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The first record of the genus *Paralimosina* L. Papp (Diptera: Sphaeroceridae) in the Afrotropical Region, with descriptions of six new species

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ABSTRACT

The Afrotropical species of the genus *Paralimosina* L. Papp, 1973, are discussed. Six new species, *Paralimosina australis* sp. n. (Rwanda, Burundi, South Africa), *P. congoensis* sp. n. (Republic of Congo), *P. flavifacies* sp. n. (Tanzania), *P. heteroneura* sp. n. (South Africa), *P. paraustralis* sp. n. (South Africa), and *P. sinelineata* sp. n. (South Africa) are described. The morphological variety among the Afrotropical species of *Paralimosina* seems to be the widest. Therefore, it is expected that many other new species will be described from the region in the future. An identification key to the new taxa is provided.

KEY WORDS: Sphaeroceridae, Limosininae, *Paralimosina*, Afrotropical, lesser dung flies, new species, identification key.

INTRODUCTION

The genus *Paralimosina* L. Papp, 1973, includes a number of sphaerocerids of the subfamily Limosininae that have robust and strongly sclerotised bodies. Genera in this subfamily have the epandrium of the male genitalia fused below the anal opening. Furthermore, important differentiating characters are located on the cercal part of the epandrial complex as well as the hypandrium, surstylus, postgonite and phallus. On the female postabdomen, the shape, armature and ratios of tergite 8 and sternite 8 can be characteristic of particular species. Likewise, the epiproct (tergite 10), cerci (not fused with tergite 10) and spermathecae may exhibit features that are diagnostic at the specific level.

Paralimosina is a diverse genus with 27 described species in the Palaearctic and Oriental regions but hitherto it has not been recorded from the Afrotropical Region (Richards 1980; Roháček *et al.* 2001). Hayashi (2008*a*) named five other species from Thailand, and Hayashi (2007, 2008*b*) described four new species from Malaysia.

Although I found six new species during the course of this study, it is highly likely that more new species of *Paralimosina* will be discovered in the future, since the morphological variety among the Afrotropical species of *Paralimosina* seems to be the widest.

MATERIAL AND METHODS

This paper is based on studies of many double-mounted specimens of *Paralimosina* which are housed in the Hungarian Natural History Museum (HNHM; Budapest), National Museum (BMSA; Bloemfontein, South Africa), and KwaZulu-Natal Museum (NMSA; Pietermaritzburg, South Africa).

Abdomina of up to several (at least one) specimens of each species were removed and treated with 10% hot sodium hydroxide (NaOH) for several minutes and lactic acid, then rinsed, *etc*., in the standard way. Those abdomina with genitalia are now kept in glycerol in plastic microvials under the respective pinned specimens.

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In the species accounts below, geographical names on specimen labels are given in their present-day spelling, whereas my annotations concerning label data are in square brackets.

The following abbreviations are used below: setae: *ifr* – interfrontal, *fr-orb* – fronto-orbital, *dc* – dorsocentral, *ad* – anterodorsal, *av* – anteroventral, *pd* – posterodorsal, *va* – ventroapical; wing veins: R – radial veins, M – medial veins, M-M – posterior crossvein, R-M–M-M – inter-crossvein section of M_{1+2} (that is, veins are written consistently in upper case, including crossveins); other: T – abdominal tergite, S – abdominal sternite. For costal sections and indices see Roháček (1982).

I name the sclerotised structures above the phallobase *and* anterior ventrally to the cerci (with connections to epandrium and surstyli) as 'subepandrial sclerite' ('medandrium' of Roháček (1998), 'decasternum' *auctorum*), although its origin may be even more complex.

TAXONOMY

Genus *Paralimosina* L. Papp, 1973

Type species: *Paralimosina kaszabi* L. Papp, 1973: 376, by monotypy.

Roháček and Papp (1988) described the genus correctly in respect of diagnostic features. However, below I will nevertheless stress the characteristics of the male and female postabdomen and genitalia.

Diagnosis: Body rather strongly sclerotised and in some species even granulose, variably with denser microtomentum or more shiny, despite presence of some microtomentum. Body length around 2.5 mm.

Head without inner orbitals, anterior *fr-orb* always clearly shorter than posterior pair. Frons with or without velvety black (or silvery) M-shaped mark (Roháček 1998: fig. 2). Facial plate normally convex, antennae not in deep hollow, or if in a shallow depression, edges are not sharp. Peristomals weaker, a genal seta present. Several (3–5) pairs of *ifr*, if one of them is very large, it emerges far from eye margin. First flagellomere not conical but if slightly so, never with rod-like projection. Eye normal or slightly reduced.

Mesonotum usually with only 1 or 2 *dc* pairs; when 3 *dc* present, then R_{4+5} slightly recurved (Roháček 1998: fig. 93) or eye strongly reduced; no presutural *dc* pair. No setulae between apical scutellars; disc of scutellum usually bare. Scutellum never velvety black-marked, with only 2 pairs of long marginal setae, disc always bare. Anepisternum without setae.

Mid trochanter without or with a short seta. Mid tibia always without ventral preapical seta, but usually with one *va* (sometimes reduced only in males). Long mid ventral seta on mid tibia present only in species with distinct *va* on mid tibia (Roháček 1998: fig. 75). Mid tibia with or without mid *av*. Mid basitarsus without long *av* and without ventral seta. Hind tibia with a long dorso-preapical seta, at most. Pulvilli and claws weakly developed; ventroapical spur of hind tibia mostly reduced.

Wing unicolorous, with cross-veins at most clouded in the Afrotropical species (there are numerous Oriental species with a patterned wing (Hayashi 2008*a*, *b*)). Wing without macrotrichia. First costal section basally with 2 shorter (paired) setae, one of them not longer than twice the length of the second, otherwise first costal section with short or medium-length setae only. Vein R_{4+5} sinuate or upcurving.

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Abdominal tergites not reduced, rather well sclerotised, marginal setae variable. Male postabdomen less downcurved; male cerci and S5 vary (but are usually simple). Male S4 normally without processes; S5 simple, without medio-caudal armature. Synsternite with basic structure characteristic of taxa in the subfamily Limosininae. Right side sclerites of the postabdomen (cf. Papp 2008) usually discernible but seldom with characteristic shape. Hypandrium with ventral single or bifurcate appendage (Roháček 1998: fig. 33). Epandrium with one connection on each side to hypandrium. Surstylus long but mostly not very high, in an anterior and a posterior lobe, the latter without robust ventral spines (Roháček 1998: fig. 108). Phallus in two parts: basiphallus short but usually high, well sclerotised without epiphallus, distiphallus varying, mostly with large ventral lobe(s), always shorter than phallapodeme, which is strong. Ejaculatory apodeme always discernible but its sclerotisation varies; and since it seems to be asymmetrical, its detectable shape is dependent on its positioning.

Female with seven normal preabdominal segments, although the length of the 7th is variable. Postabdomen not telescoped. T8 consists of 2 lateral sclerites that have a pair of medially directed, narrow ventral processes, and may bear longer setae, mostly on the caudal margin. Features concerning S8 mostly species-specific. Epiproct (= T10, or T9 *auctorum*) usually flat, with or without some setae that are of diagnostic value. Hypoproct (= S10, or S9 *auctorum*) larger in several species and with short setulae, which are sometimes very thick (peg-like). Cerci always short, not fused to T10. Spermathecae 1+2, globular, vesiculate or subspherical, without acute projections. Sclerotised ducts usually short but the length (incl. length of individual ducts when they are paired) is species-specific.

Paralimosina flavifacies sp. n.

Figs 1–18

Etymology: From Latin *flavus* (yellow) and *facies* (face), in reference to the bright yellow facial plate.

Description:

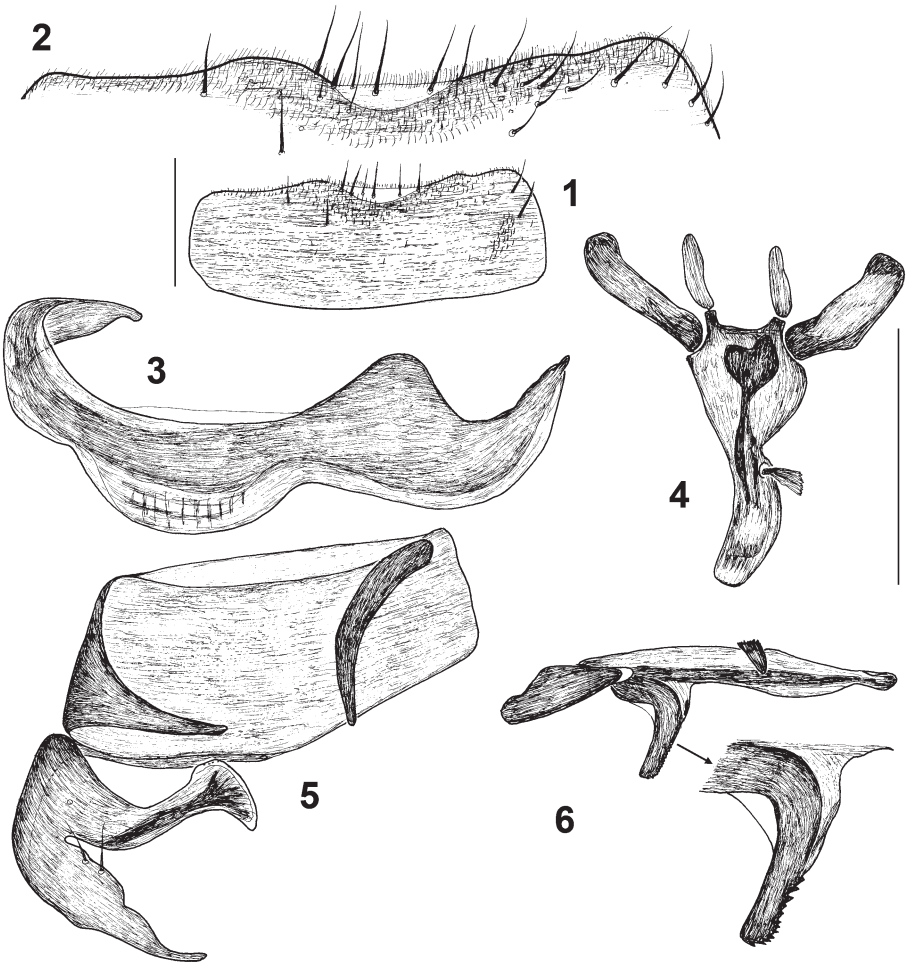
Measurements in mm: body length 2.45 (holotype), 2.55 (paratype), wing length 2.23 (holotype), 2.30 (paratype), wing width 1.01 (holotype), 1.04 (paratype).

Body blackish brown with thick grey microtomentum, head mostly yellow, occiput black, fore femur dirty yellow, mid and hind femora dark brown.

Frons without M-shaped mark, sagittal interfrontal stripe bright yellow, other frontal parts reddish yellow, less shiny, orbitalia and interfrontal lines silvery, occiput dark with silvery tomentum. Facial plate bright yellow. Gena below eye 0.15 mm, longest axis of eye 0.33 mm. Four pairs of *ifr* (0.07–0.08 mm) plus 1 pair of shorter *ifr* anteriorly. Genal seta above peristomal setae, 0.09 mm long. Aristal cilia 0.045–0.050 mm, like the apical cilia on first flagellomere.

Acrostichals dense, rather thin and short. Anterior *dc* pair distinct (0.15 mm). Wing light brown, veins darker brown, venation as in the related species. Wing membrane with rather long (0.015 mm) microtrichia. Second costal section 0.66 mm, third costal section 0.79 mm, costal index 0.83 (holotype). R-M–M-M distance 0.32 mm, M-M crossvein 0.14 mm long. Tibiae lighter brown, with both apical parts and a medial part ochre. Tarsi ochre. Mid tibia with *ad* at 18/55 (strong), 37/55 (shorter), 42/55 (strong); *pd* at

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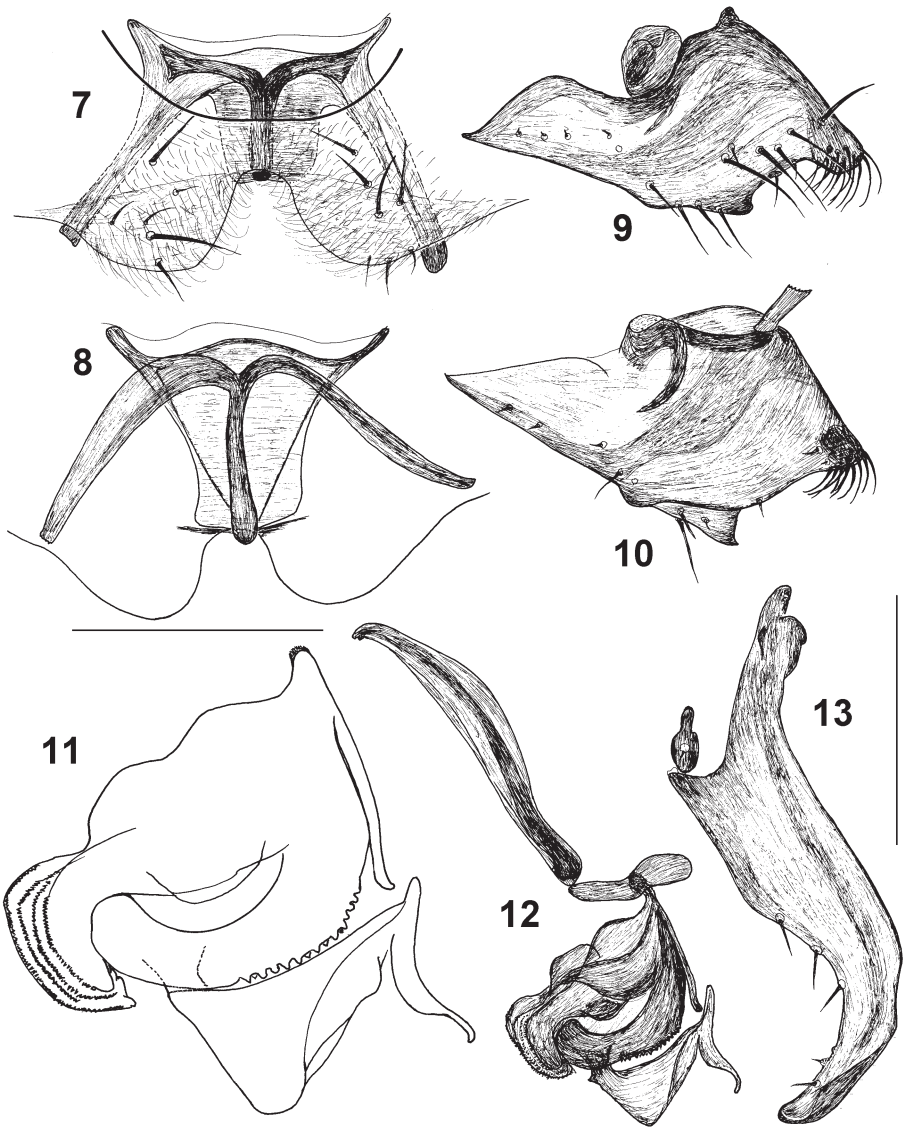


Figs 1–6. *Paralimosina flavifacies* sp. n., holotype male, postabdomen and genitalia: (1) S5, ventral view; (2) caudal part of S5 at higher magnification; (3) S6, ventral view; (4) hypandrium, ventral view; (5) S7–8, ventral view; (6) hypandrium, lateral view, with ventral process at higher magnification. Scale bars: Fig. 1 = 0.4 mm, Figs 2–6 = 0.2 mm, enlarged part of Fig. 6 = 0.1 mm.

16/55, 40/55 (both strong); anterior seta at 39/55; *va* on male mid tibia comparatively thin and only 0.09 mm long, but apical half of male mid tibia ventrally with strong, but not long, thick thornlets in *ca* 3 rows. Female mid tibia with *va*, 0.16 mm long.

Male abdominal S5 (Figs 1, 2) not particularly long, medio-caudally with a small thin desclerotised area, longer setae on caudal margin only. S6–8 not fused to each other, S6 large, i.e. comparatively long and broad (Fig. 3), S7 comparatively small with broadened caudal lobe (Fig. 5); S8 very large, particularly long. There is a well sclerotised sclerite located ventrally to S8, which cannot be interpreted as anything but a tergal part. Epandrium with long setae, particularly so ventrally. Cercal lobe (Figs 7, 8) large and broad, with no thick setae or sclerotised processes ventrally on epandrial complex. Hypandrium (Figs 4, 6) with robust, broad, asymmetrical medial part (‘rod’),

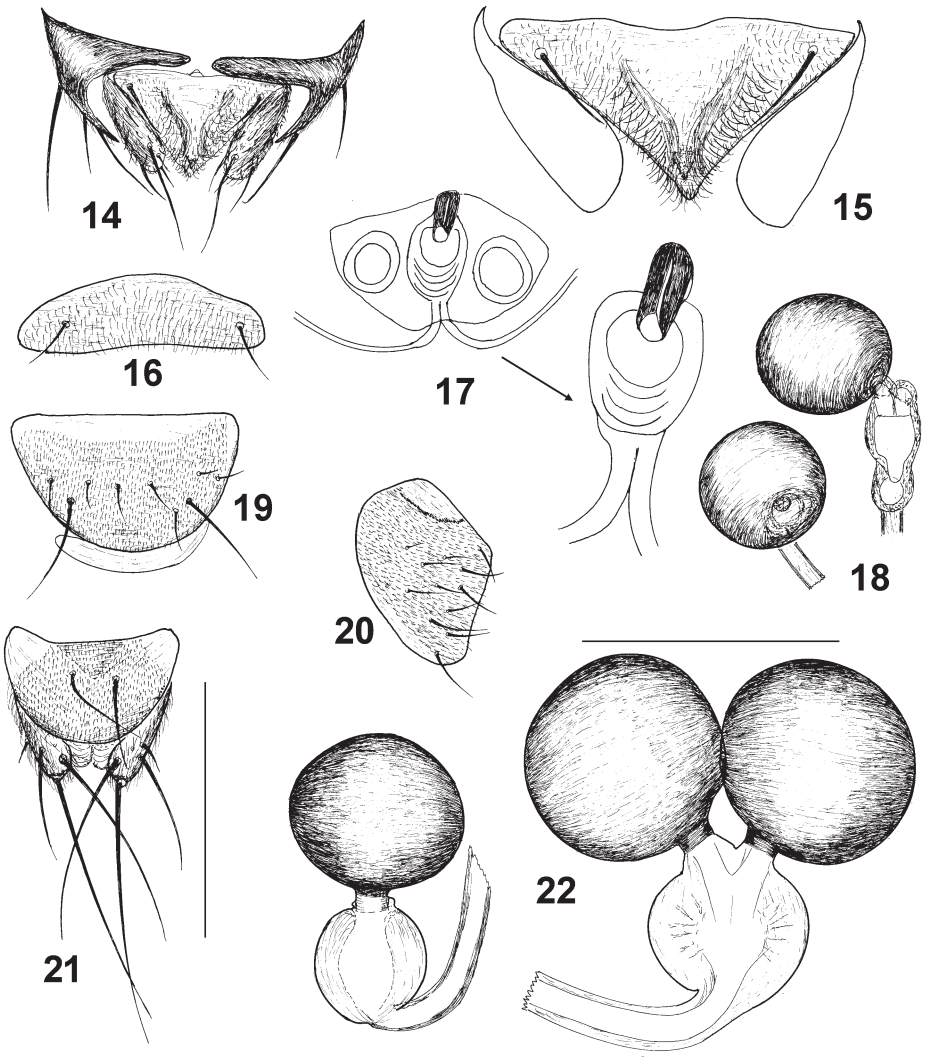
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Figs 7–13. *Paralimosina flavifacies* sp. n., holotype male, postabdomen and genitalia: (7) cercal lobes and subepandrial sclerite, caudal view; (8) cercal lobes and subepandrial sclerite, anterior (inner) view; (9) surstylus, broadest (sublateral) view; (10) surstylus, broadest inner (medial) view; (11) contours of distiphallus, lateral view; (12) phallus and phallapodeme, lateral view; (13) postgonite, lateral view. Scales bars: Fig. 12 = 0.2 mm, Figs 7–11, 13 = 0.1 mm.

and with short arms, which are not fused to epandrium. Medial part with an asymmetrical ventral process medially, which is serrate on anterior edge (Fig. 6). Connecting sclerites of hypandrium strong (Fig. 4). It is much shorter than phallapodeme, medial part with a long caudal process. Subepandrial sclerite (Figs 7, 8) with long process to surstylus, its body higher than broad. Surstylus (Figs 9, 10) very characteristic: anterior lobe smaller

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Figs 14–22. *Paralimosina* spp., female terminalia: (14–18) *P. flavifacies* sp. n., paratype: (14) T8, epiproct and cerci, dorsal view; (15) epiproct with contours of cerci, dorsal view; (16) S8, ventral view; (17) spectacles-shaped sclerite, with mid part at higher magnification; (18) unpaired spermatheca and one of the paired spermathecae with ducts; (19–22) *P. australis* sp. n., paratype: (19) S8, ventral view; (20) T8, lateral view; (21) epiproct and cerci, dorsal view; (22) spermathecae. Scale bars: Figs 14, 16–17, 19–21 = 0.2 mm, Figs 15, 18, 22 and enlarged part of Fig. 17 = 0.1 mm.

than posterior lobe, subtriangular with short setulae (pegs) only; posterior lobe large, with a short, setose caudal process and a small triangular ventral lobe; longer setae on ventral third of surstylus only. Postgonite (Fig. 13) robust with strong basal part, even apical part of postgonite not thin, with curved blunt apex; anterior edge bears some short setae. Phallus short (Figs 11, 12), basiphallus rather small, particularly short. Distiphallus (Figs 11, 12) is an intricate structure: it has a large ventral process, which

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bears a digitiform ventral process; both apical process and ventral edge above the ventral process serrate. Phallapodeme (Fig. 12) comparatively short and thick.

Female T8 in 2 parts as usual (Fig. 14), each with a large, medially directed process having some stronger lateral setae only. S8 very short, although broad, with a pair of widely separated setae (Fig. 16). Epiproct extremely large, broad and triangular, with a pair of widely separated setae and longer but fine hairs apically and on a pair of low, slightly curved, dorsal ridges (Fig. 15). Cerci short and thin, with a medium-length seta and several short pairs of setae. Spectacles-shaped sclerite, rather well-sclerotised, with a stronger, melanised cylindrical structure caudally (Fig. 17). Spermathecae (Fig. 18) globular, without any modifications; ducts short.

Holotype: ♂ TANZANIA: *Tanga*: Amani [5°06'S 38°38'E], 1–18.ii.1987, S. Mahunka & A. Zicsi (HNHM, abdomen and genitalia prepared and preserved in glycerol in a plastic microvial).

Paratype: 1♀ same data as for holotype (HNHM, abdomen and genitalia prepared and preserved in glycerol in a plastic microvial).

Paralimosina australis sp. n.

Figs 19–30

Etymology: From the Latin *australis* (southern).

Description:

Measurements in mm: body length 2.70 (holotype), 2.56–3.15 (paratypes), wing length 2.28 (holotype), 2.08–2.46 (paratypes), wing width 1.06 (holotype), 0.98–1.26 (paratypes).

Body and legs brown, tarsi dirty ochre, antennae dirty red.

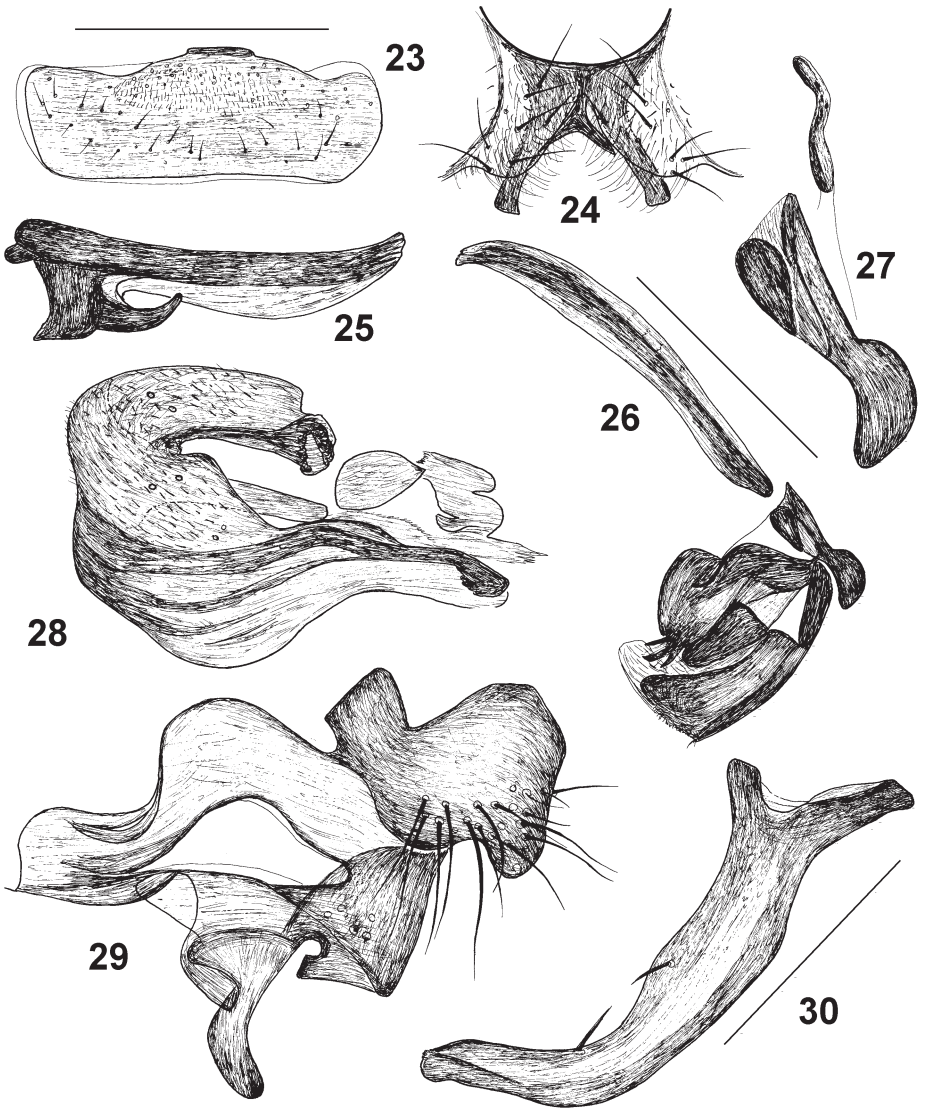
Frons with distinct M-shaped mark (silvery on dark brown). Lunular triangle and face shiny dark brown, occiput dark brown. Three or four pairs of almost evenly long *ifr* plus short anterior pair (holotype with 3 long *ifr* pairs on the right side, left side with 4 pairs plus a 9th thinner seta). Height of gena below eye 0.18 mm, longest axis of eye 0.34 mm, vertical diameter 0.28 mm. Upper 0.6 of gena longitudinally hachured. Genal seta emerges 0.09 mm above mouth margin, 0.15 mm long. Anterior *fr-orb* (0.15 mm) only half as long as posterior one (0.31 mm). Medial seta of scape 0.11 mm long. First flagellomere with cilia 0.025 mm in length. Aristal cilia *ca* 0.015 mm.

Mesonotum dark microtomentose, i.e. not shiny. Acrostichals short and dense. Anterior *dc* only 0.11 mm long. Anterior katepisternal seta not discernible, posterior pair 0.32–0.34 mm long. Wing light brown, veins including costa slightly darker brown. Second costal section 0.91 mm, third costal section 0.69 mm, costal index 1.32. Basal costal seta 0.14 mm. M-M slightly infuscated. Lower edge of discal cell, i.e. M_{3+4} distal appendage, only 0.13 mm long. R-M–M-M distance 0.28 mm, M-M 0.18 mm long.

Male fore coxa with long dense hairs medially. Male mid tibia ventrally with a row of thick, black, thorn-like spines (0.05 mm in length) on apical half but having only a few long hairs there (at most 0.12 mm). Male mid tibia with a medium-length (0.08 mm) *va*. Mid tibia with *ad* at 9/53 (small), 12/53 (medium length), 20/53, 27/53 (both long), 33/53 and 41/53 (longest, 0.14 mm); *pd* at 13/53, 24/53 and 40/53 (longest, 0.21 mm).

Abdomen shiny black. Longest lateral marginal setae on male abdominal tergite only 0.25 mm. Male S5 (Fig. 23) rather long (but much shorter than that of *P. paraustralis*), with a very short medio-caudal extension lacking a seta. That medio-caudal part is only

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Figs 23–30. *Paralimosina australis* sp. n., male paratype, postabdomen and genitalia: (23) S5, ventral view; (24) cercal lobes and subepandrial sclerite, ventral view; (25) hypandrium, lateral view; (26) phallus and phallapodeme, lateral view; (27) basiphallus and ejaculatory apodeme, lateral view; (28) S6–7 parts of synsternite, ventral view; (29) surstylus, broadest (sublateral) view; (30) postgonite, lateral view. Scale bars: Fig. 23 = 0.4 mm, Figs 24–26, 28 = 0.2 mm, Figs 27, 29–30 = 0.1 mm.

slightly more melanised. S6 part of synsternite (Fig. 28) rather large, comparatively long and broad, on the right side distinct sclerotised and melanised sclerites join it ('right side sclerites', see Papp (2008)). Those less formed sclerites are almost perpendicular to the abdominal axis (and join broadly, although membranously, also to S5). S7 part of synsternite large, with short thin setae on all of its surface. S8 part of synsternite small.

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Hypandrial arms rather short and slightly curved; medial part strong, with a sagittal ridge and an anteriorly curved asymmetrical process (Fig. 25). Subepandrial sclerite rather narrow (Fig. 24), its body only 0.07–0.08 mm high, ventral processes comparatively short and thick. Cercal lobes of epandrium very small. They can be regarded as reduced, with sagittal connection of the epandrial complex very low (Fig. 24). Surstylus with very large anterior lobe being an intricate structure: anterior and dorsal parts less strongly sclerotised (Fig. 29). Posterior lobe of surstylus (Fig. 29) much smaller; strongly sclerotised and melanised, with numerous medium-length setae. Phallapodeme strong (Fig. 26), *ca* 0.3 mm long and almost straight in lateral view. Basiphallus (Figs 26, 27) short and high, ventral apex blunt and slightly curved. Distiphallus (Fig. 26) short, only 0.17 mm, without conspicuous processes. Postgonite rather long (0.22–0.23 mm from apex to base), basal part not strongly broadened, clearly curved with blunt apex (Fig. 30). Ejaculatory apodeme (Fig. 27) discernible, but only 0.055 mm long.

Female abdomen 1.62 mm long and *ca* 1.14 mm wide, without long lateral marginal setae. Desclerotised 'window' of T1+2 with a pair of less sclerotised, round plates. T5 only slightly broader than half the width of abdomen. S2 as broad as ⅔ of width of S3 (i.e. 0.35 mm). S6 is 0.46 mm long and 0.165 mm wide. T8 (Fig. 20) subquadratic in lateral view, without medial process, with several short setae laterally. S8 (Fig. 19) rather long and rounded, with a pair of long setae laterally and having 7 or 8 short setae; anterior margin free of small hairs. Epiproct with a pair of long, more closely set setae (Fig. 21); lateral anterior edges free of small hairs. Cerci (Fig. 21) with a pair of very long (0.21 mm) apical setae and a somewhat shorter pair of medial subapical setae; a third pair of long lateral setae also present. Spermathecae (Fig. 22) globular, with short bulbous ducts.

A mature egg is cylindrical, 0.50 mm long and 0.12 mm thick.

Holotype: ♂ SOUTH AFRICA: *Eastern Cape*: Hogsback, Wolf Ridge Road, 32°35'42.2"S 26°56'51.3"E, 1143 m, 8.i.2007, L. Papp & M. Földvári, from undergrowth along a small brook (HNHM).

Paratypes: SOUTH AFRICA: *Eastern Cape*: 4♂ 2♀ same data as for holotype (HNHM, abdomen and genitalia of one male dissected and stored in glycerol in a plastic microvial); 2♀ Hogsback forest reserve, 32°36'S 26°56'E, 1300 m, 19.ii.1997, D. Barraclough & S. James, inside indigenous forest (NMSA); 1♀ same locality but 20.ii.1997, Auckland forest margins (NMSA); 1♀ Hogsback forest reserve, 30°31'S 29°38'E, 1900 m, 14–16.xi.1995, D. Barraclough, indigenous forest (NMSA); 1♀ Dwesa Nature Reserve, 32°16'S 28°51'E, 50 m, 17–20.xi.1991, D. Barraclough, indigenous forest margin (NMSA). *KwaZulu-Natal*: 2♂ 1♀ Pongola Bush Nat. Res., 27°21'S 30°6'E, 18.i.1995, B. Stuckenberg, indigenous forest (NMSA); 1♂ 2♀ Ingeli forest reserve, 30°30'S 29°44'E, 1240 m, 17.ii.1997, D. Barraclough & S. James, indigenous forest (NMSA). *Mpumalanga*: 1♀ Mt Sheba Nat. Res., 24°56'S 30°43'E, 1155 m, 3.iii.1995, D. Barraclough, deep, shaded indigenous forest (NMSA). MALAWI: 1♂ Ntchisi forest reserve, 1334Ac, 1500 m, J. Londt & B. Stuckenberg, 3–4.xii.1980, montane forest and woodland (NMSA). BURUNDI: *Kayanza Prov*.: 1♀ Parc National de la Kibira, Rweguru Sector, 2°55.320'S 29°30.067'E, 21–26.xi.2010, 2237 m, A. Kirk-Spriggs, indigenous afromontane forest, Malaise trap (BMSA).

Paralimosina paraustralis sp. n.

Figs 31–37

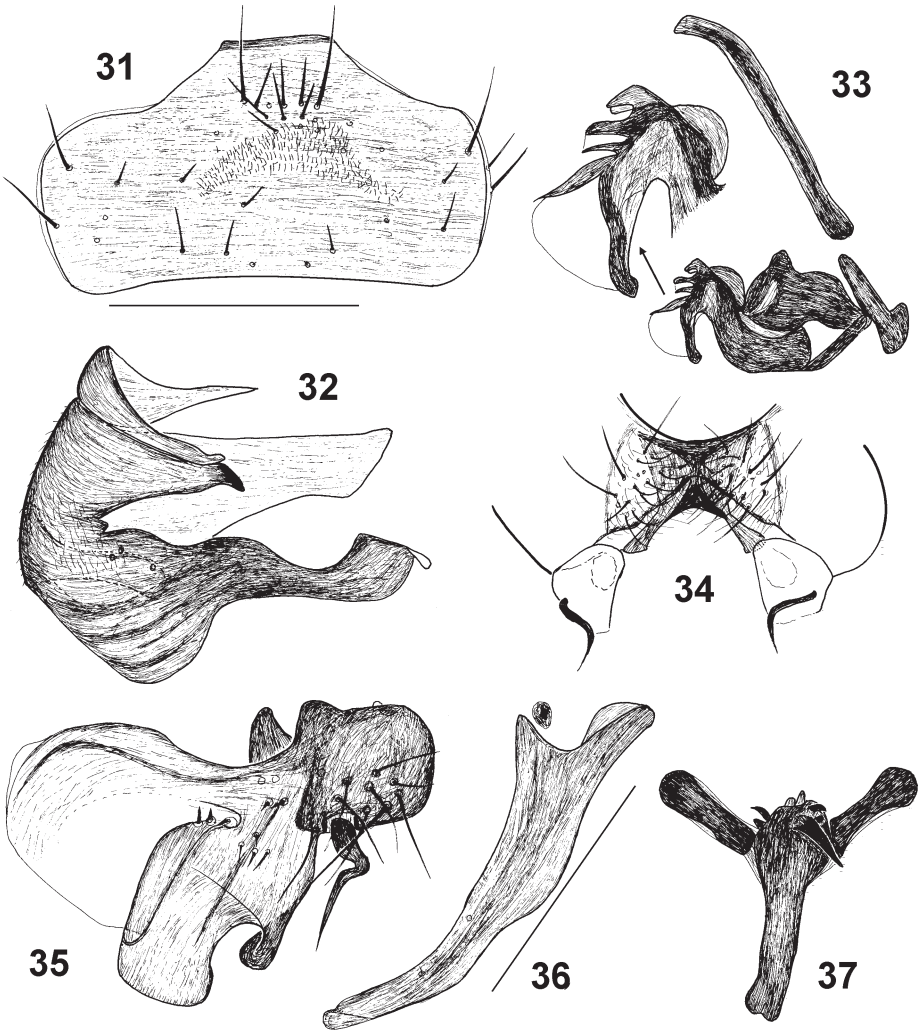
Etymology: From Latin *par* (equal, like) and *australis* (southern), in reference to similarity of this species to *P. australis*.

Description:

Male.

Measurements in mm: body length 2.56, wing length 2.30, wing width 1.07.

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Figs 31–37. *Paralimosina paraustralis* sp. n., male holotype, postabdomen and genitalia: (31) S5, ventral view; (32) synsternite, ventral view; (33) phallus and phallapodeme, with distal part of phallus at higher magnification; (34) ventral part of epandrium and subepandrial sclerite with contours of posterior part of surstyli, caudal view; (35) surstylus, broadest (sublateral) view; (36) postgonite, lateral view; (37) hypandrium, ventral view. Scale bars: Figs 31–34, 37 = 0.2 mm, Figs 35, 36, and enlarged part of Fig. 33 = 0.1 mm.

Body dark brown; frons with M-shaped pattern.

As regards body features, the male of the new species is very similar to *P. australis* sp. n. but differs in the following: mid tibia without a row of thick black setae ventrally, but apical 0.4 has long dense hairs; no *va* on male mid tibia; fore coxa with some longer hairs only; costal index 1.0.

S5 large and very long (Fig. 31), even longer medially; that medial extension with a very short medio-caudal edge, which does not bear a seta. The medio-caudal part is only slightly more melanised. S5 medially with a pair of long subcaudal setae, short setae

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present between them and also laterally. S6 part of synsternite (Fig. 32) rather large, comparatively long and broad, 'right side sclerites' less distinct than in *P. australis*. S7 part of synsternite with an exceptionally large dorsal part. S8 part small. Hypandrial arms (Fig. 37) rather short and broad, not curved, medial part strong, with a lower sagittal ridge and an anteriorly curved, asymmetrical process (Fig. 37). Subepandrial sclerite (Fig. 34) rather similar to that of *P. australis*. Cercal lobes of epandrium can be regarded as reduced but sagittal bridge definitely broader (i.e. higher). Surstylus with extremely large, intricately structured anterior lobe: anterior and dorsal parts less strongly sclerotised (Fig. 35). Posterior lobe of surstylus (Fig. 35) much smaller, with a double-curved long black bristle (Figs 34, 35); posterior lobe strongly sclerotised and melanised and bears several setae of medium length. Phallapodeme (Fig. 33) less strong, *ca* 0.23 mm long and with anterior part ventrally curved in lateral view. Basiphallus (Figs 26, 27) short and high, ventral apex blunt and slightly curved. Distiphallus short (Fig. 33), in contrast to that of *P. australis*, with several apical processes and a ventral process. Postgonite (Fig. 36) shorter than in *P. australis* (less than 0.2 mm from apex to base), thinner and less curved than that of *P. australis*, basal part not strongly broadened, with blunt apex.

Female. Unknown.

Holotype: ♂ SOUTH AFRICA: *KwaZulu-Natal*: Eshowe, Ngoye Forest Reserve [28°51'S 31°41'E], 2839DC, 29.ix.2006, G.B.P. Davies (NMSA, abdomen and genitalia preserved in glycerol in a plastic microvial).

Remark: The discovery of two such closely related species of the Afrotropical *Paralimosina* must make us aware of the possible existence of similar sister species in the region, i.e. of the need for genitalia preparations from specimens in the future.

Paralimosina congoensis sp. n.

Figs 38–41

Etymology. The species is named after Congo.

Description:

Female.

Measurements in mm: body length 1.94, wing length 1.54, wing width 0.70.

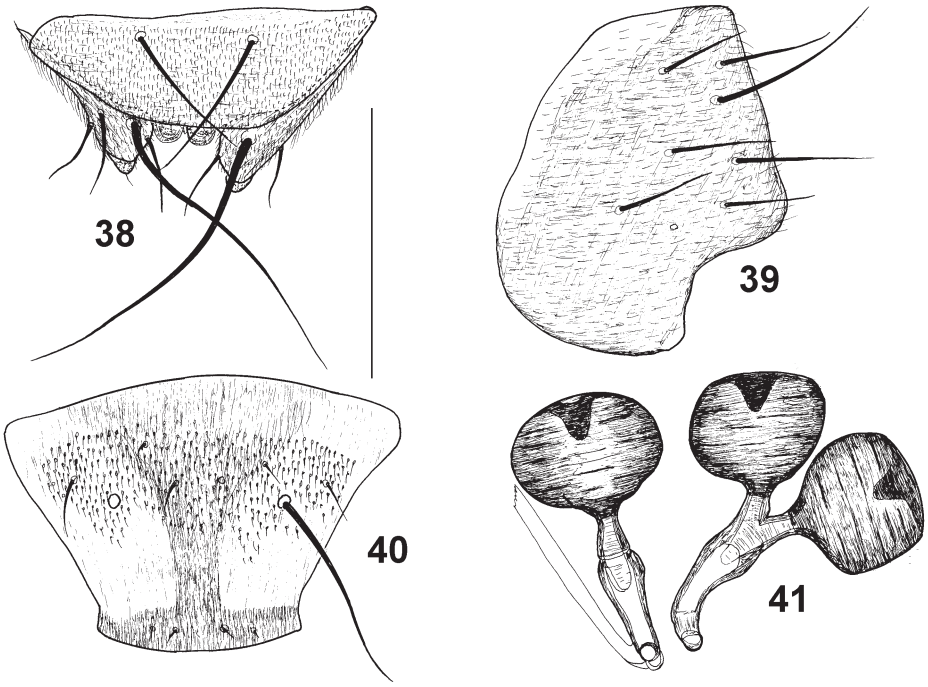
Body dark brown, including frons (the specimen was kept in alcohol for about 3 decades but colours have not faded much); tarsi ochre.

Subantennal swelling of facial plate rather large. Frons with silvery-striped M-shaped pattern. Three pairs of *ifr*, anterior one minute, 2nd and 3rd pairs of medium length (0.08 mm), the posterior pair is anteriad of anterior *fr-orb*. Anterior *fr-orb* 0.09 mm, posterior 0.15 mm long. Vibrissa 0.25 mm long, genal seta not far from mouth margin, strongly upcurving, 0.11 mm long. Antenna 0.23 mm in length. Scape with a thin but very long (0.105 mm) seta. Pedicel with similarly long setae. First flagellomere with dorsal apical conus and with cilia 0.04 mm long. Arista short (*ca* 0.50 mm), aristal cilia 0.04 mm.

Anterior dorsocentral seta only 0.08 mm.

Wing membrane light brownish, veins ochre, longest sub-basal seta of costa 0.12 mm. Setae on first costal section 0.06–0.07 mm, on second section half as long. Costa terminates just at conjunction with R_{4+5}. Second costal section 0.42 mm, third costal sec-

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Figs 38–41. *Paralimosina congoensis* sp. n., holotype female, terminalia: (38) epiproct and cerci, dorsal view; (39) left half of T8, lateral view; (40) S8, ventral view; (41) spermathecae with sclerotised ducts. Scale bar = 0.1 mm.

tion 0.52 mm, costal index 0.81. Lower edge of discal cell smaller than 90°, distal vein appendage of M_{3+4} short and colourless. R-M–M-M 0.17 mm, M-M 0.075 mm, i.e. less than half as long as R-M–M-M. Alula darker than wing membrane, very narrow rounded, only 0.05 mm broad.

No mid ventral seta on mid tibia, *va* 0.09 mm long. Mid tibia with *ad* at 8/35, 16/35, 24/35, 27/35 (very long), only 2 *pd* at 13/35 (very long) and 25/35 (very long).

Abdomen 1.04 mm long and 0.71 mm wide, only moderately flattened, with medium-length, lateral marginal setae on tergites. Only distal half of T2 desclerotised area is weakly but evenly sclerotised. Abdominal sternites not particularly broad; with short and thin setae only. Length of sternites sagittally vs broadest width (in mm): S2 0.21/0.06, S3 0.325/0.16, S4 0.35/0.15, S5 0.35/0.15, S6 0.31/0.10. S7 is 0.07 mm long, T7 and S7 form an open ring of 0.26 mm in diameter. T8 sub-pentagonal, with several moderately long, caudally directed setae (Fig. 39). S8 bipartite (Fig. 40), proximal part with seta(e) of 0.08 mm and a belt covered by dense, short, sharp setulae; distal part quadratic but the more melanised part is T-shaped.

Postabdomen slightly protruding. Epiproct rather broad, with a pair of long setae (Fig. 38). Cerci small and only 0.05 mm long, with a pair of dorsal medial setae 0.13 mm in length and with some short setae. Spermathecae (Fig. 41) are not flattened, and are vesiculate like some of the Palaearctic species (see Roháček & Papp 1988), ducts of medium length and not bulbous.

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Ten mature yellowish eggs of 0.56×0.10 mm and several immature eggs were found in the abdomen of the holotype when dissected.

Male. Unknown.

Holotype: ♀ REPUBLIC OF CONGO: Sibiti [3°41'S 13°21'E], 1.xii.1963, J. Balogh & A. Zicsi (HNHM, right wing lost when prepared from alcohol, abdomen and genitalia dissected and stored in glycerol in a plastic microvial).

Paralimosina heteroneura sp. n.

Figs 42–54

Etymology: From Greek *ἑτερος* (different) and *νευρον* (vein), in reference to the peculiarly short inter-crossvein section.

Description:

Measurements in mm: body length 2.06 (holotype), 2.15 (paratype), wing length 1.30 (holotype), 1.68 (paratype), wing width 0.71 (holotype), 0.81 (paratype).

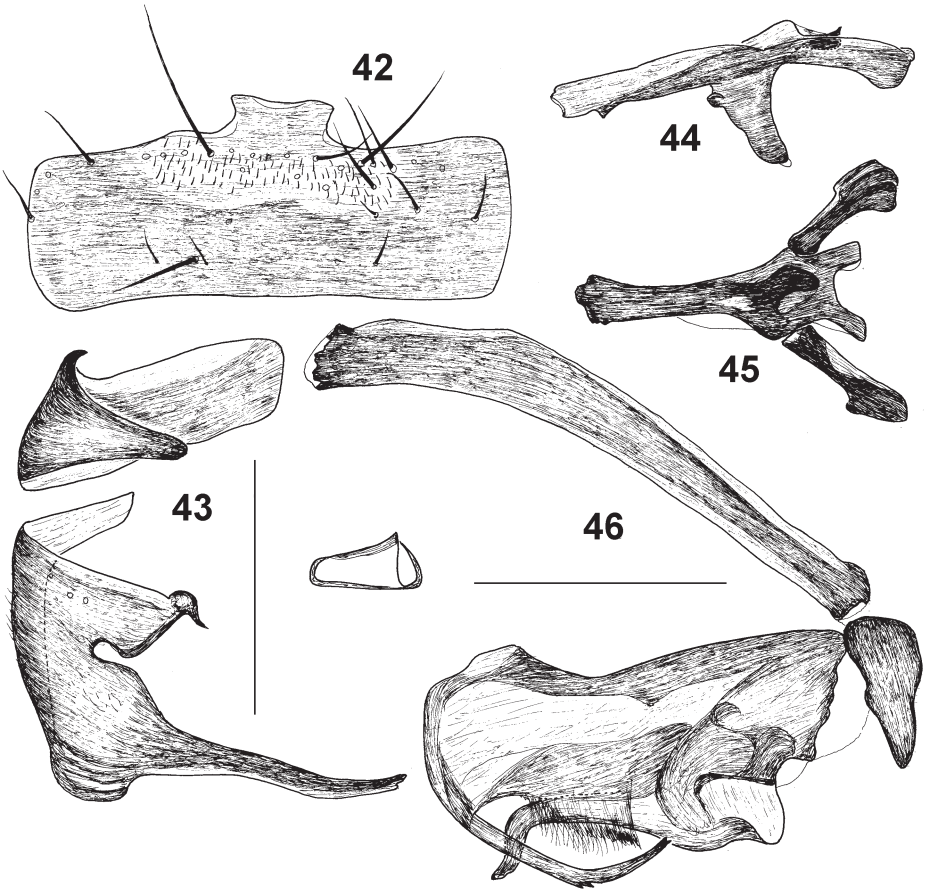
Body dark blackish brown, legs black, tarsi brown.

Frons with distinct M-shaped pattern (silvery on blackish brown). Face moderately shiny. Three pairs of long *ifr* plus a minute anterior pair (holotype), paratype female with a 4th posterior *ifr* on the left side. The posterior *ifr* pair is posterior to anterior *fr-orb.* Genal seta 0.11 mm long and emerges only 0.03 mm above mouth margin. Scape and pedicel dirty reddish, first flagellomere dark grey. Medial seta of scape light and thin; and 0.10 mm in length. Longest cilia on first flagellomere 0.05 mm, aristal cilia slightly more than 0.01 mm.

Mesonotum somewhat more shiny than in *P. australis*. Acrostichals short and dense. Anterior *dc* only 0.08–0.09 mm, i.e. hardly separable from *dc* microchaetae. Anterior katepisternal seta indistinct, posterior one 0.25 mm long. Wing light brown, veins slightly darker. Both crossveins brown-margined. Second costal section 0.440 mm, third section 0.625 mm, costal index 0.70 (holotype); 0.460:0.670 mm, costal index 0.69 (paratype). R-M–M-M 0.13 mm (holotype and paratype), M-M 0.12 mm (holotype), 0.15 mm (paratype). Lower edge of discal cell larger than 90°, vein appendage 0.05 mm. Hairs on medial surface of male fore coxa not particularly long or dense. Mid tibia with *ad* at 10/37, 16/37 (moderately long), 27/37 (longest, 0.16 mm); *pd* (they are all long) at 8/37, 13/37, 25/37 (longest, 0.13 mm); ventroapical hair on male mid tibia only 0.07 mm.

Male S5 (Fig. 42) with a quadrate medio-caudal extension, which is bare. At least 1 pair of very long, submedial, subcaudal setae and several other long setae on S5. A broad, medial, caudal, less melanised area detectable, which bears short setulae. S6–7 parts of synsternite broadly and strongly fused (Fig. 43), S8 component medium-large and not fused to S7 section. Ventral portion of S6 thin, and no sclerotised 'right side sclerites' were found. Hypandrium (Figs 44, 45) comparatively short but robust. Hypandrial arms not fused to either the epandrium or to the medial part ('rod'), arms short with broadened caudal ends (to epandrium); medial part with a large asymmetrical ventral process. No cercal lobes on epandrial complex (Figs 47, 48). Ventral part of epandrial complex with some medium-length setae and dense thin hairs. Subepandrial sclerite about as broad as high, ventral processes short (Fig. 48). Surstylus with a bilobed, less sclerotised and melanised anterior part; both lobes are rounded (Fig. 50). Part connecting to posterior section comparatively thin (narrow) but well-sclerotised. Posterior region of surstylus

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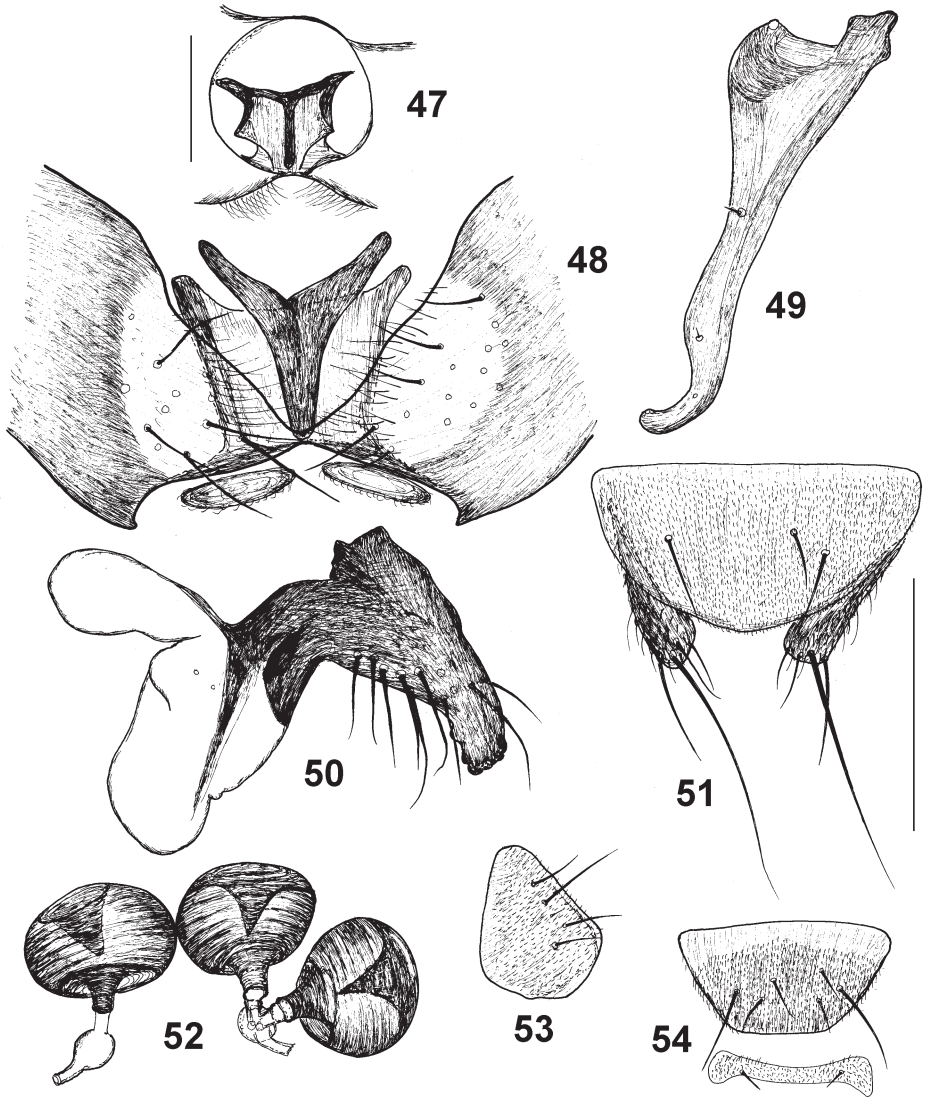


Figs 42–46. *Paralimosina heteroneura* sp. n., holotype male, postabdomen and genitalia: (42) S5, ventral view; (43) synsternite, ventral view; (44) hypandrium, lateral view; (45) hypandrium, ventral view; (46) phallus and phallapodeme, lateral view. Scale bars: Figs 42–45 = 0.2 mm, Fig. 46 = 0.1 mm.

with a long, blunt ventral lobe and several long setae. Phallapodeme 0.24 mm, curved in lateral view (Fig. 46). Phallus (Fig. 46) short, *ca* 0.20 mm. Basiphallus short and not very high, distiphallus with a long, thin, ventrally and caudally curved pair of processes and having a ventrally directed digitiform medial process. Postgonite rather broad-based (Fig. 49), basal 0.8 almost straight, only apical 0.2 narrowed and anteriorly curved. Apex of postgonite narrowly rounded.

Female T8 without medially directed process and with only *ca* 4 medium-length setae (Fig. 53). S8 trapezoid (Fig. 54), with a pair of sublateral setae 0.08 mm long, as well as 4 other short setae; anterior part free of short hairs. Hypoproct, as usual, broad and narrow, with a pair of short widely separated setae. Epiproct broad and semicrescentic (Fig. 51), with a pair of short (*ca* 0.03 mm) setae (on the only female paratype, a third asymmetrically placed seta also present). Cerci short, with a long (0.10 mm), almost straight pair of setae; other cercal setae short. Spermathecae (Fig. 52) slightly compressed, i.e. not globular, sclerotised ducts short and terminating in small bulbs.

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Figs 47–54. *Paralimosina heteroneura* sp. n., male and female postabdomen and genitalia: (47–50) holotype male: (47) ventral part of epandrium with subepandrial sclerite, anterior (inner) view; (48) ventral part of epandrium with subepandrial sclerite and contours of cerci, ventral view; (49) postgonite, lateral view; (50) surstylus, broadest (sublateral) view; (51–54) paratype female: (51) epiproct and cerci, dorsal view; (52) spermathecae; (53) left half of T8, lateral view; (54) S8 and hypoproct, ventral view. Scale bars: Figs 47, 53, 54 = 0.2 mm, Figs 48–52 = 0.1 mm.

Holotype: ♂ SOUTH AFRICA: *KwaZulu-Natal*: Southern Drakensberg, reedy meadow along Mlambonja River, 29°45'14.1"S 29°25'05.4"E, 1497 m, 20–23.i.2007, L. Papp & M. Földvári (HNHM, abdomen and genitalia dissected and stored in glycerol in a plastic microvial).

Paratypes: SOUTH AFRICA: *KwaZulu-Natal*: 1♀ Cathedral Peak area, 22829CC, 5–6.ii.1983, J.G.H. Londt, Malaise trap (NMSA); 2♀ Royal Natal National Park, Thendele, 28°42.378'S 28°56.083'E, 1600 m, 15–17. ii.2010, A.H. Kirk-Spriggs, Malaise trap in *Leucosedea*-dominated scrub (BMSA).

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Paralimosina sinelineata sp. n.

Figs 55–61

Etymology: From Latin *sine* (without) and *linea* (line), in reference to the absence of the M-shaped pattern on the frons.

Description:

Measurements in mm: body length 1.39 (holotype), 1.25–1.70 (paratypes), wing length 1.30 (holotype), 1.25–1.76 (paratypes), wing width 0.61 (holotype), 0.60–0.82 (paratypes).

Body brown, grey microtomentose, legs darker brown, tarsi only slightly lighter.

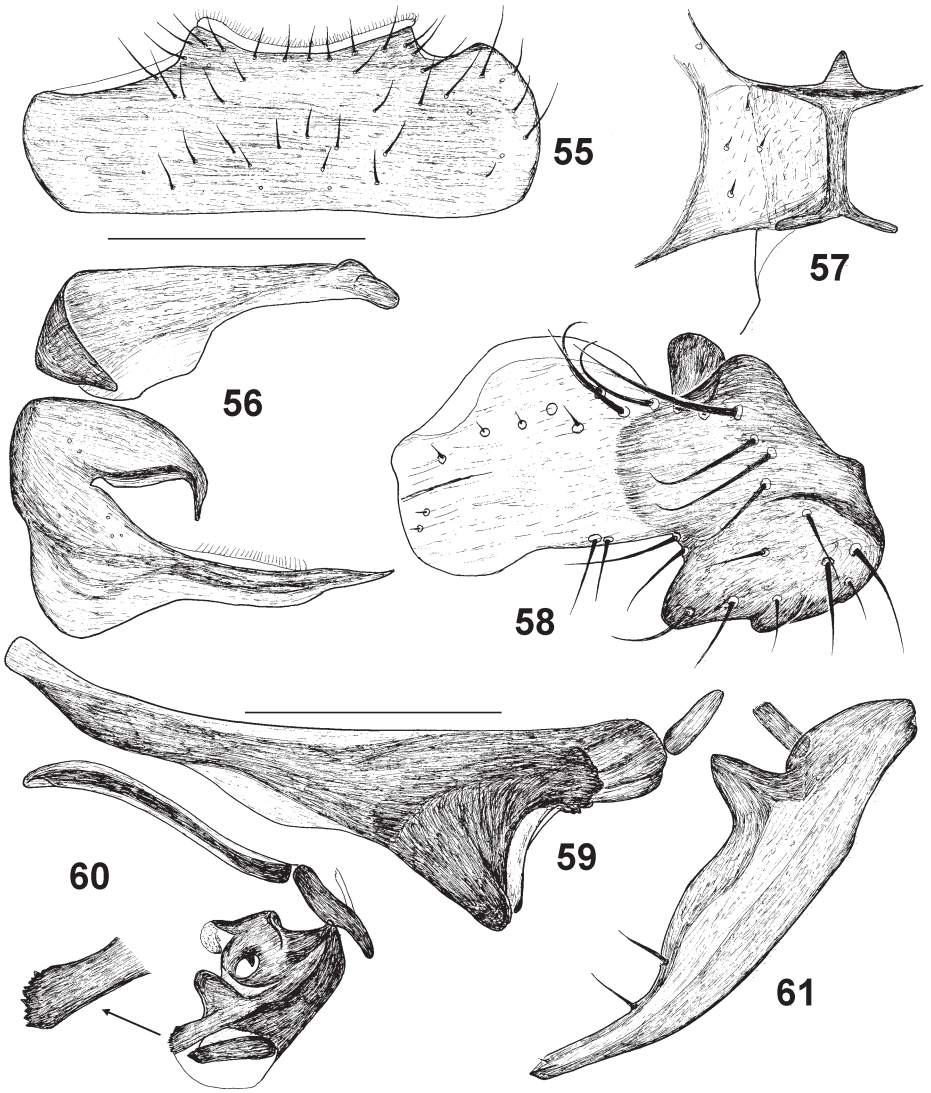
Frons without M-shaped mark, finely microtomentose brown, anterior part ochre. Four *ifr* pairs, anteriormost one prominent but not more than 0.05 mm. Antennae well separated. Medial seta on scape 0.06 mm long, genal seta 0.06 mm. First flagellomere with cilia 0.025 mm long (apical aristomeres broken off, so aristal cilia not measurable).

Anterior katepisternal seta only 0.04 mm long, posterior one 0.14 mm. Wing comparatively short, rounded, uniformly light brown, veins slightly darker, only costal vein darker brown. Basal seta on costa 0.09 mm. Costa overruns R_{4+5} by 0.02 mm. Second costal section 0.44 mm, third section 0.63 mm, costal index 0.71. R-M–M-M 0.19 mm, M-M 0.09 mm. Male mid tibia with *ad* at 9/31 (short), 15/31, 22/31, 24/31 (all three strong); *pd* at 12/31 and 25/31 (both very strong).

Male S5 (Fig. 55) broad and rather long with a broad, medial caudal extension that continued into a narrow membranous margin, which bears short hairs; there are medium-length setae caudally, medially and also on lateral edges. S6–7 parts of synsternite strongly and broadly fused, medial part of S6 not extended much to the right, dorsal part of S7 small. S8 component of synsternite not fused to S7 part, broad on the left side dorsally, narrowed to the right side. No cercal lobes on epandrial complex but the connection of the two halves is broad sagittally (Fig. 57). Subepandrial sclerite almost as high as broad, ventral processes rather short. Hypandrium robust, with a large asymmetrical ventral process (Fig. 59). Surstylus (Fig. 58) with rounded, less sclerotised and melanised anterior part, with comparatively broad connecting part and rather large posterior section, which bears numerous long and medium-length setae. Phallapodeme *ca* 0.22 mm long, slightly curved in lateral view. Phallus (Fig. 60) short (<0.2 mm), basiphallus short but comparatively high, distiphallus with a dorsal, short process medially and a pair of subapical processes, having a serrated apex (Fig. 60). Postgonite with broad base, apical ⅓ narrowed, apex sharp (Fig. 61). Anterior edge with 2 medium-length (a little more than 0.02 mm) setae.

Female abdomen 0.75 as broad as long (postabdomen not at all telescopic), without any long setae, longest marginal setae of tergites only 0.08 mm. S2 trapezoid, medially very weakly sclerotised and melanised; as a result of NaOH preparation, it looks bipartite. S3–5 are ⅓ to ⅔ as broad as tergites. S7 in its natural position (arched) 0.10 mm long and 0.25 mm broad. S8 shield-shaped, with broadly rounded caudal margin, 0.12 mm wide, 0.11 mm long with setae *ca* 0.05–0.06 mm in length on its apical 0.6. Syntergite 0.4 section as long as wide, T1 part weakly sclerotised and light medially, T2 component less darkly melanised medially but not less sclerotised than other parts. T3–6 are 0.25, 0.25, 0.23, 0.2 as long as width of abdomen at their position. T7 is 0.3× as broad as syntergite. T8 in 2 completely laterally placed, comparatively large sclerites (*ca* 0.11 mm

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Figs 55–61. *Paralimosina sinelineata* sp. n., holotype male, postabdomen and genitalia: (55) S5, ventral view; (56) synsternite, ventral view; (57) left half of subepandrial sclerite with base of surstylus, subventral-subcaudal view; (58) surstylus, broadest (sublateral) view; (59) hypandrium, lateral view; (60) phallus and phallapodeme, lateral view, with the apical process of phallus enlarged; (61) postgonite, lateral view. Scale bars: Figs 55, 56, 60 = 0.2 mm, Figs 57–59, 61 = 0.1 mm.

long and 0.15 mm broad), and with a *ca* 0.04 mm long and nearly 0.20 mm wide membranous central part. Epiproct 0.175 mm broad but only 0.050 mm long, no setal pair on epiproct. Hypoproct 0.18 mm in width, broader than a semicircle, with numerous marginal setulae 0.020–0.025 mm long. Cerci strongly oblique to the body axis (*ca* 45°), with a seta 0.11 mm in length and several shorter pairs of setae. Spermathecal ducts not long, so spermathecae are situated in the 7th segment. Spermathecae pear-shaped,

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0.045–0.050 mm broad and 0.055 mm long, apical part of the paired ones slightly obtuse. Proximal part of the ducts extended, the single one slightly and the paired ones more markedly so, where diameter of duct is a little more than 0.02 mm. Spectacles-shaped sclerite distinct, with more obviously sclerotised central part.

Holotype: ♂ SOUTH AFRICA: *Eastern Cape*: forest near R102 road, 33°56'57.3"S 23°36'20.8"E, 224 m, 15–16.i.2007, L. Papp & M. Földvári (HNHM, abdomen and genitalia prepared and preserved in glycerol in a plastic microvial).

Paratypes: SOUTH AFRICA: *Eastern Cape*: 6♂ 4♀ Tsitsikamma National Park, Plaatbos Nat. Res., 33°59.137'S 23°54.895'E, 20–22.i.2009, A. Kirk-Spriggs & S. Otto, Malaise trap in indigenous forest (BMSA, 1♂ 1♀ in the HNHM); 1♀ same data but 33°57.863'S 23°54.454'E, 300 m, 31.iii–1.iv.2009, A. Kirk-Spriggs & S. Otto (BMSA); 9♂ 3♀ Tsitsikamma National Park, Plaatbos Nat. Res., Bloukrans Pass, 33°56.558'S 23°37.556'E, 22–25.i.2009, A. Kirk-Spriggs & S. Otto (BMSA); 1♀ same data but 26–28.i.2009 (BMSA). *Western Cape*: 1♂ Tsitsikamma National Park, Keurbos forest, 33°64.435'S 23°43.714'E, 500 m, 28–30. iii.2009, A. Kirk-Spriggs & S. Otto, sweeping in indigenous mountain vegetation (BMSA).

Key to the Afrotropical species of *Paralimosina*

1 No strong setae on middle third of mid tibia. Male cercal lobes large (Figs 7, 8). Anterior lobe of male surstylus smaller than posterior lobe (Figs 9, 10). Female epiproct large, with laterally placed setal pair (Figs 14, 15). Facial plate entirely and frons partly yellow ..... **flavifacies** sp. n.

– Mid tibia with strong setae, also in the middle third. Male cercal lobes very small (e.g. Figs 24, 34) or absent. Anterior lobe of male surstylus larger then posterior lobe (Figs 29, 35). Female epiproct smaller, its setal pair is more central (e.g. Fig. 38). Facial plate and frons usually dark 2

2 Frons shiny, without M-shaped pattern. R-M–M-M much longer than M-M (up to 2× longer), lower edge of discal cell not rectangular. Anterior *dc* at least half as long as posterior *dc* ..... **sinelineata** sp. n.

– Frons dull, with M-shaped pattern. R-M–M-M ≤1.5× as long as M-M, lower edge of discal cell tends to be rectangular. Anterior *dc* weaker or even minute.....3

3 (3)–4–(5) (usually 4) pairs of short *ifr*, much shorter than (half as long as) anterior *fr-orb*. Costal index at least 1.0, usually much higher 4

– 3 pairs of long *ifr*, as long as anterior *fr-orb*. Costal index noticeably less than 1.0 5

4 Male mid tibia with a row of thick black spines ventrally on apical half but having only a few long hairs there. Male mid tibia with a medium-length *va*. Male fore coxa with long dense hairs medially. Costal index much greater than 1.0 .... **australis** sp. n.

– Male mid tibia without a row of thick black setae ventrally but apical 0.4 with long dense hairs. No *va* on male mid tibia. Male fore coxa with some longer hairs only. Costal index 1.0..... **paraustralis** sp. n.

5 R-M–M-M twice the length of M-M. Aristal cilia at least 0.04 mm long. The posterior *ifr* pair is anterior to anterior *fr-orb.* Wing membrane not darkened ....**congoensis** sp. n.

– R-M–M-M shorter or only slightly longer than M-M. Aristal cilia slightly longer than 0.01 mm. The posterior *ifr* pair is posterior to anterior *fr-orb.* Wing with a diffuse darkening around M-M ..... **heteroneura** sp. n.

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