysteronotal shield entire, apunctate. Pygidial shield apunctate. Bases of aggenital setae *ag1* situated at posterior margin of entire and well sclerotized aggenital plate. Setae *ag1* 1.6 times longer than *ag2*. All coxal fields well sclero-

Fig. 14. *Picobia phoenicuri* sp. n., female (A–D) (Reg. No. AMU–SYR.393/1) from *Phoenicurus moussieri*. **A** – hypostomal apex; **B** – genito-anal region; **C** – peritremes; **D** – solenidia of leg I. Male (E–G) (Reg. No. AMU–SYR.393/3). **E** – hypostomal apex; **F** – genito-anal region; **G** – peritremes.

tized and apunctate. Setae *3c* about twice as long as *3b*. Lengths of setae: *vi* 70–75, *ve* 70–75, *si* 75, *se* 110–130, *c1* 130–140, *c2* 105–120, *d1* 15, *d2* 120–125, *e2* 15, *f2* 10, *h2* 145–155, *ag1* 40, *ag2* 25.

Type host: Moussier's redstart *Phoenicurus moussieri* (Olype-Galliard) (Passeriformes: Muscicapidae).

Locality: Tunisia, coll. Blanc, no other data.

Type material: Female holotype (physogastric form), one female paratype (physogastric form) and two male paratypes. All material is deposited in the AMU (Reg. No. AMU–SYR.393/1–4).

Etymology: The name of this new species refers to the generic name of the host – *Phoenicurus*.

Differential diagnosis. This new species is morphologically very similar to *P. echo* Skoracki, Solarczyk et Sikora, 2012 found on white-browed robin chat, *Cossypha heuglini* Hartlaub (Passeriformes: Muscicapidae) (Skoracki et al. 2012b). In both species most qualitative characters are similar. Mites of these two species can be distinguished by measurements of setae. In females of *P. phoenicuri* sp. n., the lengths of setae *si*, *c1*, *e2* and *f2* are 140, 205–210, 145–150 and 60, respectively; in males the lengths of setae *ve*, *si*, *c2* and *d2* are 55–70, 75, 105–120 and 120–125, respectively. In females of *P. echo*, the lengths of setae *si*, *c1*, *e2* and *f2* are 180, 240, 185, and 90 respectively; in males the lengths of setae *ve*, *si*, *c2* and *d2* are 100–115, 100–125, 150–160 and 140, respectively.

Key to the genera of the Picobiinae (females)

- 1 Opisthosomal lobes present. Movable cheliceral digit dentate, each with three teeth *Calamincola* Casto, 1978
- Opisthosomal lobes absent. Movable cheliceral digit edentate 2
- 2 Solenidion ϕ I present 3
- Solenidion ϕ I absent 7
- 3 Genital setae present 4
- Genital setae absent *Gunabopicobia* gen. n.
- 4 Bases of setae *1a–1a* coalesced. Propodonotal shield divided into two or three separated sclerites 5
- Bases of setae *1a–1a* not coalesced. Propodonotal shield entire *Lawrencipicobia* gen. n.
- 5 Setae *vi* and *ve* situated in transverse row. Lateral propodonotal shields bearing bases of setae *ve*, *si* and *se*. Apodemes I with thorn-like projection in middle part 6
- Setae *vi* and *ve* situated in longitudinal row. Lateral propodonotal shields bearing bases of setae *vi*, *ve*, *si* and *se*. Apodemes I without thorn-like projection in middle part *Columbiphilus* Kivganov et Sharafat, 1995

Fig. 15. *Picobia phoenicuri* sp. n., male (Reg. No. AMU-SYR.393/3) from *Phoenicurus moussieri*. **A** – dorsal view; **B** – ventral view.

- 6 Genital setae absent. Genital lobes are absent. Solenidion ϕ I represented by microseta, solenidion σ I setiform *Pseudopicobia* Skoracki, Scibek et Sikora, 2012
- Genital setae present. Genital lobes present. Solenidion ϕ I distinctly developed, solenidion σ I bulb-like *Picobia* Haller, 1878
- 7 One pair of genital setae and two pairs of pseudanal setae present *Rafapicobia* Skoracki, 2011
- Genital setae absent, two pairs of pseudanal setae present *Neopicobia* Skoracki, 2011

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