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Biogeographical and evolutionary aspects of a Guineo-Congolian bushcricket tribe: Revision of the genera *Cestromoecha* Karsch, 1893 and *Poreuomena* Brunner von Wattenwyl, 1878, with the description of new species (Orthoptera, Tettigoniidae, Phaneropterinae)

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Abstract

The genera *Cestromoecha* and *Poreuomena* of the tribe Poreuomenini in Phaneropterinae are revised and new generic characters are given for both genera, and six new species are described in *Poreuomena*. The newly described species are *P. biaculeata* **sp. nov.**, *P. eala* **sp. nov.**, *P. gracilicercata* **sp. nov.**, *P. ivoriana* **sp. nov.**, *P. matthaei* **sp. nov.**, and *P. tshuapa* **sp. nov.** Based on characters defining the two genera, three species so far listed under *Cestromoecha* are transferred to *Poreuomena: P. crassipes* Karsch, 1890, *P. laeglae* (Massa, 2015), and *P. magnicerca* (Massa, 2013). One species of *Cestromoecha*, *C. mundamensis* Karsch, 1896, is synonymised with *C. tenuipes* (Karsch, 1890) since no morphological differences were detected between the type specimens. Thus, two species remain with *Cestromoecha*, and *Poreuomena* now contains 16 species.
Morphological closely-related species of *Poreuomena* suggest rapid speciation in the Congo Basin due to several expansions and shrinkages of the Guineo-Congolian forest belt since the Oligocene. At least two different morphological lineages are discernible. On the other hand the genus *Cestromoecha* Karsch, 1893 is a species-poor taxon.

Key Words

taxonomy, identification characters, synonymies, biogeography, speciation

Introduction

Information on Phaneropterinae and also other Orthoptera of Central to West Africa is sparse. Most research activity, mainly the collecting of specimens, reaches back to colonial times. More recent studies in parts of Africa were conducted by, for example, Naskrecki (2009) or Heller et al. (2014). Only recently further more comprehensive research was conducted in West (Côte d'Ivoire) and Central Africa (Central African Republic) including light trapping, thus enabling the study of the Tettigoniidae fauna of these areas in more detail (e.g. Massa 2013, 2015, 2016, 2017, 2018, 2020; Hemp and Massa 2017; Massa et al. 2020). New species of *Poreuomena* have been detected by visiting various entomological collections in Europe or within material received from African expeditions.

In this study, we focus on the tribe Poreuomenini which includes the three genera, *Cestromoecha* Karsch, 1893, *Poreuomena* Brunner von Wattenwyl, 1878 and the monotypic *Paraporeuomena* Massa, 2018, tentatively included in the tribe. Currently, the genera *Cestromoecha* and *Poreuomena* contain 13 species, all from central-western Africa. We review the genera *Poreuomena* and *Cestromoecha* providing new characters on generic level since both genera were described only on the few male specimens present at that time only by Brunner von

Wattenwyl (1878) and Karsch (1893). A biogeographical analysis is conducted on the basis of the morphology of the outer male genitalic apparatus.

Materials and methods

Most specimens studied in the present paper were studied in museum collections, others were collected at nighttime attracted to light (UV) both on the ground and in the canopy of central-western countries of tropical Africa during scientific expeditions. Before mounting specimens, the left wing of every male having different cerci was spread in order to allow the study of the stridulatory file on the underside of the left forewing; the number and arrangement of the teeth are diagnostic and are useful characters to identify whether a species is bioacoustically separated from one another (Heller 2006). Characters of specimens, such as stridulatory area, stridulatory file, cerci in frontal and lateral views were photographed with a Nikon Coolpix 4500 digital camera, mounted on a Wild M3 Stereomicroscope, or with an Olympus Tough F2.0 camera. Photographs were integrated using the freeware CombineZP (Hadley 2008). Mounted specimens were measured with a digital caliper (precision 0.01 mm). Due to the difficulties in identifying females, in the present paper, they are included only in case they were collected at the same locality and on the same date as a corresponding male.

Abbreviations used in this paper

ANHRT African Natural History Research Trust, Hereford, UK.
BMPC Bruno Massa Collection, Palermo, Italy.
CCH Claudia Hemp Collection, Bayreuth, Germany.
HNHM Hungarian Natural History Museum (Magyar Természettudományi Múzeum)
MfN Museum für Naturkunde, Berlin, Germany.
MHNG Muséum d'Histoire Naturelle de Géneve, Geneva, Switzerland.
MNHN Muséum National d'Histoire Naturelle, Paris, France.
MNCN Museo Nacional de Ciencias Naturales, Madrid, Spain.
MRAC Musée Royal de l'Afrique Centrale, Tervuren, Belgium.
MSNG Museo Civico di Storia Naturale 'G.Doria', Genoa, Italy.
NHRS Naturhistoriska Riksmuseet, Stockholm, Sweden.
NHM Natural History Museum (formerly British Museum Natural History), London, UK.
NHMW Naturhistorisches Museum Wien, Vienna, Austria.
PAPC Philippe Annoyer Collection, Sainte Croix Volvestre, France.
RBINS Royal Belgian Institute of Natural Sciences, Bruxelles, Belgium.

Results

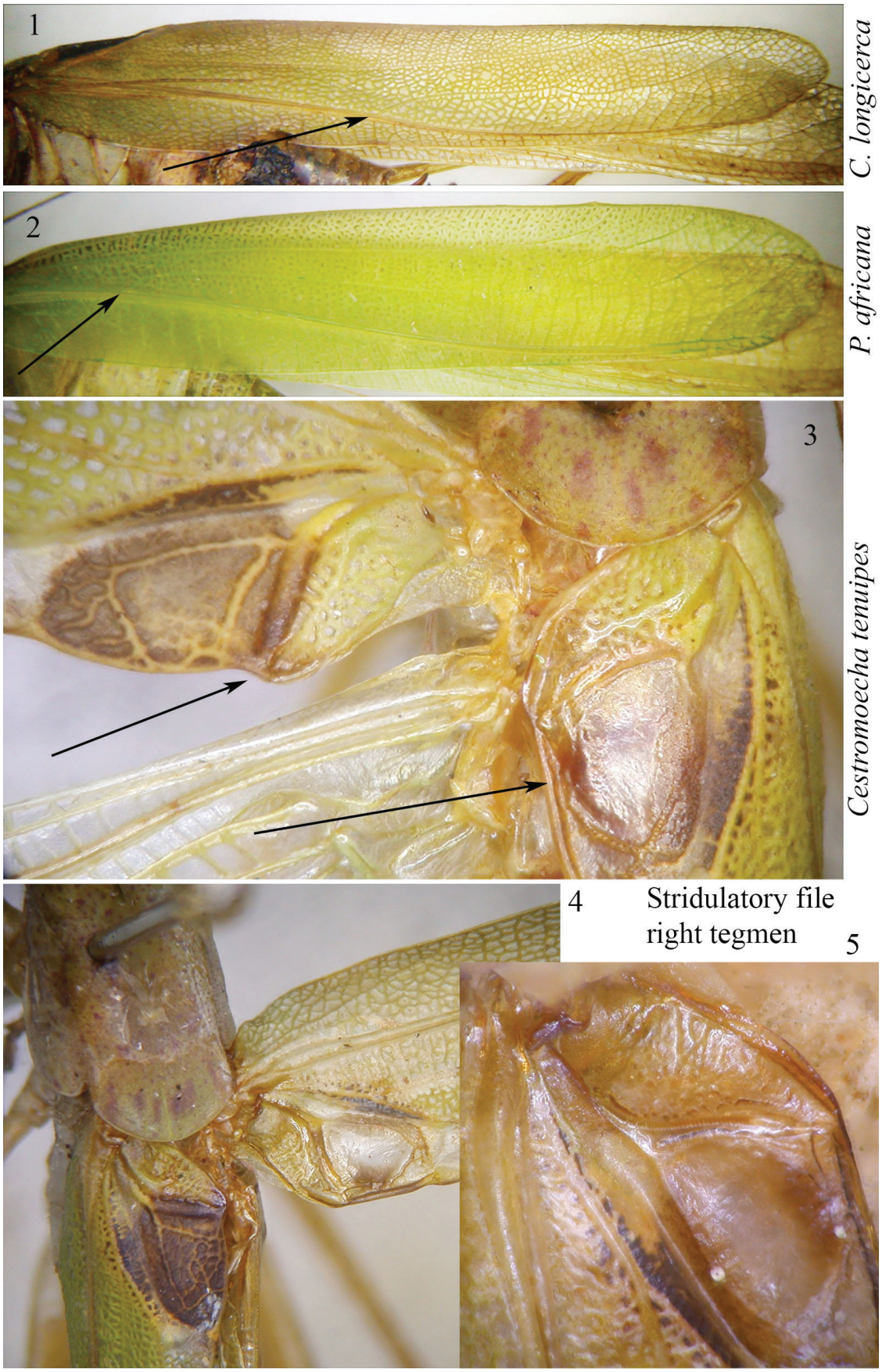
Tribe Poreuomenini Brunner von Wattenwyl, 1878

Iconography. The name *Poreuomena* is probably derived from the Greek verb Πορεύω meaning "bringing something into a definite direction". The name *Cestromoecha* is probably derived from Κέστρον, an instrument used in pyrography (drawing by means of heat), pointed on one side and rounded on the other. The same name was used by the Macedonians to indicate a particular type of arrow; the word indicates something that has the form of κέστρον (κέστρον μοι έχειν).

Remarks on the tribe Poreuomenini. Brunner von Wattenwyl (1878) erected the group Poreuomenae and the genus on the single species *Poreuomena africana* from Gabon, the only species known in this group at that time. Brunner von Wattenwyl (1878) noted that the new genus is similar in habitus to the genus *Phaneroptera.* Regarding differences to *Phaneroptera* both sides of the tympanal organs are closed in *Poreuomena* (not true for all newly-described species though, see below) while they are open in *Phaneroptera*. Furthermore, the fore tibiae are smooth without any furrow at their dorsal sides and completely unarmed. These characters differentiate the Poreuomenini from Phaneropterini and place them near to the Holochlorini (formerly divided into Holochlorae and Psyrae). Since *Poreuomena* was erected on the species *africana* generic characters were the 10th abdominal tergite of the males being extended in two lobes and the Rs vein branching off near the base of the tegmen.

Karsch (1890) described *Poreuomena tenuipes* but erected a few years later his own genus on this species (Karsch 1896). The differentiating character for the two genera as given by Karsch (1896) was a bilobed 10th male tergite in *Poreuomena* and an undifferentiated 10th tergite in *Cestromoecha.* Further Karsch noted that the first side vein of the radius (Rs) typically branches off near the base in *Poreuomena* but more in or behind the middle in *Cestromoecha* (Figs 1, 2). Comparing all species we found that a further typical character of *Poreuomena* is flaps on both tegmina – both with stridulatory files on the underside (Figs 6–8). A flap and very likely convergently-evolved similar structure is only found in the East African endemic *Ectomoptera* Ragge, 1980 that has, however, a well-developed mirror on the right tegmen, while in *Poreuomena* a mirror is lacking completely. On the right tegmen only a reduced stridulatory file is found in *Ectomoptera* (for a review of stridulatory files on the right tegmen of Ensifera see Leroy 1970 or Chamorro-Rengifo et al. 2014). Table 1 shows a compilation of characters for species of the two genera *Poreuomena* and *Cestromoecha* with respective taxonomic changes.

Referring to the type species of *Poreuomena*, *P. africana*, and *Cestromoecha*, *C. tenuipes*, several species are currently misplaced and are here transferred to their respective genus on grounds of generic characters given above and below. A very obvious distinguishing character on generic level is the presence (*Poreuomena africana*) or



Figures 1–5. Venation of Poreuomenini. Arrows point at Rs branching of from the radius **1.** Rs branching off after the middle in *Cestromoecha tenuipes*. **2.** Rs branching off basally, for example, in *Poreuomena africana*. **3–5.** Mirror area of *Cestromoecha tenuipes* lacking the flaps on both tegmina bases, but with a well-developed mirror on the right tegmen (arrows). **5.** Mirror area of *Cestromoecha tenuipes* from the underside with a well-developed stridulatory file, typical for all Poreuomenini.







Figures 6–8. Tegminal flaps at the bases of the tegmina, here in *Poreuomena tshuapa* sp. nov., a generic character for the genus *Poreuomena*.

Table 1. Morphological characters of the genera *Poreuomena* and *Cestromoecha*. **Rs:** Position of Rs branching off from radius. **Flaps:** flaps on both tegmina developed or not. **Mirror:** mirror on right tegmen developed or not. **10th:** 10th abdominal tergite "bilobed" (derived from the basic structure of an elongated 10th tergite with lateral bulges or short or long, straight or downcurved lateral processes) or undifferentiated or differently shaped.

Species	Rs	Flaps	Mirror	10th abdominal tergite
Cestromoecha				
C. longicerca Massa, 2013	behind middle	no	large mirror	stout 10th tergite with almost straight posterior margin
C. mundamensis Karsch, 1896 (synonym with the following species)	behind middle	no	small mirror	straight margin with median ridge
C. tenuipes (Karsch, 1890)	behind middle	no	small mirror	undifferentiated, straight margin
Poreuomena				
P. africana B. v. Wattenwyyl, 1878	basal	yes	no	bilobed: posteriorly produced with two thick downcurved processes
P. biaculeata sp. nov.	basal	yes	no	bilobed: posteriorly produced with two laterally compressed downcurved lobes
P. crassipes (Karsch, 1890) stat. nov.	basal	yes	no	bilobed; elongated downcurved flap forming two bulges
P. duponti Griffini, 1908	basal	yes	no	bilobed : posteriorly produced with two thick processes
P. eala sp. nov.	basal	yes	no	bilobed: posteriorly produced with two bulgy lobes
P. forcipata Sjöstedt, 1902	basal	yes	no	bilobed: posteriorly produced with two thick somewhat laterally expanded and downcurved processes
P. gracilicercata sp. nov.	basal	yes	no	bilobed: two stout bulges with long downcurved processes
P. huxleyi Massa, 2013	basal	yes	no	bilobed: posteriorly produced with short stout processes narrowing suddenly to a thin elongate, laterally compressed, flagellum-like shape
P. laeglae (Massa, 2015) stat. nov.	basal	yes	no	two broad but narrow lobes with median gap
P. lamottei Chopard, 1954	basal	yes	no	bilobed: posteriorly produced with two stout and downcurved lateral processes
P. magnicerca (Massa, 2013) stat. nov.	basal	yes	no	undifferentiated, straight margin
P. matthaei sp. nov.	basal	bulge	no	broad, shield-like with median gap
P. sanghensis Massa, 2013	basal	yes	no	bilobed: broad with short lateral flanges forming a u-shaped gap between them
P. tshuapa sp. nov.	basal	yes	no	broad with shallow median depression and two reduced knob-like processes
P. wilverthi Griffini, 1908	basal	yes	no	bilobed: broad with short lateral flanges

absence (*Cestromoecha tenuipes*) of a mirror on the right side of the tegmen (Figs 3–5) – as well as the well-developed flaps with the stridulatory files on the underside in *Poreuomena* (Figs 6–8). *Cestromoecha* either has, at most, a small bulge on the left tegmen and a separate flap with a stridulatory file on the underside on the right wing but a well-developed mirror.

Karsch (1896) noted that he could not decide whether *Poreuomena crassipes*, described by him on a single female, also belonged to the new genus *Cestromoecha* or not since the male was unknown. Ragge (1968) in his index-catalogue of African Phaneropterinae listed the latter species under *Cestromoecha* without giving reasons for this change. Massa (2013) described the male of *C. crassipes* leaving it with *Cestromoecha*, although having a bilobed 10th tergite and tegminal flaps typical for *Poreuomena*. *Poreuomena magnicerca* transferred by us from *Cestromoecha*, has typical tegminal flaps, a Rs branching off from the radius near the base of the tegmen, however, for *Poreuomena*, with an untypical, undifferentiated and thus not bilobed 10th abdominal tergite. All other known *Poreuomena* species, including the here newly-described species have tegminal flaps on both tegmina, except for *P. matthaei* sp. nov. with a bulge at the right base of the tegmen. A flap is here defined as elongated and narrow, mostly pointed structure at the base of the tegmina, while a bulge is a broad and not pointed structure. Further, *Poreuomena* species have a Rs branching off from the radius near the base and a 10th abdominal tergite derived from a bilobed basic structure (elongated bulges or with short or long, straight or downcurved lateral processes). Two species remain in *Cestromoecha*, *C. tenuipes* (syn. *C. mundamensis*) and *C. longicerca*, both having mirrors on the right side of the tegmen and no tegminal flaps (Figs 10, 12, 17).

Genus *Cestromoecha* Karsch, 1893

Figs 9–21

Cestromoecha Karsch, 1893. Berlin Ent. Z. 38: 128; type species: *Poreuomena tenuipes* Karsch, 1890

Re-description. Medium-sized, predominantly green, typical Phaneropterinae with narrow and elongate tegmina surpassed at their apices by the alae. Fastigium verticis smaller than the width of the scapus; triangular with rounded apex, shallowly sulcate, separated from conical fastigium frontis by a gap. Antennal sockets elevated beside fastigia. Fore coxa with a spine. Fore and mid femora dorsally rounded, ventrally with very tiny spinules. Hind femora slender, slightly thickened in basal part, with few tiny spinules along the ventral length. Fore tibiae very slender, thickened in the area of the tympana and slightly sulcate dorsally; tympana open on the inner, conchate on the outer side. Hind tibiae triangular or narrow rectangular in diameter, densely packed along each edge with slender spines; dorsally with a pair of tiny spurs on each side, ventrally with each one larger spur on each side. Left tegmen of typical Phaneropterine shape, with a slight bulge where the stridulatory file is located at the underside (Figs 10, 17). The right tegmen with a well-developed mirror (Figs 3, 5). Male 10th abdominal tergite either flap-like or stout (Figs 13, 14, 20). Cerci from stout to long, slender and pointed; subgenital plate deeply bilobate; without styli (Figs 15, 21).

Cestromoecha longicerca Massa, 2013

Figs 1, 9–15

Cestromoecha longicerca Massa, 2013. J. Orth. Res. 22: 142; type locality: Central African Republic, Dzanga-Ndoki National Park (BMPC).

Material examined. Central African Republic, Dzanga-Ndoki National Park, Lake 1, UV trap, 11–12.II.2012 (holotype ♂); same data 20–23.II.2012 (paratype ♂) (BMCP); **Central African Republic**, Dzanga-Ndoki NP, Saline des Buffles, 25.I.2012 (1♂); Mboki, 25–26.I.2012 (light) (1♂); Lake 1, 14–15.II.2012, 19–20.II.2012 (light) (3♂) (PAPC). **Gabon**, Mikongo (Rougier), Mts de Cristal (secondary forest) (430 m alt.) 28.VII-12.VIII.2019 (MV Light Trap) (1♂) (ANHRT).

Diagnosis. The stridulatory area of the left tegmen is short; it is slightly arched and has ca. 30 evenly-spaced teeth (Fig. 11). The right tegmen has a mirror (Fig. 10). The cerci are strongly curved downwards at their bases, with their inner parts concave, sharply bent upwards and becoming narrower with pointed tips (Figs 13, 14). The subgenital plate is triangular, narrowing to its apex, divided into two long and acute lobes (Fig. 15).

Colour. Green-brownish, tegmina green with a black marking on the stridulatory area (Figs 9, 10), black spots on the posterior margin of tegmina, 3–4 small yellow spots on the centre of the tegmina. Some small reddish spots are present on the pronotum.

Measurements (mm). Males. Body length: 15.7–16.0; Pronotum length: 4.0–4.2; Pronotum height: 3.5–3.7; Length of hind femora: 17.4–17.5; Length of tegmina: 25.8–28.2.

Remarks. The cerci of the male have a very stout base, with the inner part concave bending sharply upwards and becoming very narrow; the cerci surpass clearly the 10th tergite and the apices are very pointed (Figs 13, 14).

Distribution. Dzanga-Ndoki National Park (Central African Republic) (Massa 2013, Massa et al. 2020), and Mts de Cristal (Gabon) (Massa, in press).

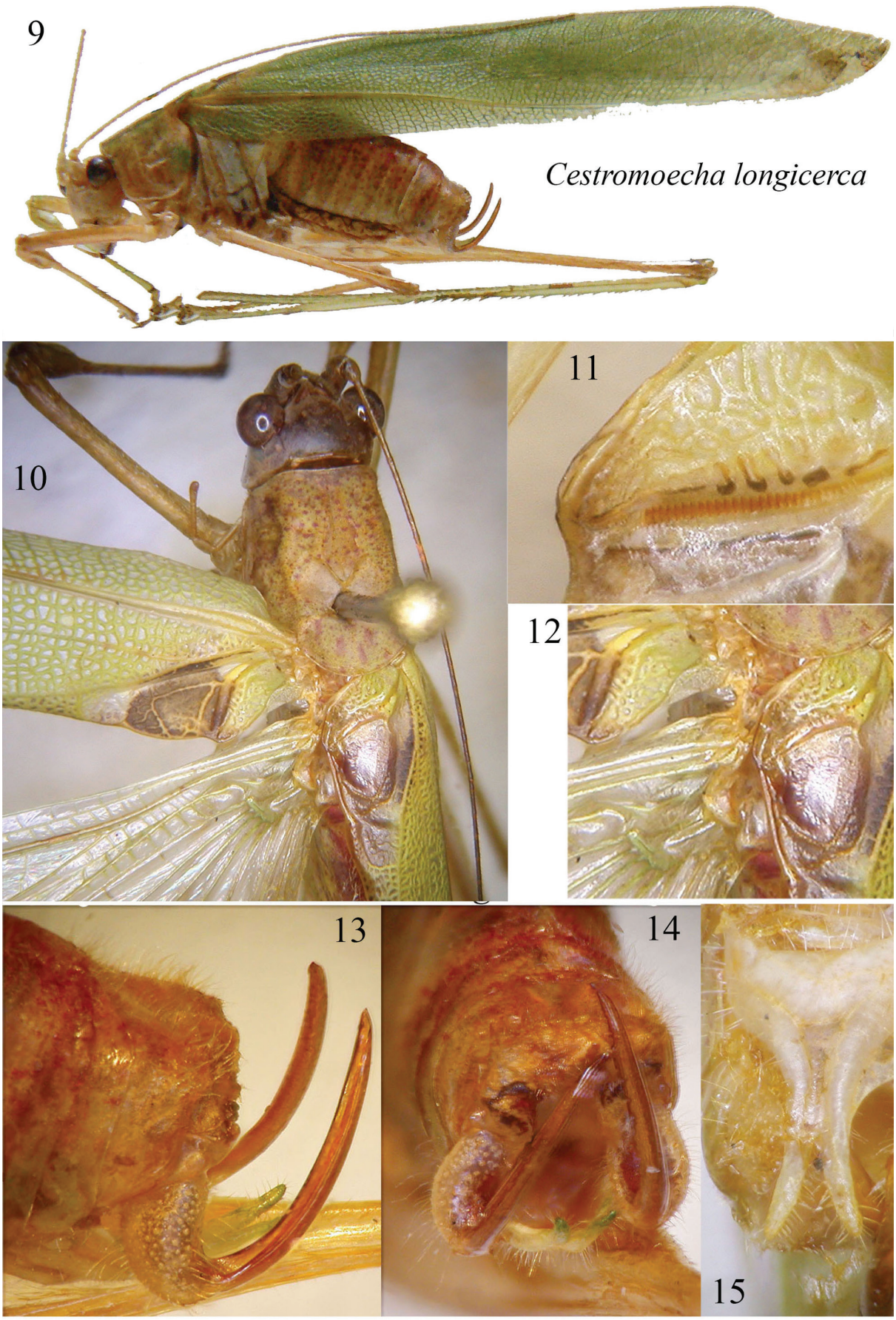
Cestromoecha tenuipes (Karsch, 1890)

Figs 16–21

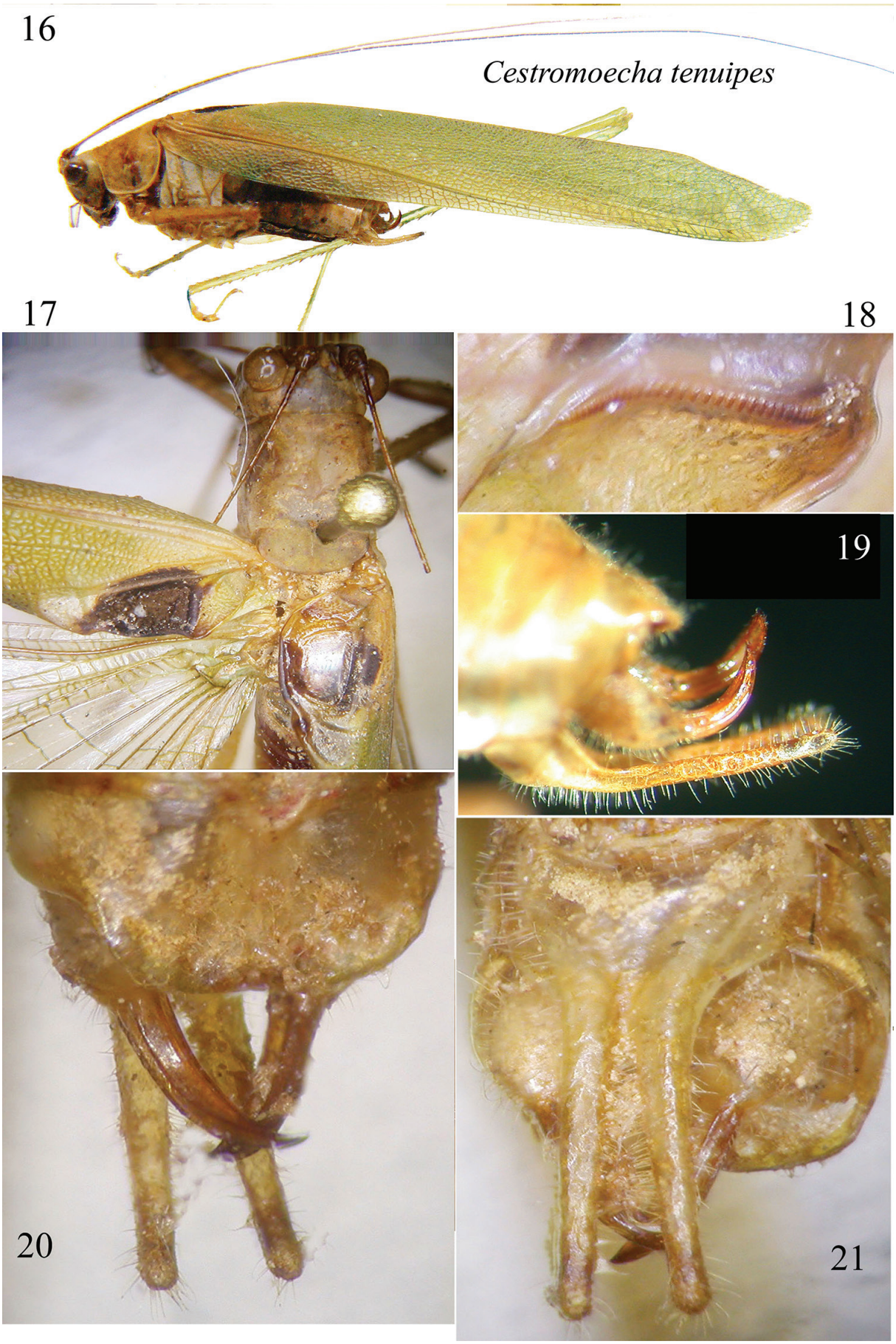
Cestromoecha tenuipes Karsch, 1890. Entom. Nachricht. 16: 363; type locality: Cameroon, Barombi Station (MfN).

Syn. *Cestromoecha mundamensis* Karsch, 1896 syn. nov.

Karsch 1896. Stett. Entomol. Z. 57: 338; type locality: Cameroon, Mundame (MfN).



Figures 9–15. Morphological details of male *Cestromoecha longicerca*. Habitus (**9**). Stridulatory area with mirror on right tegmen (**10**), stridulatory file on the underside of the left tegmen (**11**), close-up of mirror (**12**), abdominal apex in lateral view (**13**), rear view (**14**) and subgenital plate (**15**).



Figures 16–21. Morphological details of male *Cestromoecha tenuipes*. Habitus (**16**), stridulatory area (**17**), stridulatory file on the underside of the left tegmen (**18**), abdominal apex in lateral (**19**) and dorsal view (**20**) and subgenital plate (**21**).

Material examined of *C. tenuipes*. Cameroon, Barombi Station (2♀ syntypes) (MfN); **Cameroon** (1♀) (MCNM); **Cameroon**, Mundame (1♂, 2♀) (NHMW); **Angola** (1♀); **Equatorial Guinea**, Fernando Poo (1♂);

Material examined of *C. mundamensis*. Equatorial Guinea, Fernando Poo, Musolo I. 1902, L. Fea (1♂, 1♀); Fernando Poo, Basile (1♀) (MSNG); **Cameroon**, Campo Ma'an National Park (lowland rainforest) (950 m alt.) 10–22. III. 2018 (MV Light Trap), Fotsing, Ishmael, Miles, Safian (1♂) (ANHRT); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 30–31. I. 2012, 11–12. II. 2012, 21–22. II. 2012 (light) (3♂) (BMPC & PAPC).

Diagnosis. Sjöstedt (1912) stated that Griffini (1905/6) found no differences between *C. tenuipes* and *C. mundamensis*, both described by Karsch. Sjöstedt mentions that a generic character on which *Cestromoecha* was erected, is a missing mirror on the right tegmen, while *C. mundamensis* has a well-developed mirror. However, both *C. tenuipes* (Fig. 17) and *C. mundamensis* males have well-developed mirrors and a comparison of the outer genitalic system of both *C. tenuipes* (Figs 19–21) and *C. mundamensis* showed no differences. Therefore, we suggest to synonymize both species that also have an overlapping distribution pattern to be synonymised.

Distribution. Central to West Africa.

Genus *Poreuomena* Brunner von Wattenwyl, 1878

Poreuomena Brunner von Wattenwyl, 1878. Monographie der Phaneropteriden 187; type species: *Poreuomena africana* Brunner von Wattenwyl, 1878

Re-description. Medium-sized, predominantly green typical Phaneropterinae with narrow and elongate tegmina surpassed at their apices by the alae. Fastigium verticis smaller than the width of the scapus; triangular and sulcate above, separated from the conical fastigium frontis by a gap. Antennal sockets elevated beside fastigia. Fore coxa with a spine. Fore and mid femora dorsally rounded, ventrally with very tiny spinules. Hind femora slender, slightly thickened in basal part, with few tiny spinules along the ventral length. Fore tibiae very slender, thickened in the area of the tympana and sulcate dorsally; tympana open on inner, conchate on outer side. Hind tibiae triangular or narrow rectangular in diameter, densely packed along each edge with slender spines; dorsally with a pair of tiny spurs on each side, ventrally with one larger spur on each side. Bases of the tegmina differentiated into flaps; on each of these flaps, a similar shaped stridulatory file on the underside is present. No mirror developed on the right tegmen. Rs vein branching off from the radius basally. Male 10th abdominal tergite usually bilobate, either with evenly rounded lobes, lobes reduced to short bulges or strongly elongated. Male cerci simple, expanded at their tips or differentiated in differently-shaped branches. Subgenital plate elongated (but not markedly surpassing abdominal apex) with mostly a pair of short stout to more slender lobes or unlobed with two rounded apices at the posterior margin.

All checked specimens also have an area of dark cells surrounded by the green more elevated veins in the cubital area of the tegmina.

Poreuomena africana Brunner von Wattenwyl, 1878

Figs 22–28

Poreuomena africana Brunner von Wattenwyl, 1878. Monographie der Phaneropteriden, 187; type locality: Gabon (MHNG).

Material examined. Cameroon (1♂, 1♀) (MCNM); **Cameroon**, Campo Ma'an National Park (lowland rainforest) (950 m alt.) 10–22. III. 2018 (UV Cold Cathode Light Trap), Fotsing, Ishmael, Miles, Safian (2♂ in ANHRT; 1♂ in BMPC); **Gabon**, Mikongo (Rougier), Mts de Cristal (secondary forest) (430 m alt.) 0°29'47"N, 11°10'42"E, 28. VII-12. VIII.2019 (LepiLED Light Trap), Albert, Aristophanous, Bie Mba, Dérozier, Moretto (1♂) (ANHRT); **Gabon**, Mts de Cristal National Park, Kinguelé 3. XII. 2015 (UV) (BMPC); **Gabon**, M'Bigon 26. I. 1986, A Pauly (1♂) (RBINS).

Diagnosis. The 10th abdominal tergite (Fig. 25) is similar to that of *P. lamottei* (Fig. 78) – with two lateral processes. However, the male cerci are completely different in *P. africana*, broader at the base tapering to acute tips of the two branches (Figs 22, 25, 28) while the male cerci in *P. lamottei* are simple, expanded into three tips apically (Fig. 78).

Description. Tegmina about 5.8–5.9 longer than broad. Stridulatory file 0.3 mm long; teeth more widely spaced at inner side, becoming more densely set distally (Fig. 24). Fore femora unarmed. Mid femora with 4–5 outer ventral small spines, inner ventral side unarmed. Hind femora only distally with a ventral double row of 2–3 small spines. Fore tibiae with a ventral double row of 4–5 spines; mid tibiae with a ventral double row of 5 spines, hind tibiae with 4 rows of numerous spines and apically 3 spurs on each side. Last abdominal tergite enlarged and apically bilobate and flattened (Figs 22, 25, 26); cerci basally stout, apically divided into two tips, the inner shorter and incurved, the outer longer, flattened, outcurved and with 5–6 inner dark teeth like a knife (Figs 22, 25, 28). The subgenital plate is short with two stout lobes with rounded tips (Figs 26, 27).

Colour. Small species, uniformly green-yellowish, a little brownish around the stridulatory area (Fig. 23) and small black dots on the posterior margins of the tegmina.

Measurements (mm). Males. Body length: 18.5–19.9. Pronotum length: 3.7–3.8. Pronotum height: 2.8–2.9. Length of hind femora: 19.6–19.8. Length of tegmina: 26.5–26.8. Width of tegmina: 4.5–4.6.



Figures 22–28. Morphological details of male *Poreuomena africana*. Drawing Fig. 53, taken from Brunner von Wattenwyl (1878) (**22**), head and stridulatory area (**23**), stridulatory file on the underside of the left tegmen (**24**), apex in rear view (**25**) and lateral view (**26**), subgenital plate (**27**) and cerci (**28**).

Poreuomena biaculeata sp. nov.

http://zoobank.org/F77ABD30-E5BE-4E0B-BD0C-92D88B2BD4F9

Figs 29–35

Material examined. Democratic Republic of the Congo. Léopoldville (today Brazzaville) 1937, A. Tinant (holotype ♂) (MRAC).

Diagnosis. Very closely related to *P. wilverthi*, a species widespread in the Congo basin and the Albertine Rift. *P. biaculeata* sp. nov. has the 10th abdominal tergite deeply split into two lobes (Figs 33, 34), while in *P. wilverthi* the 10th abdominal tergite is not divided as deeply, just at the apex however, with a median groove. The cerci in *P. wilverthi* are thick but smoothly tapering to the apex with an acute tip (Figs 105, 106), while in *P. biaculeata* sp. nov., the cerci are thick at the base and then suddenly narrowing midway forming a finger-like but pointed and sclerotized apical section (Figs 32–34). *P. biaculeata* sp. nov. is also closely related to *P. crassipes* with a similar tegminal flap of the 10th abdominal tergite but differently shaped cerci.

Description. Male. Typical *Poreuomena* species with wings protruding over the body by only a few mm (Fig. 29). Where tegmina meet, when folded, interior part of cells of dark colour while surrounding and elevated veins green (tawny in preserved insect). Rs branching off in the first half of the basal part of the tegmen. Tegmina with two flaps at their base, the flap of the left wing smaller and more pointed than the broader flap with a rounded tip on the right tegmen. The stridulatory rib marked dark brown on the flap of the left tegmen, uniformly brown on the right tegmen. Beneath flaps, tegmina with narrow longish, oval brown markings. Stridulatory file on the underside of left flap about 1.1 mm long; teeth at the apical part of the left flap very densely set and gradually getting larger to the middle of the file where the teeth are largest and widely set. At the end of the file at the interior part, strongly curved with small and a few widely set teeth; with about 20 widely and in the middle large teeth, apically more than 30 very densely set teeth (Fig. 31). Stridulatory file on the right tegminal flap not as strongly developed but of similar shape and the same arrangement of the teeth. The 10th abdominal tergite of typical bilobate form, deeply divided medially thus forming two processes with upcurved posterior parts (Figs 33, 34). Cerci thick at the base, then strongly narrowing and forming a sclerotised pointed apical tip (Figs 33, 34). Subgenital plate with two slender but short lobes (Fig. 35). Titillators present (two slender long structures), protruding between the subgenital plate and the cerci (Fig. 32).

Female. Unknown.

Measurements (mm). Male (n = 1). Body length: 22; pronotum length: 3.7; length hind femora: 21.2; length of tegmina: 28.3; width of tegmina: 4.3.

Distribution. Congo Basin.

Etymology. Named after the shape of cerci that are similar to two stings, from Latin *biaculeatus* (= with two stings).

Poreuomena crassipes Karsch, 1890 stat. rev.

Figs 36–40

Poreuomena crassipes Karsch, 1890. Entom. Nachricht. 16: 364; Type locality: Cameroon (MfN).

Material examined. Central African Republic, Dzanga-Ndoki National Park, Ndoki, Lake 1, UV trap 1, 31.I.-2.II.2012 (♂); 11–12.II.2012 (♂); 20–23.II.2012 (♂); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, camp 1, 15–16.II.2012 (♂); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, UV trap 2, 15–16.II.2012 (♂); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 11–12.II.2012 (light) (3♂); Lake 3, 25–26.II.2012 (light) (1♂) (BMPC); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 29–30.XI.2010 (1♂, 1♀); 30.XI-1.XII. 2010 (light) (1♂) (PAPC).

Diagnosis. Morphologically closely related to *P. biaculeata* sp. nov. and *P. wilverthi.* All three species share a similar 10th abdominal tergite that is flap-like, deeply divided into two lobes in *P. biaculeata* sp. nov. (Figs 33, 34), with an indentation only at its posterior margin and a central furrow in *P. wilverthi* (Fig. 107) and with only a shallow groove medially in *P. crassipes* (Fig. 40). The cerci of the three species are also similar, stout at their bases, narrowed halfway into a sclerotised tip in *P. biaculeata* sp. nov. (Figs 33, 34), evenly tapering into a tiny sclerotised tip in *P. wilverthi* (Figs 104, 106) and stout in *P. crassipes* with two sclerotised dents at their apices (Figs 39, 40).

Description. Karsch (1890, p. 364, note 1) described very briefly only the female of *C. crassipes* from Cameroon. Massa (2013) described the male. The 10th tergite is apically rounded with a clear bilobate incision (Fig. 40); the cerci are robust, up- and incurved, their apex is sharply narrowed and pointed (Figs 39, 40). The subgenital plate is not long, but clearly bilobate (Fig. 40). The stridulatory area of the left tegmen is black, short and straight (Fig. 37) and the stridulatory file has ca. 40 teeth, apically upcurved (Fig. 38).

Measurements (mm). Males. Body length: 17.3–19.6; pronotum length: 3.8–4.1; pronotum height: 3.3–3.6; length of hind femora: 19.3–20.2; length of tegmina: 27.3–30.6.

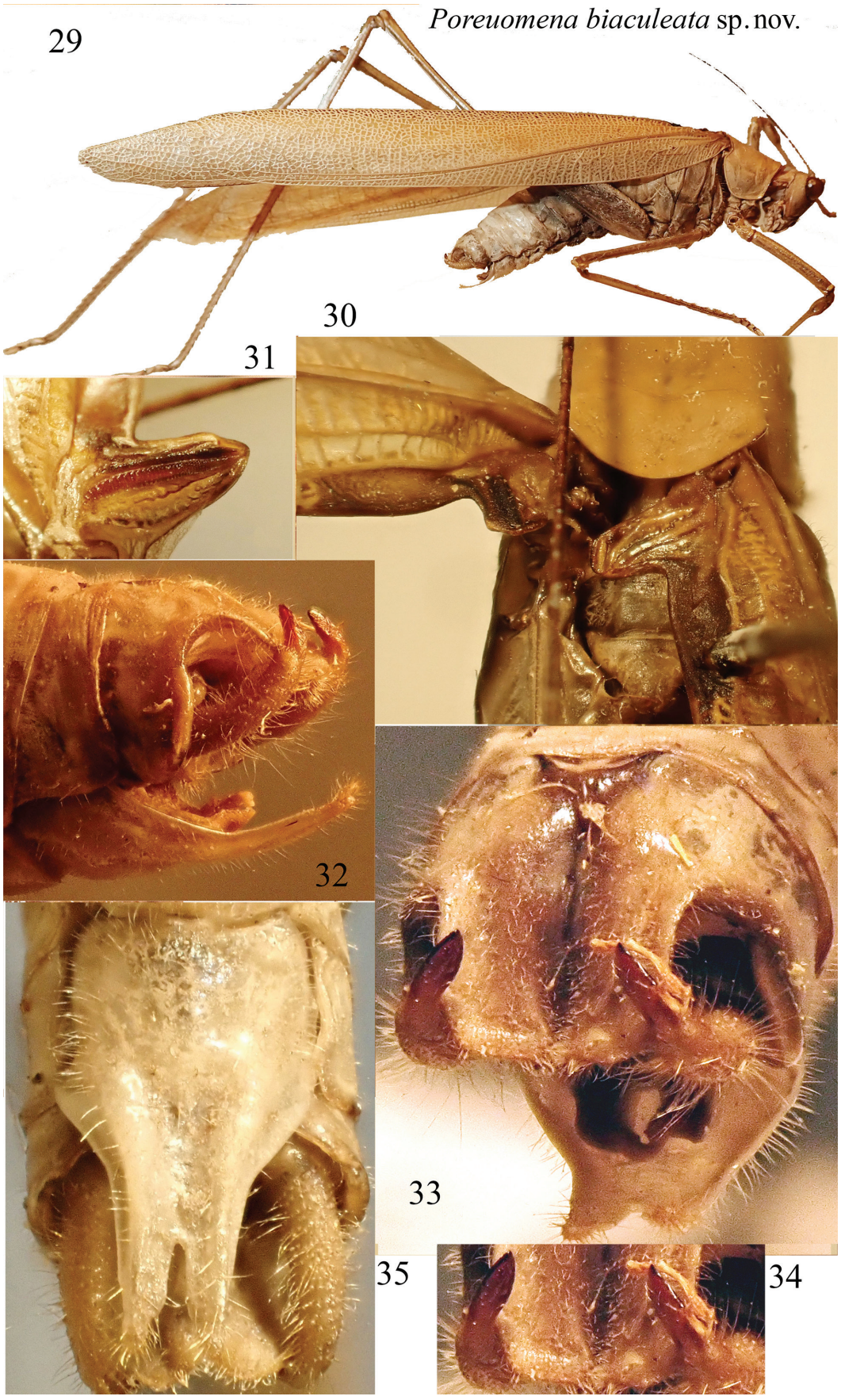
Distribution. *P. crassipes* is known from Cameroon (Karsch 1890; Ragge 1968), the Central African Republic (Massa 2013; Massa et al. 2020), the Democratic Republic of the Congo and the Ivory Coast (Ragge 1967; 1968).

Poreuomena duponti Griffini, 1908

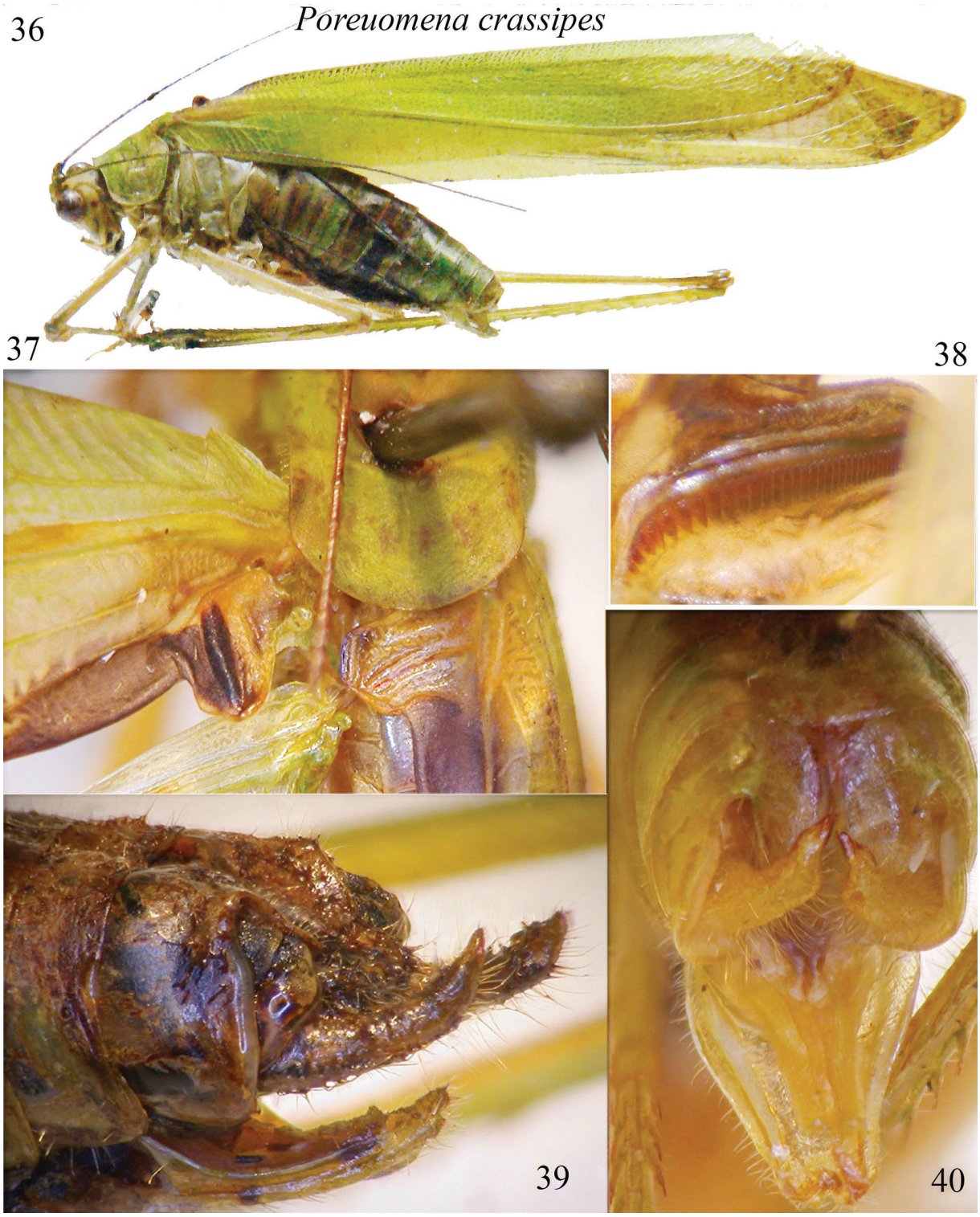
Figs 41–44

Poreuomena duponti Griffini, 1908. Mem. Soc. entom. Belgique, Bruxelles 15: 84; type locality: Cameroon, Mukonje Farm (RBINS).

Material examined. Cameroon, Mukonje Farm (♂ holotype, 4♀) (RBINS); **Cameroon**, Mukonje Farm (2♀ syntypes) (MSNG).



Figures 29–35. Morphological details of male *Poreuomena biaculeata* sp. nov. Habitus (**29**), left tegminal flap with stridulatory file on the underside (**30**), stridulatory file on the underside of the left tegminal flap (**31**), abdominal apex in lateral (**32**) and rear view (**33**), cerci (**34**), subgenital plate (**35**).



Figures 36–40. Morphological details of male *Poreuomena crassipes*. Habitus (**36**), stridulatory area (**37**), stridulatory file on the underside of the left tegminal flap (**38**), lateral (**39**) and rear view (**40**) on apex.

Diagnosis. The 10th abdominal tergite is hood-shaped with a small median indentation (Fig. 42). The cerci are stout within a sharp-angled incurved sclerotised tip (Figs 43, 44); the subgenital plate is bilobate (Fig. 44). No other *Poreuomena* species has a hood-shaped 10th abdominal tergite and such peculiar cerci with tips acute-angled.

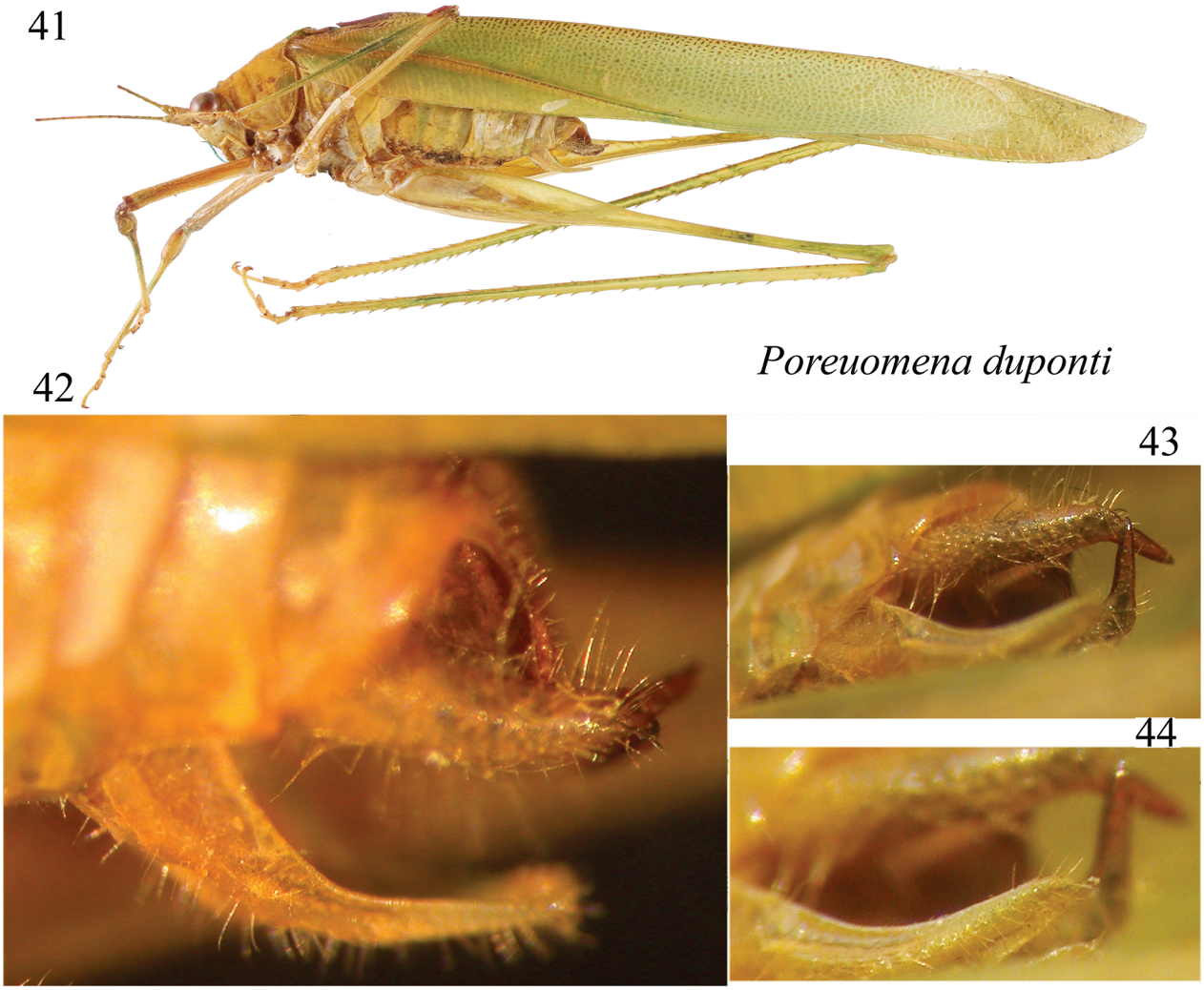
Distribution. Known only from the type locality, Cameroon.

***Poreuomena eala* sp. nov.**

http://zoobank.org/C3C9285D-215D-4C67-BA1D-AFDD94D4A2C6

Figs 45–51

Material examined. Democratic Republic of the Congo, Eala, IV 1935. J. Ghesquiére (Holotype ♂) (MRAC); same data as holotype, but IV and XI 1935 (Paratypes 1♂, 2♀) (MRAC).



Figures 41–44. Morphological details of male *Poreuomena duponti*. Habitus (**41**), lateral view on apex (**42**), lateral view of cerci (**43, 44**).

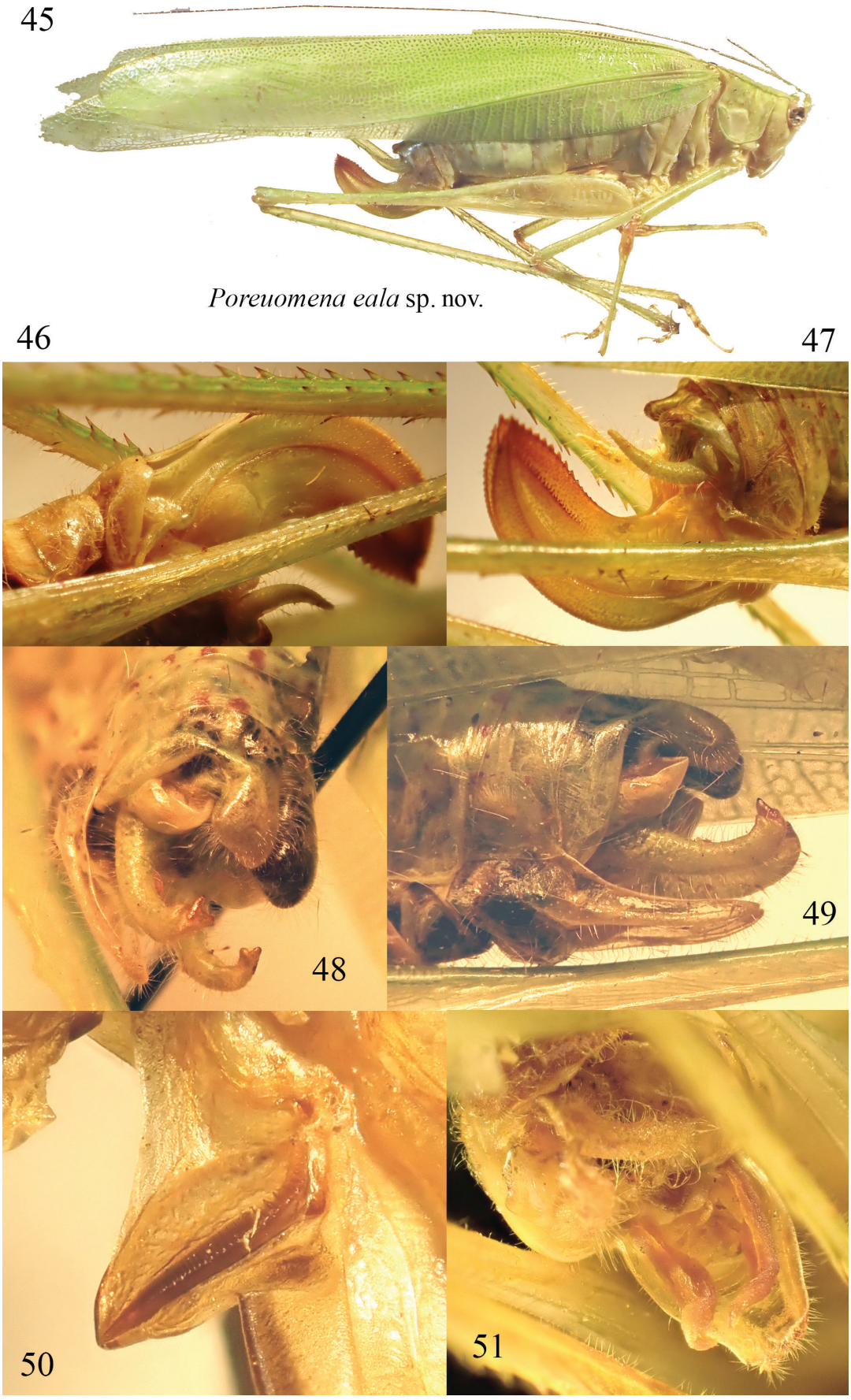
Diagnosis. Rather stout species with a 10th abdominal tergite differentiated into two bulges (Figs 48, 49). The cerci are stout and upcurved with stout bifurcate tips (Figs 48, 49). No other *Poreuomena* species has such a combination of bifurcate tips of the cerci and a 10th abdominal tergite differentiated into two bulges.

Description. Male. Stout species with wings projecting over the body by about half of their length. Where tegmina meet, when folded, interior part of cells of dark colour while surrounding and elevated veins green. Rs branching off in the first half of the basal part of the tegmen. Tegmina with two flaps at their base, the flap of the left wing smaller and more pointed than the broader flap with a rounded tip on the right tegmen. The stridulatory rib marked dark brown on the flap of the left tegmen, uniformly brown on the right tegmen. Beneath flaps, tegmina with narrow longish brown markings. Stridulatory file on the underside of the left flap about 1.3 mm long; teeth at apical part of the left flap very densely set and gradually getting larger, about from half of the file teeth large and more widely to very widely spaced; inner part then strongly curved and teeth becoming smaller and then obsolete; with about 45–50 teeth (Fig. 50). Stridulatory file on the right tegminal flap not as strongly developed, but of similar shape and the same arrangement of the teeth. The 10th abdominal tergite bilobate, differentiated into two bulges (Fig. 48). Cerci stout along whole length, at their ends upcurved and divided into two tips (Figs 48, 49). Subgenital plate elongated, deeply divided into two lobes; without styli (Fig. 49). Between subgenital plate and cerci, two longish internal structures present (titillators) (Fig. 51).

Female. As male comparatively stout, of uniform green colour without brown markings (Fig. 45) present in males on and beneath the stridulatory area. As in the male, where tegmina meet when folded, interior part of cells of dark colour while surrounding veins green. Posterior margin of 10th abdominal tergite differentiated into two lobes or bulges, similar to those of the male, but much smaller and shorter (Fig. 46). Ovipositor short and upcurved. Subgenital plate triangular with an indentation at the posterior tip (Fig. 47).

Measurements (mm). Males (n = 2). Body length: 22.7–23.1; pronotum length: 4.4–4.5; length hind femora: 22–22.5; length of tegmina: 30–31.5; width of tegmina: 4.4–5.2.

Females (n = 2). Body length: 19.5–22; pronotum length: 4.2–4.4; length of hind femora: 21–22.1; length



Figures 45–51. Morphological details of *Poreuomena eala* sp. nov. Habitus, female (**45**), subgenital plate (**46**) and lateral view on ovipositor (**47**), semi-lateral (**48**) and lateral (**49**) view on the male abdominal apex, stridulatory file on the underside of the male left tegminal flap (**50**), titillators (**51**).

of tegmina: 32–32.7; width of tegmina: 5.4–5.5; length of ovipositor: 6.4–6.5.

Distribution. DRC, Équateur Province.

Etymology. Named after the area Eala where specimens of this species were collected.

Poreuomena forcipata Sjöstedt, 1902

Figs 52–56

Poreuomena forcipata Sjöstedt, 1902. Bihang Kungl. Svenska Vet. Akad. Handl. 27 (3): 12; type locality: Cameroon (NHRS).

Material examined. Central African Republic, Dzanga-Ndoki NP, Lake 1, 14–15.II.2012, 19–20.II.2012 (light) (2♂) (BMPC).

Syn. *Poreuomena gladiator* Bolívar, 1906

Poreuomena gladiator Bolívar, 1906. Mem. Soc. espan. Hist. nat. 1: 337; type locality: Cameroon (MNCN).

Material examined. Cameroon, holotype ♂ of *P. gladiator* (MNCN) (Fig. 52).

Diagnosis. Griffini (1908) supposed that, because Bolívar (1906) overlooked the paper of Sjöstedt (1902), *P. gladiator* Bolívar, 1906 from Cameroon could be synonymous with *P. forcipata* Sjöstedt, 1902, also from Cameroon. The male cerci of the two taxa are identical. Both lack the black marking on the stridulatory area of the male left tegmen (Fig. 54); thus *P. gladiator* has been synonymised with *P. forcipata* by Massa (2013). Morphologically most closely related to *P. laeglae* (both species share an asymmetrical supra-anal plate with a spine on the left margin, Fig. 55), *P. tshuapa* sp. nov. and *P. magnicerca* (also see diagnosis at *P. laeglae*).

Description. Rather stout species with comparatively broad tegmina (Fig. 54). The 10th abdominal tergite is broad with two lateral processes, while the cerci are highly modified into two branches (Figs 55, 56). The inner branch is blade-like with sclerotised margins, while the outer or apical one is finger-like (also see at *P. tshuapa* sp. nov.). This species has an asymmetrical supra-anal plate with a stout spine on the left side, lacking on the right (Massa et al. 2020; Fig. 55 arrow). The male subgenital plate is triangular and has a small apical concavity (Fig. 56). The stridulatory file has ca. 35 teeth, the last 8–10 placed more or less perpendicularly to the main file (Fig. 53).

Distribution. Cameroon and the Central African Republic.

Poreuomena gracilicercata sp. nov.

http://zoobank.org/63C3449A-4D9E-4CC2-A08A-23703B121D9E

Figs 57–61

Material examined. Zaire (**Democratic Republic of the Congo**), 180 km W from Bukavu, rainforest, 14.V.1988, leg. A. Vojnits et al., Arthropoda collected at 160 W MV lamp, No. 320 (Teleki expedition) (Holotype ♂) (HNHM); **Democratic Republic of the Congo**, Kivu, Terr. Mwenga, Kitutu, 650 m alt. (lumiere), IV.1958, N. Leleup (Paratype ♂) (MRAC).

Diagnosis. The elongated and slender shape of the male cerci – thickened in the middle with an inner dent – and the 10th abdominal tergite forming two long downcurved processes are unique.

Description. Male. Typical *Poreuomena* species with wings protruding over the body by only a few mm. Where tegmina meet when folded, interior part of cells of dark colour while surrounding and elevated veins green (or tawny in preserved insect). Rs branching off in the first half of the basal part of the tegmen. Tegmina with two flaps at their bases, the flap of the left wing smaller and more pointed than the broader flap with a rounded tip on the right tegmen. Left flap completely marked brown, right one partly brown, especially along the bulge of the stridulatory file on the underside (Fig. 57). Beneath flaps, tegmina with narrow longish, dark brown markings. Stridulatory file on the underside of left flap about 1.2 mm long; upcurved at the inner end with few smaller and widely-spaced teeth (about 5), in the middle part with widely set large teeth (about 12) and, at the apical end, with densely-set teeth decreasing in size (about 10–12); distal end strongly curved downwards (Fig. 58). Stridulatory file on the right tegminal flap not as strongly developed, but of similar shape and the same arrangement of the teeth. The 10th abdominal tergite forming at the anterior part two convex bulges, at its posterior end differentiated into two long and slender and downcurved processes (Figs 60, 61). Cerci strongly elongated, in the middle thickened with an inner sclerotised dent. Subgenital plate bilobate (Fig. 59).

Female. Unknown.

Measurements (mm). Males (n = 2). Body length: 18.2–18.6; pronotum length: 3.9–4.05; length hind femora: 19.3–19.6; length of tegmina: 28.6–29.15; tegmina width: 4.98–5.0.

Distribution. Democratic Republic of the Congo.

Etymology. Named after the long and slender male cerci.

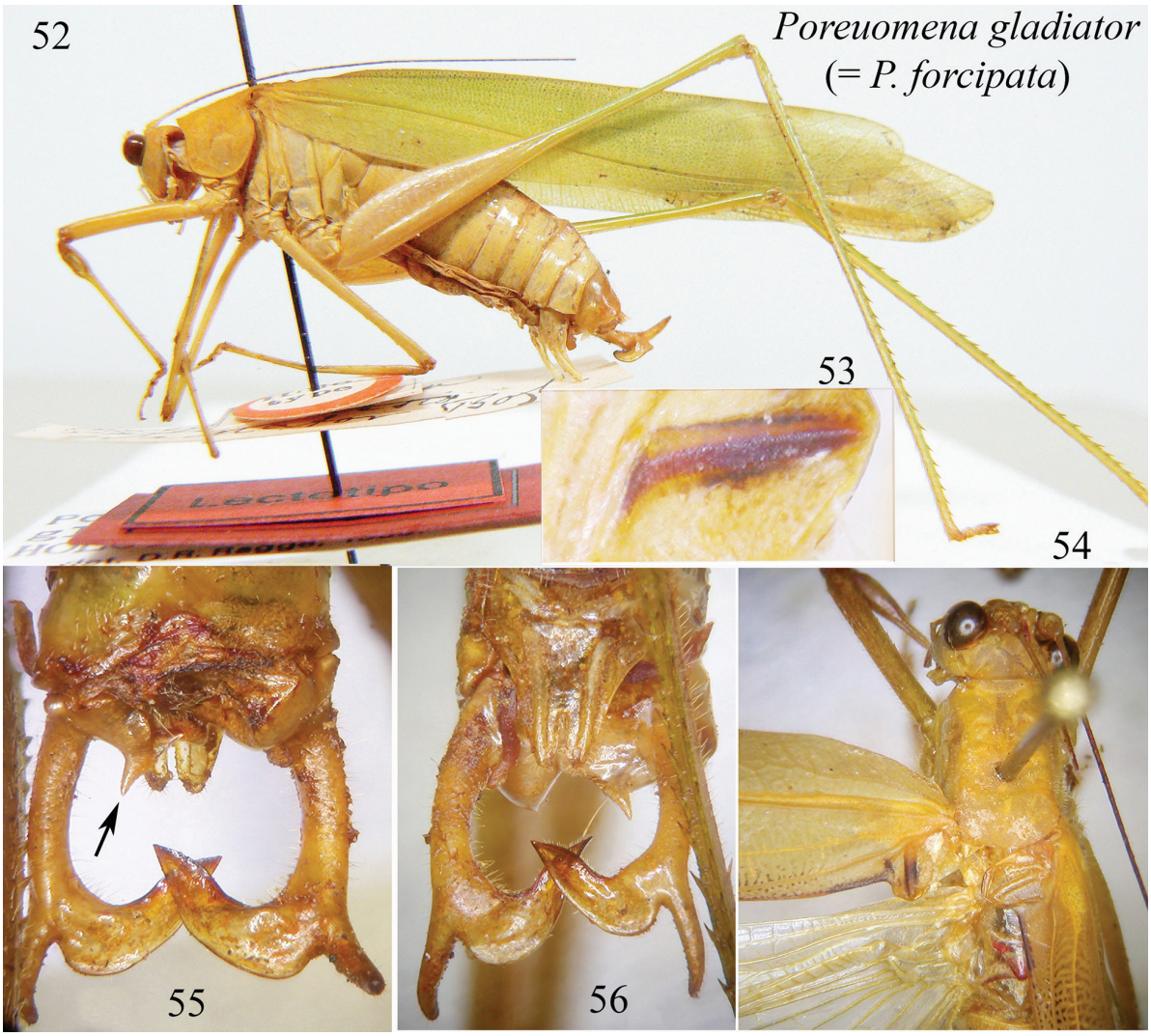
Poreuomena huxleyi Massa, 2013

Figs 62–64

Poreuomena huxleyi Massa, 2013. J. Orth. Res. 22: 140; type locality: Equatorial Guinea, Fernando Poo, Santa Isabel (MNCN).

Material examined. Equatorial Guinea, Bioko (Fernando Poo), Santa Isabel (♂ holotype) (MCNM); **Cameroon,** Gulf of Guinea Is, Bioko (Fernando Poo), Santa Isabel (Malabo) (1♂) (NHMW).

Diagnosis. This species is easy to recognise by the short apical lobes on the 10th tergite of the male and cerci clearly upcurved and with a lateral spine. The most closely-related species is *P. africana*, which, however, has much longer lobes of the 10th abdominal tergite and more robust cerci.



Figures 52–56. Morphological details of male *P. gladiator* (= *P. forcipata*) (lectotypus). Habitus (**52**), stridulatory file on the underside of left tegminal flap (**53**), stridulatory area (**54**), dorsal view (**55**) and ventral view (**56**) on apex. Arrow in Fig. 55 shows the asymmetrical spine.

Description. Typical *Poreuomena* species with narrow tegmina surpassed by the alae by a few mm (Fig. 62). Stridulatory area marked brown (Fig. 64). Two spines are present on the ventral margin of the hind femora. The apical lobes of the 10th tergite are short and square, separated widely (Fig. 63); the cerci are in- and downcurved, dorso-ventrally flattened in the apical portion where a lateral spine is present.

Colour. *P. huxleyi* is brownish coloured, with green tegmina and hind tibiae; a black marking is typical at the base of the tegmina and some small black spots on the posterior margin of the tegmina.

Distribution. Equatorial Guinea and Cameroon.

***Poreuomena ivoriana* sp. nov.**

http://zoobank.org/EFB42F6B-219C-4608-86AD-CF0469B0B3B9

Figs 65–69

Material examined. Côte d'Ivoire, Taï National Park, Research Station 22.III-4.IV.2017 (light) (♂ holotype) (BMPC).

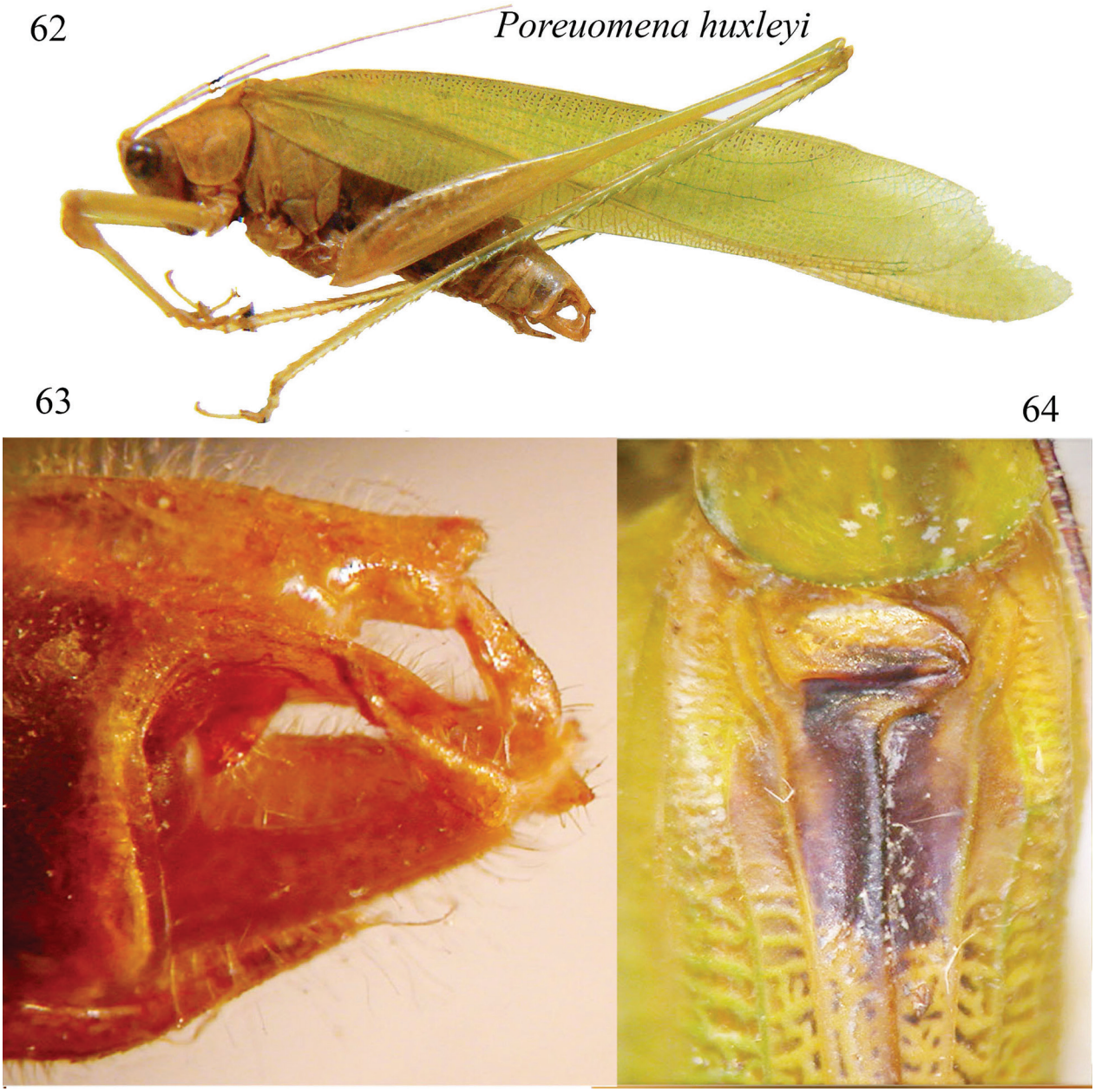
Diagnosis. *P. ivoriana* sp. nov. is a comparatively small species of *Poreuomena*, characterised by its green colour, the blackish triangular areas on the left and right tegmina (Fig. 65) and incurved cerci with a flattened inner process (Figs 67, 68). Probably morphologically related to *P. lamottei* distributed further west in Africa. The male cerci of both species are differentiated into flattened structures in both species, however, more pronounced in *P. ivoriana* sp. nov. The 10th abdominal tergite is very different in both species. While in males of *P. lamottei*, the posterior margin of the 10th abdominal tergite forms two comparatively long and, at their tips, downcurved processes, in *P. ivoriana* sp. nov. only two short lobes are developed.

Description. Male. Green coloured with a faint blackish stripe on the stridulatory area; the triangular area close to the stridulatory file above the left tegmen and the corresponding area on the right tegmen are black. Antennae thin, fastigium of the vertex separated from the fastigium of the frons, face smooth, eyes round, prominent. Pronotum with a flat and smooth disc, the anterior margin straight, the posterior margin broadly rounded. Tegmina



Figures 57–61. Morphological details of male *Poreuomena gracilicercata* sp. nov. Head, pronotum and stridulatory area (**57**), stridulatory file on the underside of the left tegminal flap (**58**), subgenital plate (**59**), lateral (**60**) and rear view (**61**) on apex.

narrow, ca. 5.8 times broader than long, stridulatory area of the left tegmen short. The flap of the left tegmen comparatively broad (damaged in the holotype) (Fig. 65). The corresponding flap on the right tegmen also broad. Stridulatory file 0.3 mm long, with ca. 45 little arched teeth which are more evenly spaced at their base than at the



Figures 62–64. Morphological details of male *Poreuomena huxleyi*. Habitus (**62**), lateral view on apex (**63**), stridulatory area (**64**).

apex (Fig. 66). Fore coxa armed with a small spine, fore femora with 4 small spines on ventral inner margins, mid femora with 4–5 small spines on ventral outer margins, hind femora with 2–3 rows of small ventral spines distally. Fore tibiae with tympanum conchate on inner and open on the outer side, with 2–3 small spines on inner margins, mid tibiae with 9–10 small spines on outer and inner margins, hind tibiae with numerous spines and 3 apical spurs on each side. Last abdominal tergite flattened and enlarged with two apical small pointed processes, cerci stout, short and incurved, before their tips, they have an inner flattened process (Figs 67–69). Subgenital plate long with a narrow concavity and two parallel pointed processes; styli absent (Fig. 69).

Measurements (mm). Male. Body length: 19.0; pronotum length: 4.1; pronotum height: 2.3; length hind femora: 18.2; length of tegmina: 23.3; width of tegmina: 4.0.

Etymology. *P. ivoriana* sp. nov. is named after the Côte d'Ivoire.

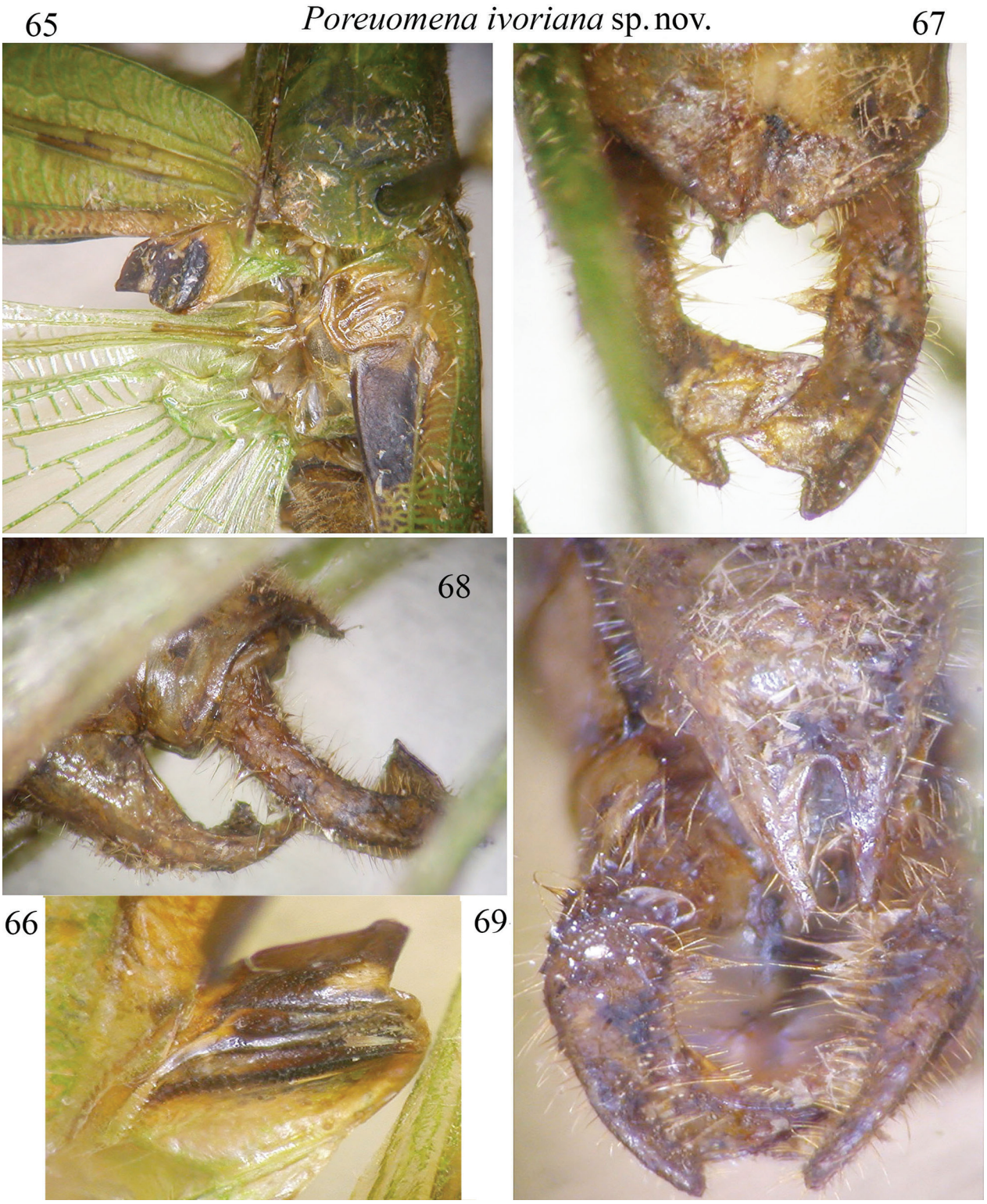
Distribution. Presently known only from the Taï National Park (Côte d'Ivoire).

Poreuomena laeglae (Massa, 2015) stat. nov.

Figs 70–73

Poreuomena laeglae Massa, 2015. ZooKeys 524: 38; type locality: Côte d'Ivoire, Tuba, Biémasso (MSNG).

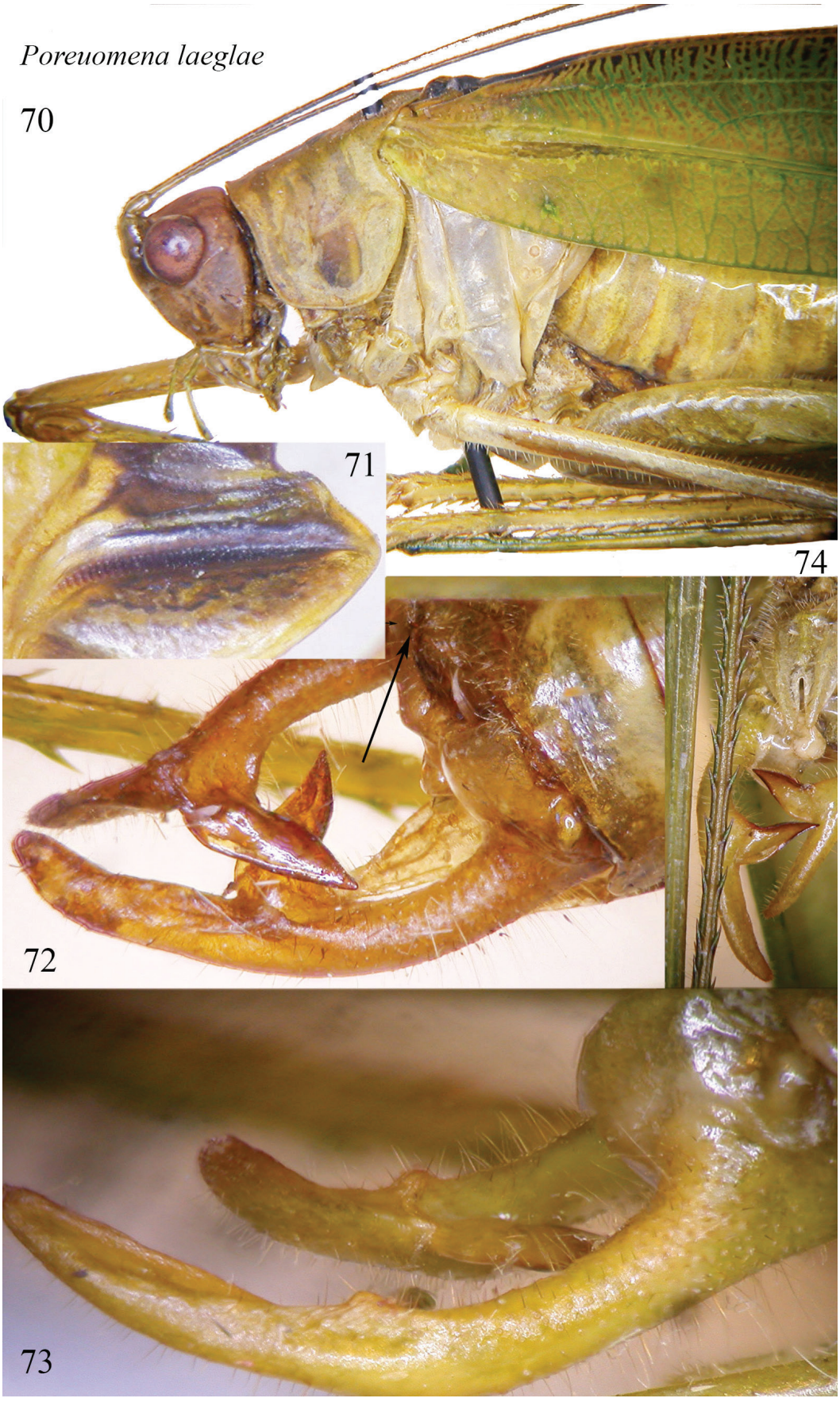
Material examined. Côte d'Ivoire, Tuba, Biémasso (441 m) 9.VII.2014 (UV trap) (♂ holotype) (MSNG); same locality, 7–11.VII.2014 (♂ paratype, ♀ allotype); same locality, 9.VII.2014 (♂ paratype); **Côte d'Ivoire**, Taï National Park Research Station 18.III.2017 (1♂);



Figures 65–69. Morphological details of male *Poreuomena ivoriana* sp. nov. Stridulatory area (**65**), stridulatory file on the underside of the left tegminal flap (**66**), view on male cerci in dorsal (**67**) and lateral view (**68**), subgenital plate (**69**).

Côte d'Ivoire, Mt. Tonkoui 31.X.2018 (1♀) (BMCP); **Liberia**, Lofa County, Wologizi Mts. (611 m alt.) 20.XI-1.XII.2017 (MV Light trap) (2♂); **Liberia**, Lofa County, Wologizi Mts. (611 m alt.) 24–29.XI.2017 (Light Catode Trap) (1♂); **Liberia**, Lofa County, Foya Proposed Protected Area (530 m alt.) 10–19.XI.2017 (MV light Trap) (6♂); **Liberia**, Sinoe County, 6.5 km NW Jacksonville Forest near Solve Problem Vill. (103 m alt.) 23–27.I.2018 (MV Light trap) (2♂) (ANHRT).

Diagnosis. *P. laeglae* was described in the genus *Cestromoecha*, but it actually belongs to the genus *Poreuomena* because it has two well-developed tegminal flaps and no mirror. The Rs vein branches off near the base and not past the middle as typical for *Cestromoecha*. It



Figures 70–74. Morphological details of male *Poreuomena laeglae* stat. nov. Head, pronotum and part of abdomen in lateral view (**70**), stridulatory file on the underside of the left tegminal flap (**71**), lateral view on cerci and 10th abdominal tergite (**72**), cerci lateral view (**73**), subgenital plate and cerci (**74**). Arrow in Fig. 72 shows the small asymmetrical spine.

is morphologically most closely related to *P. forcipata* (both species share an asymmetrical supra-anal plate with a spine on the left side) and also to *P. magnicerca* and *P. tshuapa* sp. nov. The cerci of the males are differentiated into two branches in the first two species, with a finger-like apical or outer branch and a blade-like expanded inner branch, however, differently shaped between *P. laeglae* and *P. forcipata.* In *P. magnicerca* and *P. tshuapa* sp. nov., the third blade-like branch or expansion is present giving the expression of the cerci having three branches. The flaps on the left tegmina bearing the stridulatory files on the underside are differently shaped between *P. tshuapa* sp. nov. (oval and pointed) and *P. magnicerca* (laterally slightly expanded and not pointed) as is the shape of the stridulatory file itself supporting species status for *P. tshuapa* sp. nov. The 10th abdominal tergites, however, are very similar amongst these four species since they are rather undifferentiated with a more or less straight posterior margin and thus very likely derived from the bilobed condition as the generic character of the genus *Poreuomena*.

The stridulatory file of *P. laeglae* is similar to that of *P. magnicerca* with a distal part with less and more widely-spaced teeth than in the proximal part (Massa 2015).

Description. Typical *Poreuomena* species with elongated habitus. Fore and mid femora with 4–5 very small spines, fore tibiae with 3 ventral spines + 1 spur on each side, mid tibiae with 6–7 ventral spines + 1 spur on each side, hind tibiae with 3 spurs on each side. Ventral margins of hind femora with 2 small basal spines. Tegmina narrow, stridulatory area of left tegmen black and straight; stridulatory file downcurved with ca. 50 teeth, distal part with asymmetrical and widely-spaced teeth (Fig. 71). The 10th tergite slightly bilobate with an asymmetrical supra-anal plate having a spine on the left side at the margin (Fig. 72, arrow) (similar to *P. forcipata*, Fig. 55, arrow). Cerci stout, long and incurved, with the basal part rounded and the apical part flattened and pointed (Fig. 72); in the middle, with a well-developed flattened large inner spine, blackish at the tips (Fig. 73). Subgenital plate concave, triangular and long, with a deep concavity, processes almost parallel (Fig. 74).

Colour. Probably predominantly green when alive, brown to tawny when preserved. Stridulatory area of left tegmen and area below black. Small black spots are present on the posterior margins of the tegmina. Two longitudinal parallel dark lines are present on the outer surface of the hind femora.

Measurements (mm). Males. Body length: 18.5–19.4; pronotum length: 4.0–4.2; pronotum height: 3.4–3.6; hind femur: 18.2–20.7; tegmina: 26.4–27.5.

Female. Body length: 21.7; pronotum length: 4.0; pronotum height: 3.4; hind femur: 20.8; tegmina: 29.4; ovipositor: 6.1.

Distribution. Presently only known from the Ivory Coast and Liberia in West Africa.

Poreuomena lamottei Chopard, 1954

Figs 75–79

Poreuomena lamottei Chopard, 1954. Mem. Inst. franc. Afr. Noire 40(2): 40; type locality: Guinea, Nimba, N'zo (MNHN).

Material examined. Côte d'Ivoire, Azagny National Park (light trap) (3♂); **Côte d'Ivoire**, Taï National Park, Res. Station 5–10.VII.2015 (light trap) (1♂) (NHM).

Diagnosis. *P. lamottei* has a similar 10th abdominal tergite as *P. eala* sp. nov., but the lobes are much narrower and have a large gap between them in *P. lamottei*. In addition, the male cerci are similar between the two species, stout and upcurved at their tips, however, with bifid tips in *P. eala* sp. nov.

Description. Typical *Poreuomena* species with stridulatory area marked dark brown (Fig. 75). The stridulatory file is arched and consists of about 60 teeth, of which roughly 30 large teeth are situated in the distal part and 30 smaller and evenly-spaced teeth in the proximal part (Fig. 76). The last tergite is differentiated into two stout and downcurved processes (Figs 77, 78); the subgenital plate is elongated with two outcurved lobes (Fig. 79); the cerci are stout and incurved and possess an apical flat tip with three short processes (Fig. 78).

Distribution. Guinea, Ghana (Chopard 1954; Naskrecki 2009) and Ivory Coast (Massa 2017).

Poreuomena magnicerca (Massa, 2013) stat. nov.

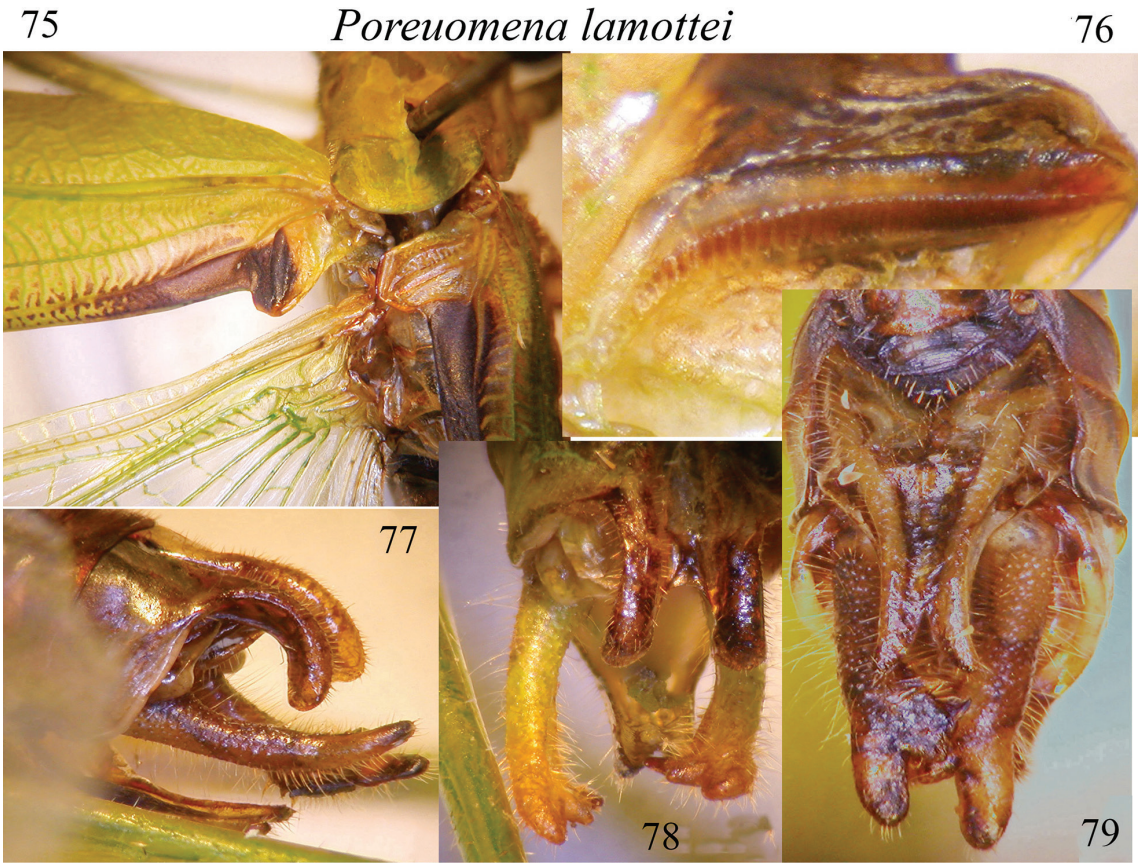
Figs 80–85

Poreuomena magnicerca Massa, 2013. J. Orth. Res. 22: 142; type locality: Central African Republic, Dzanga-Ndoki National Park (MSNG).

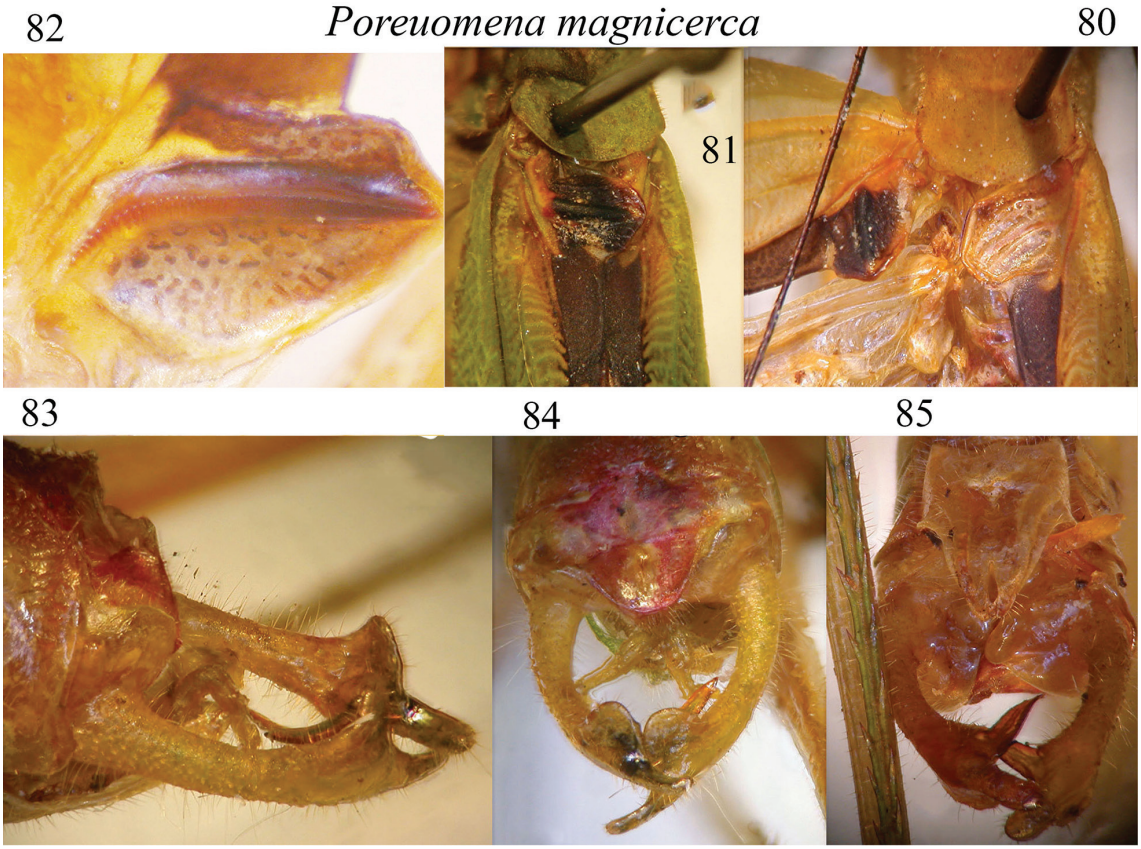
Material examined. Central African Republic, Dzanga-Ndoki National Park, Lake 1, UV trap, 6–8.II.2012 (Holotype ♂) (MSNG); same data (paratype ♂); same data 11–12.II.2012 (paratype ♂); same data 20–23.II.2012 (paratype ♂); **Central African Republic**, Dzanga-Ndoki NP, Mboki 24.I.2012 (2 paratypes ♂); **Central African Republic**, Dzanga-Ndoki NP, Ndoki, Lake 1, camp 1, 15–16.II.2012 (2 paratypes ♂) (BMCP); **Central African Republic**, Dzanga-Sangha Special Reserve, Camp 1, 27–28.I.2005 (light) (1♂); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 22–23.XI.2010, 30.XI-1.XII.2010 (light) (2♂) (PAPC); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 1–2.II.2012, 4–5.II.2012, 9–10.II.2012, 12–13.II.2012, 14–15.II.2012 17–18.II.2012, 19–20.II.2012, 23–24.II.2012 (light) (6♂, 4♀); **Central African Republic**, Dzanga-Ndoki NP, Lake 7, 29.II-1.III.2012 (light) (1♂) (BMPC & PAPC).

Diagnosis. Compare diagnoses at *P. laeglae*, *P. tshuapa* sp. nov., and *P. forcipata*.

Description. *P. magnicerca* was described in the genus *Cestromoecha*, but actually belongs to the genus



Figures 75–79. Morphological details of male *Poreuomena lamottei*. Stridulatory area (**75**), stridulatory file on the underside of the left tegminal flap (**76**), lateral (**77**) and dorsal view (**78**) on apex of abdomen, subgenital plate (**79**).



Figures 80–85. Morphological details of male *Poreuomena magnicerca* stat. nov. Stridulatory file on the underside of the left tegminal flap (**80**), stridulatory area with closed (**81**) and left opened wing (**82**), lateral (**83**) and dorsal view on apex (**84**), subgenital plate (**85**).

Poreuomena since sharing all generic characters with this genus and lacking a mirror on the right tegmen, typical for *Cestromoecha*. The stridulatory area of the left tegmen is black (Figs 80, 81); the stridulatory file is long and straight and has about 50 teeth (Fig. 82) and is clearly longer and has smaller teeth than *C. longicerca*. The cerci are stout, long and incurved, with the basal part rounded and the apical part pointed; they appear trifid because, subapically, they have a well-developed upper laterally flattened bulge and an inner long spine (Figs 83, 84). The subgenital plate is concave, triangular and elongated, with a deep concavity and with processes positioned very close to each other (Fig. 85).

Colour. Probably predominantly green when alive, brown to tawny when preserved. The stridulatory area of the left tegmen and the area below black. Small black spots are present on the posterior margins of the tegmina.

Measurements (mm). Males. Body length: 19.5–21.0; pronotum length: 3.9–4.0; pronotum height: 3.4–3.6; length of hind femora: 19.4–21.7; length of tegmina: 30.3–33.0.

Females. Body length: 17.7–21.0; pronotum length: 4.1–4.9; pronotum height: 3.1–4.0; length of hind femora: 18.8–21.7; length of tegmina: 27.7–29.2; width of tegmina: 4.6–5.0; length of ovipositor: 5.1–5.9.

Distribution. Known only from the Central African Republic.

Poreuomena matthaei sp. nov.

http://zoobank.org/68478863-55B7-4E99-BF95-3D987B9FE8D4

Figs 86–90

Material examined. Gabon, Lope National Park, Ogooue-Ivindo 4.IV.2014, Ecotrop Team (♂ holotype) (BMPC).

Diagnosis. *P. matthaei* sp. nov. is a comparatively large *Poreuomena* species, characterised by its yellowish colour, whitish triangular areas on the left and the right tegmina and incurved cerci with a flattened blackish tip. The 10th abdominal tergite is similar to that of *P. gracilicercata* sp. nov. Both species, however, have differently-shaped male cerci. While all other *Poreuomena* species have flaps at the bases of the tegmina, in *P. matthaei* sp. nov. only the area at the base of the right tegmen is developed as a flap, while on the right side, a bulge is present (Fig. 86).

Description. Male. Yellowish-cream coloured with a faint blackish stripe on the stridulatory area (Fig. 86); the triangular area close to the stridulatory file above the left tegmen and the corresponding area on the right tegmen are whitish. Antennae thin, fastigium of the vertex separated from the fastigium of the frons, face smooth, eyes round, prominent. Pronotum with a flat and smooth disc, the anterior margin straight, the posterior margin broadly rounded (Fig. 86). Tegmina narrow, ca. 10.7× broader than long; stridulatory area of the left tegmen comparatively long for the genus. Stridulatory file 0.5 mm long, with ca. 70 slightly arched teeth which are more evenly spaced at their base than at the apex (Fig. 87). Fore coxa armed, fore femora with 4 small spines on the ventral inner margins, mid femora with 5–6 small spines on the ventral outer margins, hind femora with 3–4 rows of small ventral spines distally. Fore tibiae with the tympanum conchate on the inner and open on the outer side, with 3–4 small spines on the inner margins, mid tibiae with 3–4 small spines on the outer margins, hind tibiae with numerous spines and 3 apical spurs on each side. Last abdominal tergite flattened and enlarged (Figs 88, 89), cerci basally stout, long and incurved, their tips blackish and flattened. Subgenital plate elongated with two roundish lobes (Fig. 90).

Female. Unknown.

Measurements (mm). Males. Body length: 23.6; pronotum length: 4.8; pronotum height: 2.7; length hind femora: 22.8; length of tegmina: 32.0; width of tegmina: 3.0.

Etymology. *P. matthaei* sp. nov. is dedicated to the late Matteo Griggio, who at the age of 43 left us on 14 May 2020 due to an aneurysm. Matteo was a lively behavioural ecologist who was also very committed to nature conservation, curious about every particular aspect of nature, including Orthoptera as a food source for the Rock Sparrow in Sardinia.

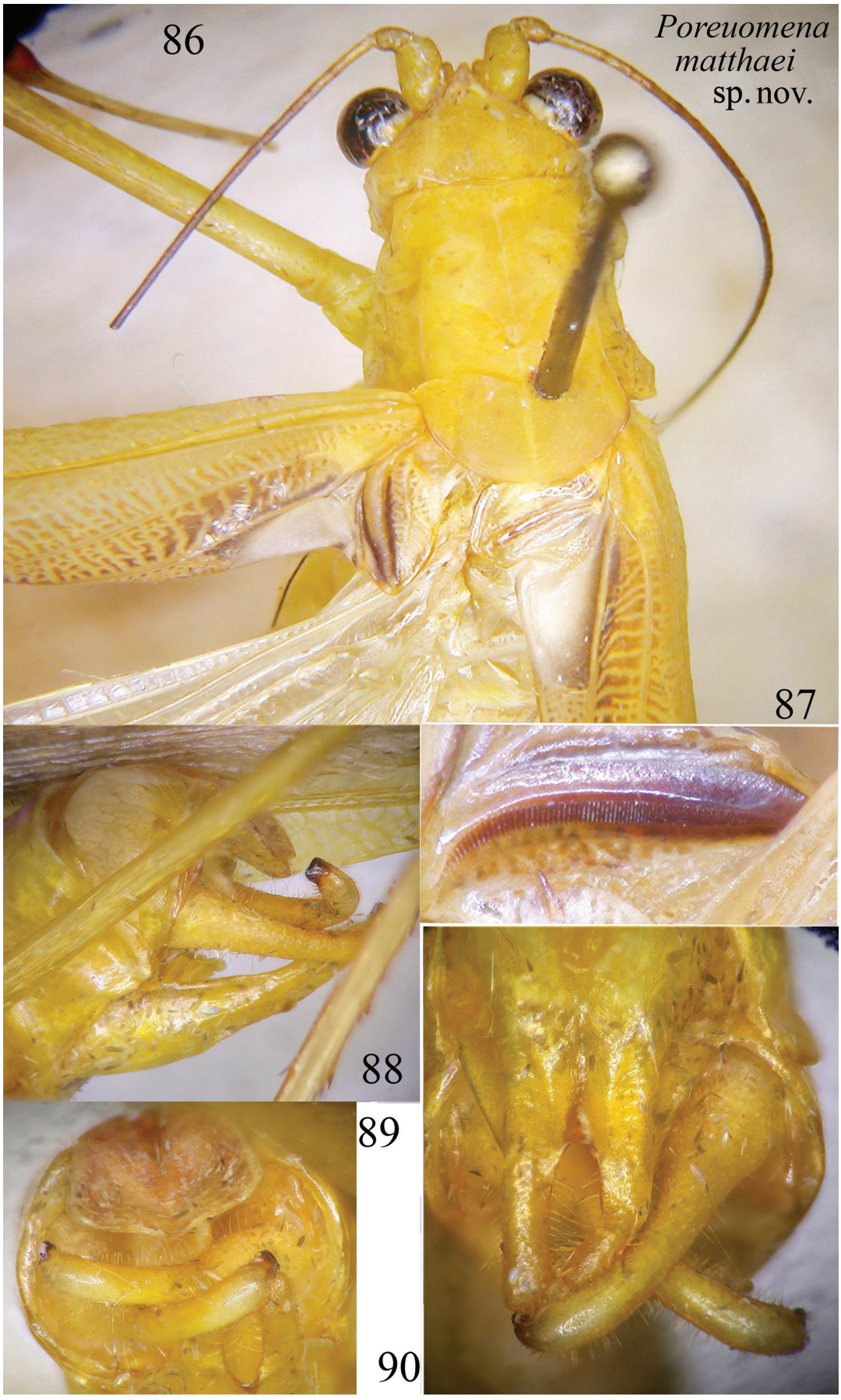
Distribution. Presently known only from the Lope National Park (Gabon).

Poreuomena sanghensis Massa, 2013

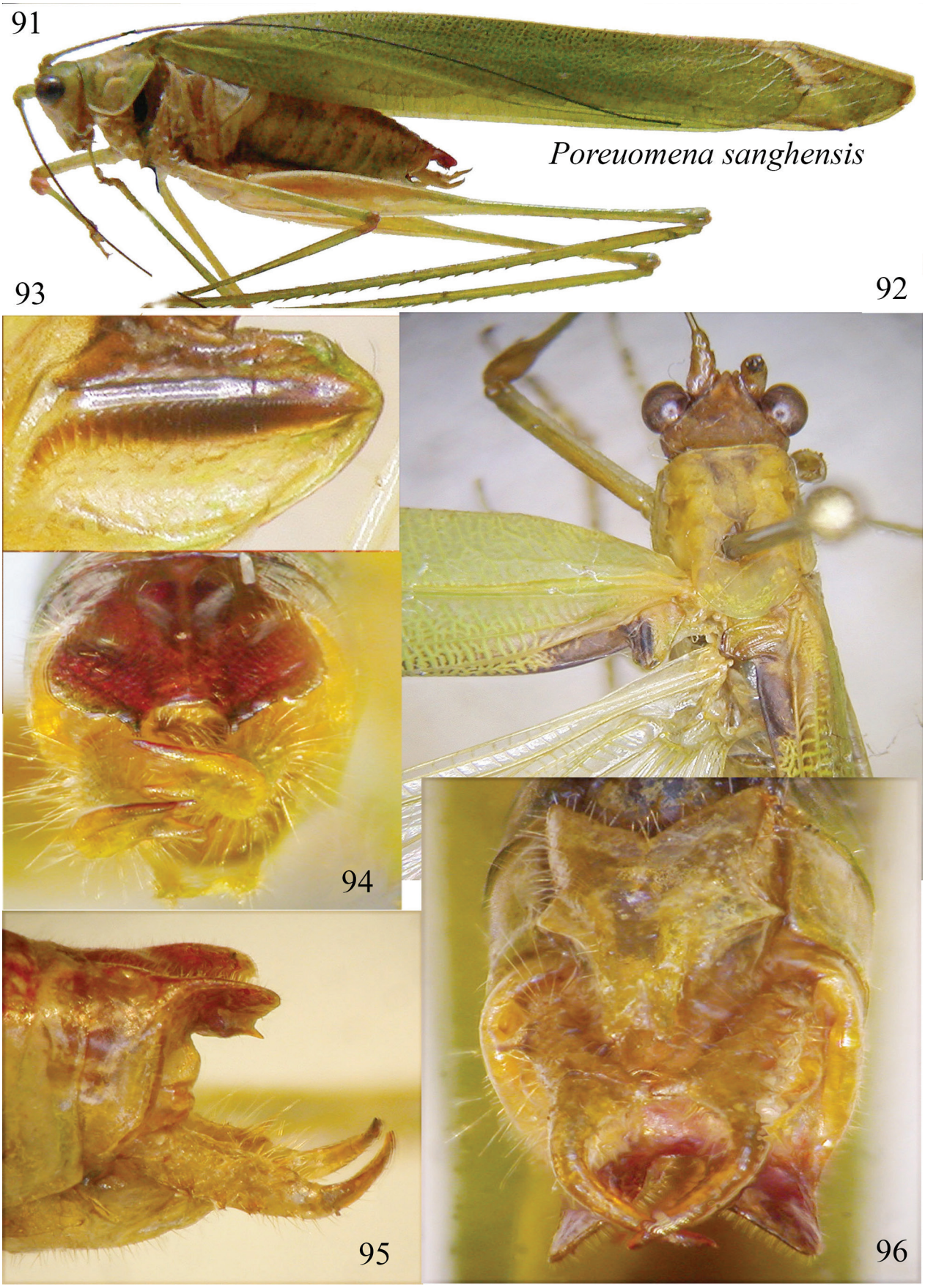
Figs 91–96

Poreuomena sanghensis Massa, 2013. J. Orth. Res. 22: 140; type locality: Central African Republic, Dzanga-Ndoki National Park (MSNG).

Material examined. Central African Republic, Dzanga-Ndoki National Park, Lake 1, UV trap, 10–12.II.2012 (holotype ♂) (MSNG); same data 20–23.II.2012 (allotype ♀); same data 8–10.II.2012 (paratype ♂); same data 20–23.II.2012 (5 paratypes ♂); same data 31.I-2.II.2012 (1 paratype ♂) (BMPC); **Central African Republic**, Dzanga-Ndoki National Park, border of Lake 1, 13–14.II.2012 (2 paratypes ♂) (BMPC); **Central African Republic**, Dzanga-Ndoki National Park, Lake 1, camp 1, 14–15.II.2012 (paratype ♂) (BMCP); **Central African Republic**, Dzanga-Sangha SR, Camp 3, 4–6.II.2005 (2♂); 10–11.X.2008; Camp 1, 14–15.X.2008 (light) (2♂) (PAPC); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 30.XI-1.XII.2010 (light) (1♂); **Central African Republic**, Dzanga-Ndoki NP, Lake 1, 25–26.I.2012 (light), 9–10.II.2012, 10–11.II.2012, 14–15.II.2012 (light) (6♂) (BMPC & PAPC). **Cameroon**, Campo Ma'an National Park (lowland rainforest) (950 m alt.) 10–22.III.2018 (MV Light Trap), Fotsing, Ishmael, Miles, Safian (1♂); **Cameroon**, Campo Ma'an National Park (lowland rainforest) (950 m alt.) 10–22.III.2018 (UV Cold Cathode Light Trap), Fotsing, Ishmael, Miles, Safian (2♂); **Gabon**, Mikongo (Rougier), Mts de Cristal (secondary forest) (430 m alt.) 28.VII-12.VIII.2019 (MV



Figures 86–90. Morphological details of male *Poreuomena matthaei* sp. nov. Head, pronotum and stridulatory area (**86**), stridulatory file on the underside of the left tegminal flap lateral (**87**), lateral (**88**) and rear view on apex (**89**) and subgenital plate (**90**).



Figures 91–96. Morphological details of male *Poreuomena sanghensis*. Habitus (**91**), stridulatory area (**92**), stridulatory file on the underside of the left tegminal flap (**93**), rear (**94**) and lateral (**95**) view on apex, subgenital plate (**96**).

Light Trap), Albert, Aristophanous, Bie Mba, Dérozier, Moretto (3♂) (ANHRT).

Diagnosis. Small and fragile species, green (alive) or brown (preserved) coloured, with a brown-reddish upper area of the abdominal tergites. The 10th abdominal tergite of *P. sanghensis* is similar to *P. wilverthi*, however, not downcurved, but produced posteriorly with a deep median fold. The male cerci are also similar between these two species, however, much more fragile-built in *P. sanghensis*.

Description. Typical *Poreuomena* species with an elongate habitus (Fig. 91). Stridulatory area of the left tegmen short and straight (Fig. 92). The stridulatory file has ca. 40 teeth, of which 7–8 are proximally placed nearly perpendicularly to the others (Fig. 93). The ventral margins of the hind femora have 2 spines. The 10th tergite ends with two short reddish rounded flat lobes with an inner spine (Figs 94, 95); the cerci have a wide round base, with an inner spine, then becoming narrower; upcurved and pointed apically (Figs 94–96). The male subgenital plate is stout, the processes are slender and incurved, forming a circular space between them (Fig. 96).

Colour. Predominantly green when alive, brown to tawny when preserved; dorsal area of abdominal tergites brown-reddish. A black marking is present at the base of the tegmina of the male, absent in the female.

Measurements (mm). Males. Body length: 15.2–17.5; pronotum length: 3.0–3.2; pronotum height: 2.5–2.7; length hind femora: 16.0–18.8; length of tegmina: 23.6–24.8.

Female. Body length: 19.4; pronotum length: 3.3; pronotum height: 2.8; length of hind femora: 19.2; length of tegmina: 30.0; length of ovipositor: 3.9.

Distribution. Central African Republic (Dzanga-Ndoki National Park and Dzanga-Sangha Special Reserve), Cameroon (Massa 2013; 2015), and Gabon (Massa, in press).

Poreuomena tshuapa sp. nov.

http://zoobank.org/EEE36B7E-C218-44AB-A00B-2DEA756A6460

Figs 97–100

Material examined. Democratic Republic of the Congo, Tshuapa, Bokungu 1949, M. Dupuis (Holotype ♂); same data as holotype (Paratype ♂); **Democratic Republic of the Congo**, Haut-Lopori V-VI 1927, J. Ghesquiére (Paratype ♂) (MRAC).

Diagnosis. Similar in the outer male genitalic apparatus to *P. magnicerca* from further west in the Congo Basin. Differentiated from *P. forcipata* and *P. laeglae* by a different 10th abdominal tergite which is clearly divided into two lobes in *P. forcipata*, while *P. tshuapa* sp. nov. only has small humps and the posterior margin of the 10th abdominal tergite of *P. laeglae* is more-or-less straight. *P. forcipata* has male cerci differentiated into two branches, an outer rather blunt, finger-like part and an inner blade-like expanded branch with an acute tip, similar to the inner branch of *P. tshuapa* sp. nov. and *P. magnicerca*. However, *P. tshuapa* sp. nov. has an additional branch just below the finger-like part of the cerci, absent in *P. forcipata*, but also present in *P. magnicerca* (also see diagnosis at *P. laeglae*). In *P. magnicerca*, the blade-like subapical section or the "third" branch is more roundish and larger than in *P. tshuapa* sp. nov. and the subgenital plate differs between these two species. In *P. tshuapa* sp. nov., the subgenital plate is bilobate with the processes clearly separated, while in *P. magnicerca*, the lobes of the subgenital plate are shorter and situated more closely to each other. Further, in *P. forcipata* and *P. laeglae*, asymmetrical spines are present on the left side of the supra-anal plates.

Description. Male. Probably predominantly green when alive, preserved specimens of tawny colour (Fig. 97). Where tegmina meet when folded, interior part of cells of dark colour while surrounding and elevated veins green/tawny. Typical *Poreuomena* species with Rs branching off from the radius near the base. The tegmina have two typical well-developed flaps at their base, the flap on the left side smaller and more pointed than the flap on the right tegmen. Beneath the flaps, tegmina with narrow longish brown markings are typical for several *Poreuomena* species. The stridulatory file on the left tegminal flap is about 1.5 mm long with small broadly-spaced inner teeth becoming gradually larger and are more densely set (Fig. 98). The last third consists of very densely packed teeth becoming smaller again; the apical part is strongly curved. All-in-all, the stridulatory file consists of about 70–80 teeth. Stridulatory file on the underside of the right tegmen not as well-developed, but similar in shape and size and arrangement of the teeth. The 10th abdominal tergite has almost a straight posterior margin with only two bump-like structures laterally (Fig. 99). The cerci are stout, divided at their apical part into three branches: a subapical blade located just beneath the second elongated, finger-like branch and an inner blade-like or leaf-like expanded branch with sclerotised margins (Figs 99, 100). The subgenital plate is elongated and deeply divided into two lobes; without styli (Fig. 100). Between the subgenital plate and the cerci, two longish internal structures are present (titillators).

Female. Unknown.

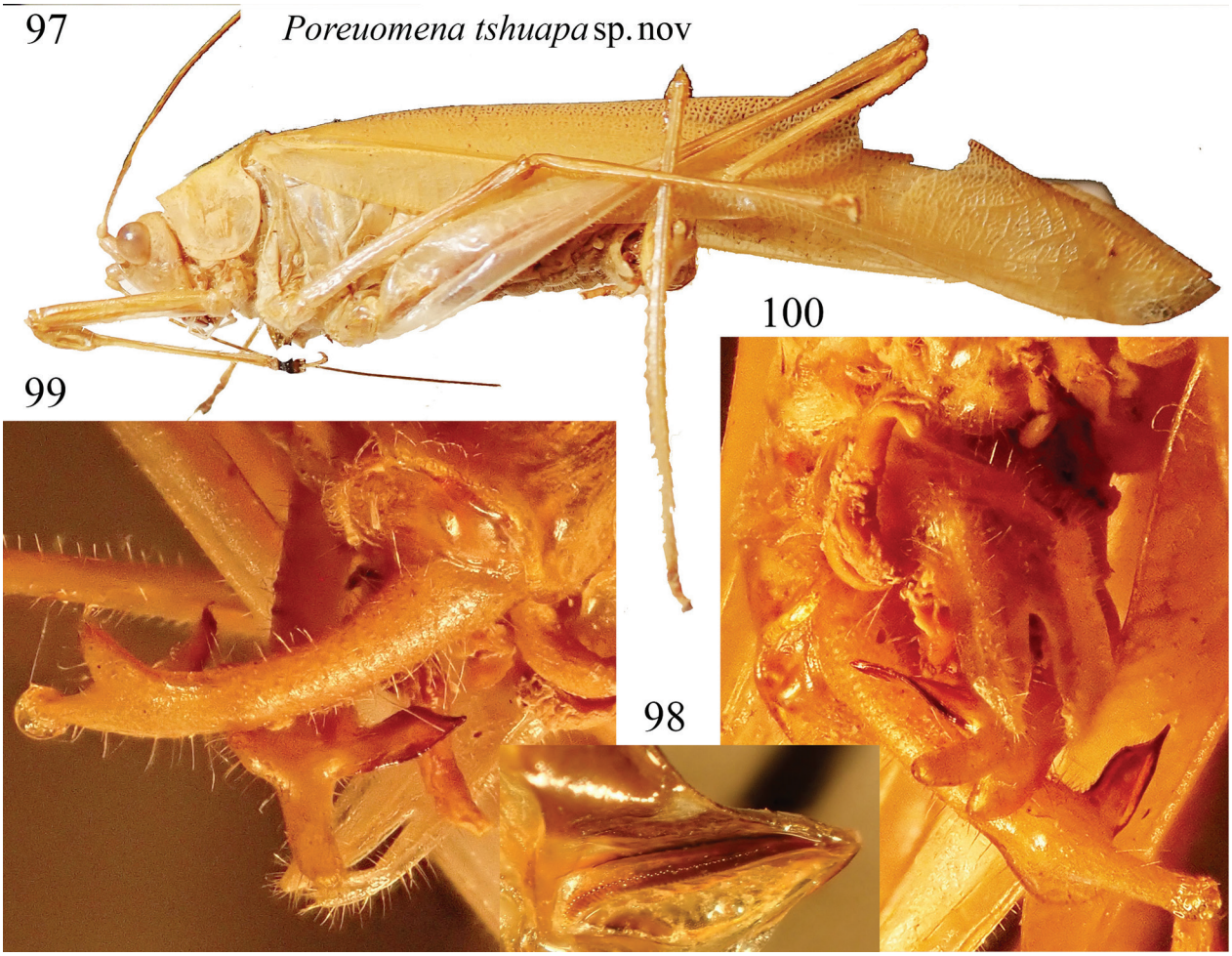
Measurements (mm). Males (n = 3). Body length: 17.7–18.2; pronotum length: 3.8–4.1; length hind femora: 20.3–21.2; length of tegmina 29.6–30.4; width of tegmina: 4.6–5.0.

Distribution. Democratic Republic of the Congo, Tshuapa Province.

Poreuomena wilverthi Griffini, 1908

Figs 101–107

Poreuomena wilverthi Griffini, 1908. Mem. Soc. entom. Belgique, Bruxelles 15: 85; type locality: Democratic Republic of Congo, Umangi (RBINS).



Figures 97–100. Morphological details of male *Poreuomena tshuapa* sp. nov. Habitus (**97**), stridulatory file on the underside of the left tegminal flap (**98**), different views on apex with cerci (**99, 100**).

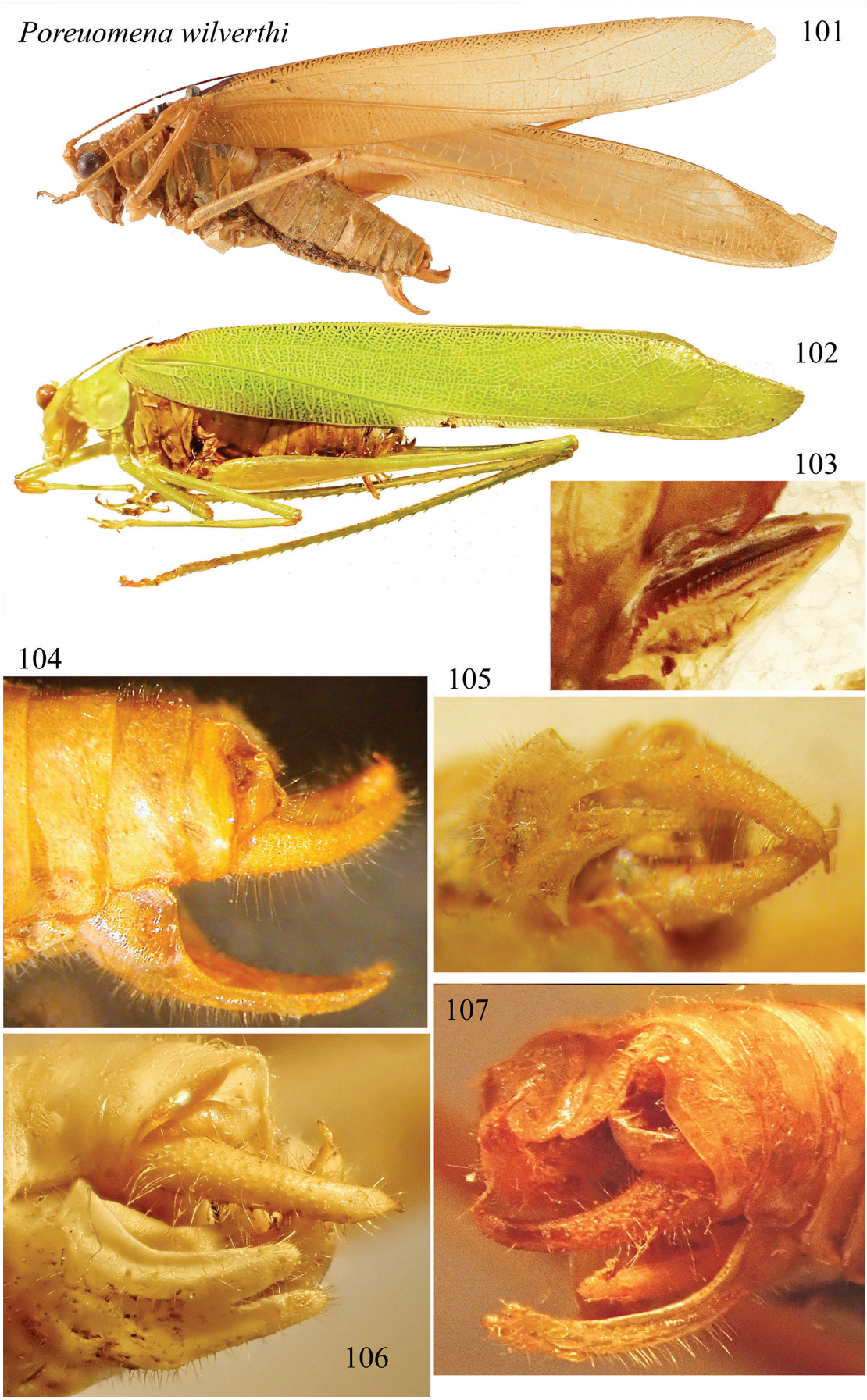
Material examined. Democratic Republic of Congo, Umangi IX-XI.1896 (♂ holotype) (RBINS). **Central African Republic**, Lesse, Lt. Bonnevie (1 ♂); **Democratic Republic of Congo**, Binga, 8-III-1932, H. J. Bredo (1 ♂) (MRAC); **Democratic Republic of the Congo**, N Lac Kivu, Rwankwi, IV 1948, J. V. Leroy (MRAC); **Democratic Republic of the Congo**, Yamgambi, 15.6.1949, Rev Pére, J. K. A. van Boven (1 ♂) (MRAC); **Democratic Republic of the Congo**, Yambata, II/III -1914, Dr Giorgi (2♂) (MRAC); **Democratic Republic of the Congo**, 180 km W from Bukavu, rainforest, 14.V.1988, leg. A. Vojnits et al., Arthropoda collected at 160 W MV lamp, No. 320 and 326 (Teleki expedition) (1♂) (HNHM).

Re-description. Male. Typical *Poreuomena* species with wings protruding over the body by only a few mm (Figs 101, 102). Where tegmina meet when folded, interior part of cells of dark colour while surrounding and elevated veins green (tawny in preserved insect). Rs branching off in the first half of the basal part of the tegmen. Tegmina with two flaps at their base, the flap of the left wing smaller and more pointed than the broader flap with a rounded tip on the right tegmen. The stridulatory rib and surrounding part of the flap of the left tegmen marked dark brown, few patches of brown on right tegmen. Area beneath flap with large brown marking. Stridulatory file on the underside of left flap about 1.2 mm long; the area at the inner side of the file strongly curved; with a few small widely-set teeth (Fig. 103). This part is followed to about the middle of the file by about 16–18 large and increasingly more densely-set large teeth changing then to about 40 or more very densely-set teeth decreasing in size apically. Stridulatory file on the right tegminal flap not as strongly developed, but of similar shape and the same arrangement of the teeth. The 10th abdominal tergite a rounded flap with a median groove and an indentation at the posterior margin giving the structure a bilobate shape (Figs 106, 107). The cerci are thick and slightly incurved with a very narrow and pointed tip (Figs 104–107). The subgenital plate is bilobate with short lobes with rounded tips (Fig. 105). Between the subgenital plate and the cerci, thick blade-like titillators are present (Fig. 107).

Female. Unknown.

Measurements (mm). Males (n = 7). Body length: 17.2–19.5; pronotum length: 3.7–4.0; pronotum height: 2.6–3.0; length hind femora: 18.5–23.2; length of tegmina: 27.9–30.0. Width of tegmina: 3.8–5.1.

Distribution. Widespread west of the Albertine rift into the area of the Central African Republic.



Figures 101–107. Morphological details of male *Poreuomena wilverthi*. Habitus (**101**, syntype, **102**), stridulatory file on the underside of the left tegmen (**103**), lateral view on apex (**104**), subgenital plate (**105**), apex ventral-lateral (**106**) and dorsal-lateral view (**107**).

Remarks. At present only the holotype was known. The new material studied coming from the Natural History Museum of Budapest and the Africamuseum Tervuren considerably enlarges the known area of distribution of this species (Fig. 111).

Key to the species of Poreuomenini (males)

1 Tegmina broad, ratio length/width 4.6 ..... *Paraporeuomena signata* Massa, 2018
1´ Tegmina narrow, ratio length/width 6 to 8.75 (*Cestromoecha* 7.25–7.4; *Poreuomena* 6.1 (*P. wiverthi* – 8.75 *P. biaculeata* sp. nov.)) 2
2 Mirror present, Rs branching off at the middle or past the middle of the tegmen ..... *Cestromoecha* 3
2´ Mirror absent, Rs branching off near the base of the tegmen ..... *Poreuomena* 4
3 Cerci strongly curved downward at base and then sharply bent upwards, at tips very acute (Fig. 13) ..... *C. longicerca*
3´ Cerci rather short and of normal shape, slightly in- and upbent at tips (Figs 19, 20) ..... *C. tenuipes*
4 10th abdominal tergite bilobed; cerci not differentiated into well-developed branches (sometimes with flattened tips) 5
4´ 10th abdominal tergite broad and with straight or slightly incurved posterior margin, but not bilobate; cerci differentiated into two or three apical branches 16
5 10th abdominal tergite deeply divided into two lobes or into processes 6
5´ 10th abdominal tergite flap-like and not deeply divided into two lobes or processes 9
6 Processes of 10th abdominal tergite long and downcurved; cerci very elongated, but stout with an inner dent about middle (Figs 60, 61) ..... *P. gracilicercata* sp. nov.
6´ Processes of 10th abdominal tergite much shorter and stouter; cerci not very elongated but of different shapes 7
7 10th abdominal tergite with two short and stout processes from which each a lobe is arising (Fig. 63) ..... *P. huxleyi*
7´ 10th abdominal tergite with two processes without additional lobes 8
8 Processes of 10th abdominal tergite short and stout, only slightly downcurved (Fig. 25). Cerci stout at base, tips differentiated into two branches, one elongated and spine-like upbent, the other stouter and bent inwardly (Figs 25–27) ..... *P. africana*
8´ Processes of 10th abdominal tergite more slender, evenly downcurved (Fig. 77); cerci with broadened and flattened tips differentiated into three blunt tips (Fig. 78) ..... *P. lamottei*
9 Cerci with two stout tips 10
9´ Cerci pointed, flattened, or with bent apices but not differentiated into two tips 11
10 10th abdominal tergite differentiated into two thickened bulges that are slightly downcurved (Fig. 48) ..... *P. eala* sp. nov.
10´ 10th abdominal tergite flap-like with median groove along length (Fig. 33) ..... *P. biaculeata* sp. nov.
11 Cerci slender, evenly tapering and with acute tips 12
11´ Cerci flattened, blunt or with acute angle at tips 14
12 Cerci very slender evenly tapering to tips; 10th abdominal tergite with elevated margins and deep median groove; medially at posterior margin with u-shaped incision with two acute tips at each side (Fig. 95) ..... *P. sanghensis*
12´ Cerci more stout along whole length with strongly narrowed acute tips (Figs 104–106); 10th abdominal tergite not with elevated margins ..... *P. wilverthi*
13 Cerci laterally flattened 14
13´ Cerci with blunt or acute tips 15
14 Cerci flattened laterally in apical third, with an inner apical flange and a blunt outer tip (Fig. 67); 10th abdominal tergite broad with two closely set rounded bulges at posterior margin (Fig. 67) ..... *P. ivoriana* sp. nov.
14´ Cerci flattened from base onwards, tips narrowed and curved, sclerotised and with acute tips (Fig. 40); 10th abdominal tergite a flap with median depression (Figs 39, 40) ..... *P. crassipes* stat. nov.
15 Cerci with a strong angle at tips (Figs 43, 44); 10th abdominal tergite a downcurved flap (Fig. 42) ..... *P. duponti*
15´ Cerci with a blunt sclerotised tip, evenly incurved (Fig. 88); 10th abdominal tergite flap-like with a shallow tip medially on posterior margin (Fig. 90) ..... *P. matthaei* sp. nov.
16 Cerci differentiated into two branches 17
16´ Cerci differentiated into three branches (Fig. 99) ..... *P. tshuapa* sp. nov.
17 Cerci with two branches and an inner flange (Figs 83–85) ..... *P. magnicerca* stat. nov.
17´ Cerci with two branches, without an inner flange 18
18 Spine on left side of supra-anal plate long and conspicuous (Fig. 55); finger-like apical branch of cerci downwards orientated (Figs 55, 56), shorter compared to *P. laeglae*, with pointed tip ..... *P. forcipata*
18´ Spine on left side of supra-anal plate small (Fig. 72, arrow); finger-like apical branch of cerci flattened and large, orientated backwards and thus on one level with the basal part of the cerci (Figs 72, 73) ..... *P. laeglae* stat. nov.

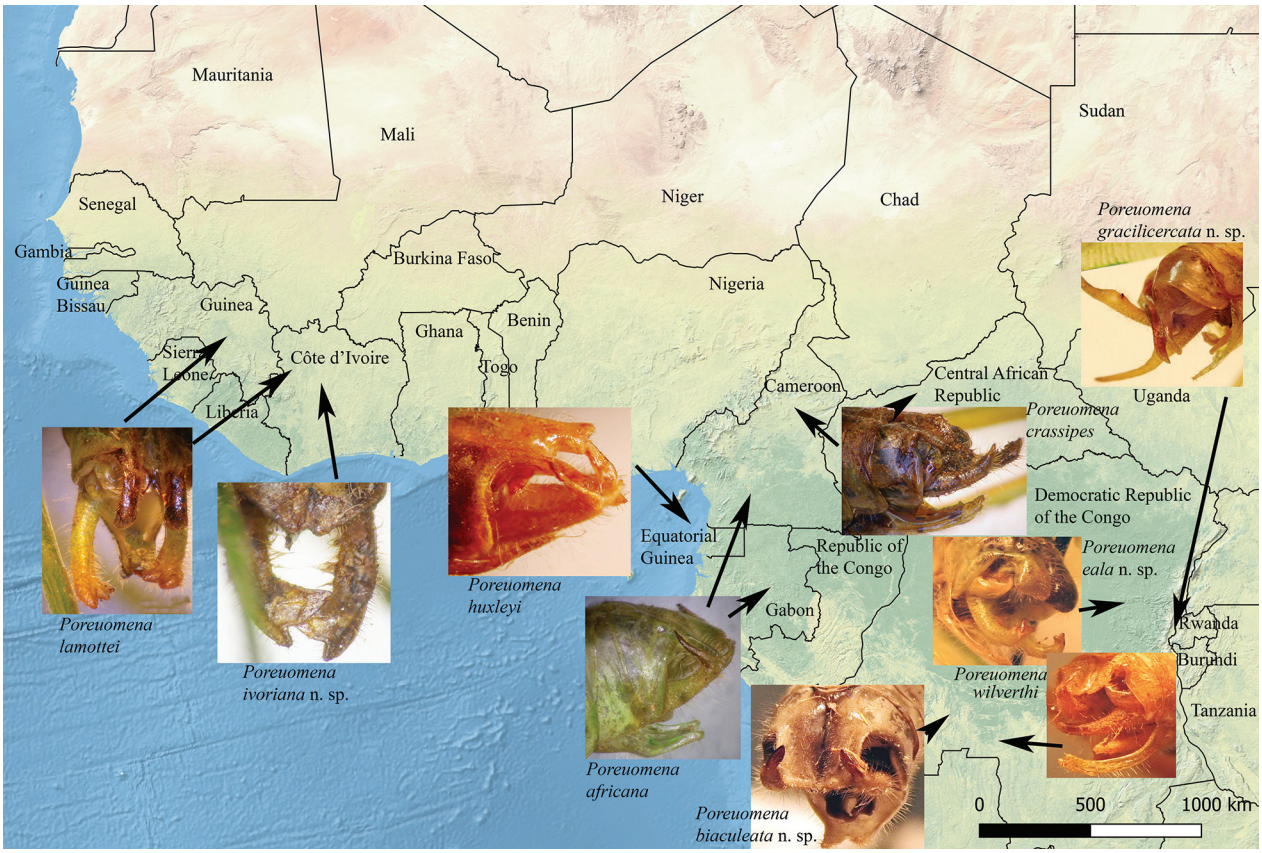


Figure 108. „Lineage 1": *Poreuomena* species with bilobate 10th abdominal tergite and its deviations and cerci with one branch only. Map taken from Google maps.

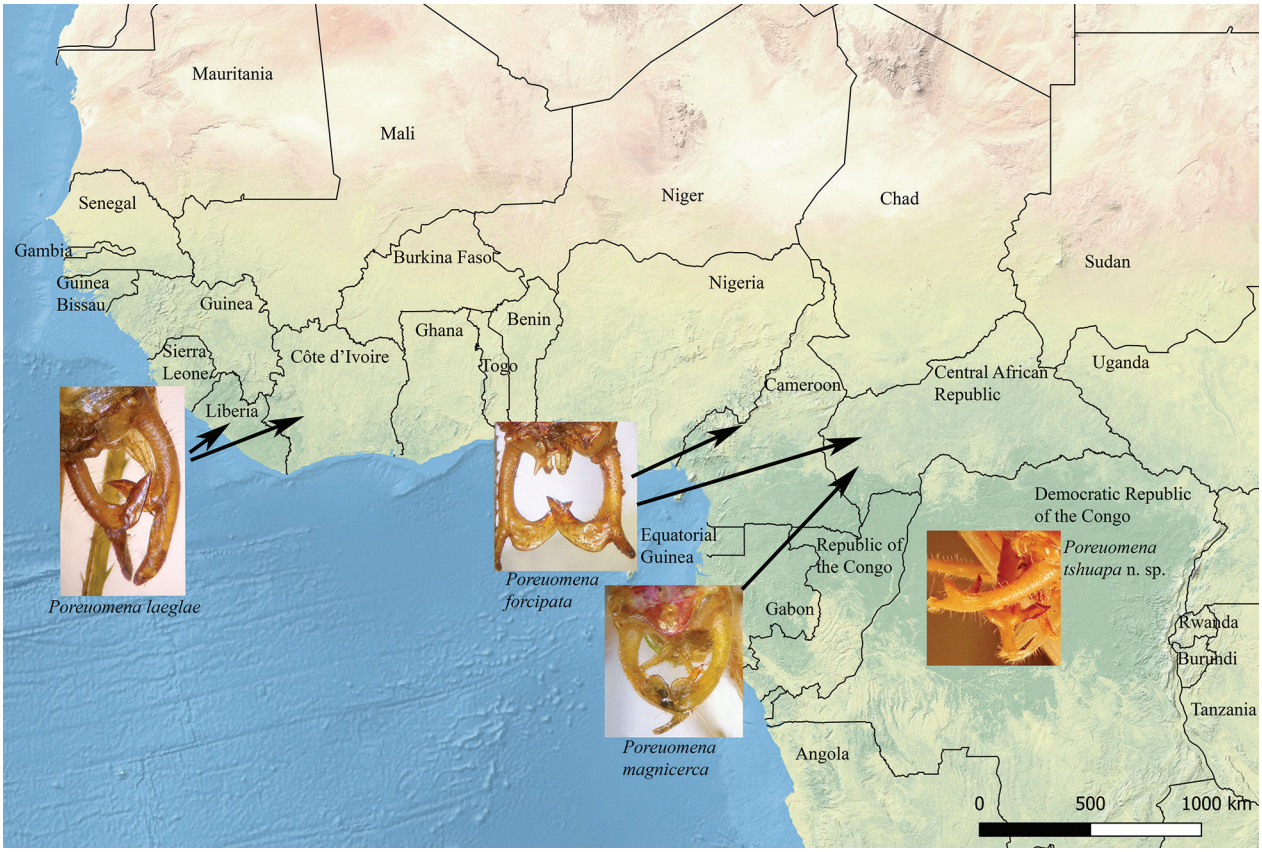


Figure 109. „Lineage 2": *Poreuomena* species with male cerci clearly differentiated into several branches.

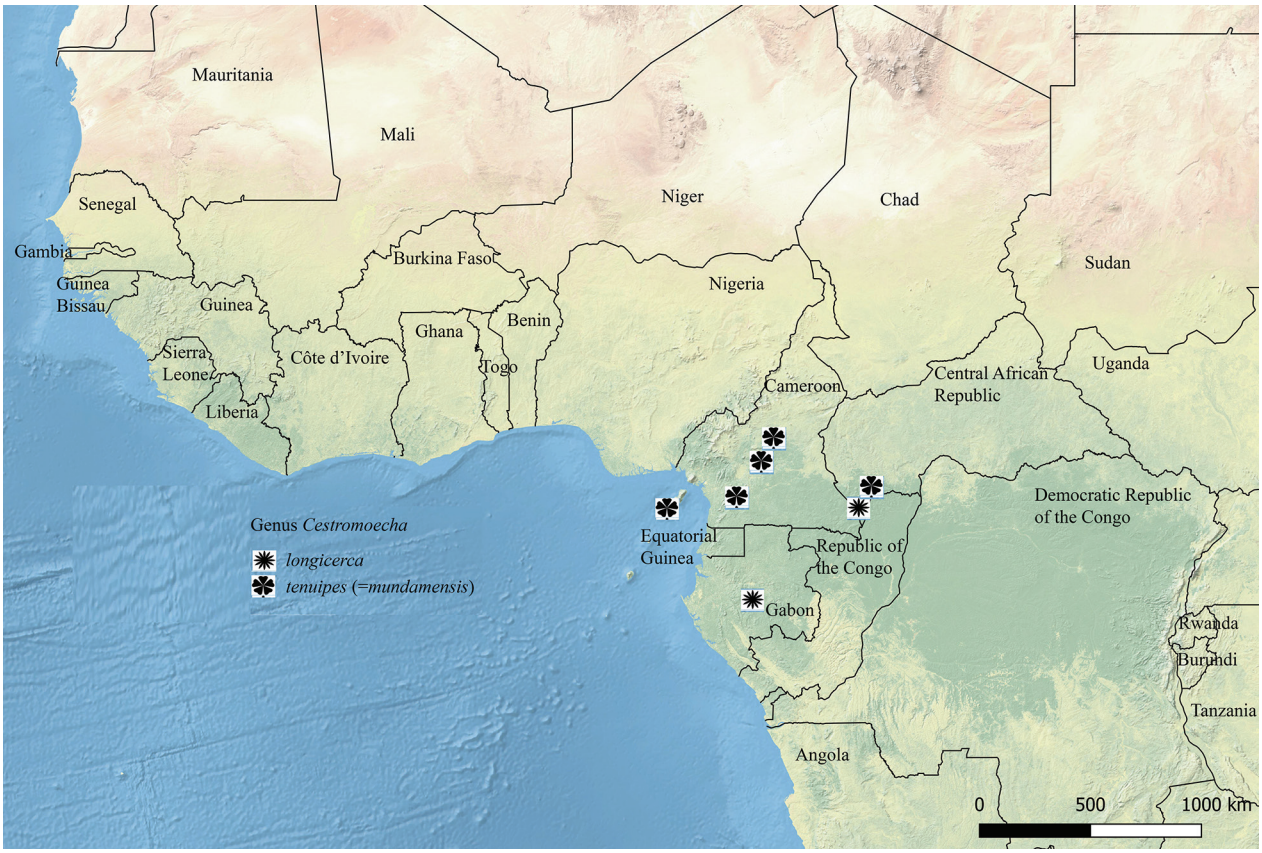


Figure 110. Distribution of *Cestromoecha* species. The record of *C. tenuipes* at Irangi, 100 km north of Bukavu in the Democratic Republic of the Congo is not shown since it is uncertain because only a female was collected (record in Heller et al. 2014).

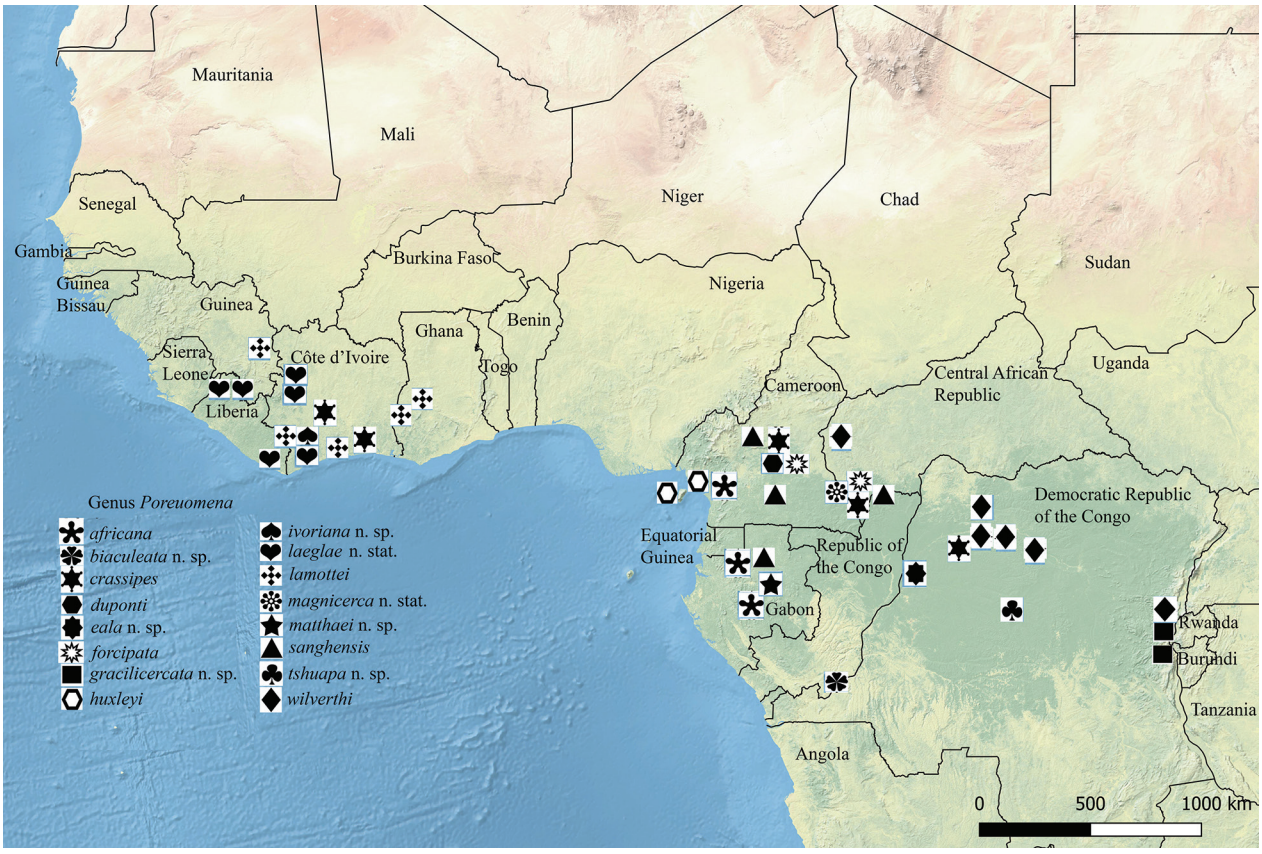


Figure 111. Distribution of species of the genus *Poreuomena*.

Discussion

Distribution patterns of Central and West African Orthoptera taxa are poorly understood. As forest-bound taxa the comparatively species-rich genus *Poreuomena* very likely diversified in the course of several expansions and shrinkages of the Guineo-Congolian forest belt caused by large-scale climatic changes. Humid tropical Africa has been thought to have been covered more or less continuously by forest. About 33 m years ago (Ma) during the Oligocene a period of drastic global cooling fragmented the Eocene pan-African forest (Coetzee 1993) leading very likely to the diversification of many West/Central and East African plant and animal taxa. A second major climatic change is dated in the Miocene, the climate is thought to have been warmer and more humid, connecting the pan-African forest again from coast to coast (Morely 2000; Axelrod and Raven 1978). Since *Poreuomena* as well as *Cestromoecha* (and other purely Central/West African Tettigonoidea taxa), do not have representatives in eastern Africa, it is likely that these genera evolved after the pan-African forest belt has been split up. Around 16 Ma ago the climate in Africa became drier and savannahs spread (Axelrod and Raven 1978; Jacobs 2004) fragmenting rain forests. Covreur et al. (2008) found in tree taxa of the family Annonaceae that all East African taxa were found to have diversified prior to Pleistocene times and their successive origins (ca. 33, 16 and 8 Ma) coincide with known periods of aridification and geological activity in Africa that would have recurrently isolated the Guineo-Congolian rainforest from the East African one. A third period intensifying a drier climate took place after extensive geological activities in the East African Rift System uplifting the central Tanganyikan plateau (Wasser and Lovett 2000; Sepulchre et al. 2006). Thus from 8 Ma the climate became considerably drier and vast savannah areas developed.

In the light of these dramatic changes of the climate in the past and thus leading to fragmentation and recurrent expansion of forest cover, the high diversity found in *Poreuomena* could be explained. However, *Cestromoecha*, on the other hand is a species-poor genus with only two known species at present. Either the latter genus did not cope well with recurrent fragmentation events of its habitat and species became extinct or the picture we see is due to poor collecting activities and gaps in our knowledge of the diversity of many Central and West African taxa including *Cestromoecha*. In *Poreuomena* however, several morphological closely related species suggest a diversification during the past couple of million years, similar to time-scales of speciation found in East African Orthoptera (e.g. Schultz et al. 2007; Voje et al. 2009; Hemp et al. 2010a, b, 2015, 2016, 2018, 2019, 2020). All investigated Orthoptera taxa with an array of morphological closely-related species evolved more or less during the past 1–3 m years due to climatic fluctuations recurrently fragmenting and connecting forests in the Eastern Arc Mountains in Kenya and Tanzania and the old coastal forests. That isolation has not been 100% for this group of insects, however, as seen in genera with representatives both in Central/West and East Africa (e.g. genera of Pseudophyllinae such as *Zabalius* Bolívar, 1886 or *Stenampyx* Karsch, 1890 or in morphologically closely-related genera, such as *Tomias* Karsch, 1890 in Central/West African and *Pseudotomias* Hemp, 2016 in East Africa; also see Hemp 2016; 2020). Molecular analyses on wood mice of the genus *Hylomyscus* showed that species diversified in the Miocene, a first branch of mice branching off from Central African ancestors and reaching East Africa (Nicolas et al. 2020), while a second branch of East African mice diversified in the Pleistocene, 1–3 Ma. At the same time, Central African mice of the genus *Hylomyscus* diversified as well showing that major climatic changes and thus shifts of forest cover must be the reason behind this pattern seen in small mammals and analogous in Orthoptera.

In *Poreuomena* two morphological lineages are discernible: Lineage 1 consists of species with a (for *Poreuomena*) typical bilobed 10th abdominal tergite in males or a 10th tergite deviated from this condition (Fig. 108). The subgenital plate of the males of these species is bilobed and the cerci consist of a single branch (acute, bifurcate or with expanded tips, extremely elongated processes in *P. gracilicercata* sp. nov., Fig. 60). Morphologically most similar are species of Central Africa, the widespread *P. wilverthi* (Albertine Rift to Central African Republic), *P. eala* sp. nov. and *P. biaculeata* sp. nov., both in the Congo Basin (Democratic Republic of the Congo), *P. crassipes* and *P. africana* from Cameroon and Gabon and *P. huxleyi* from Equatorial Guinea (Bioko) and Cameroon (Fig. 108). Further West in the Côte d'Ivoire two species are known morphologically clearly different from the more centrally-distributed species with conspicuous male cerci expanded at their tips, *P. ivoriana* sp. nov. and *P. lamottei*. In addition, *P. sanghensis* distributed in the Congo Basin has bifurcate male cerci, however, not expanded. *P. ivoriana* sp. nov. has a flat expanded flange at the cerci. Such a flange is also found in species assigned to lineage 2, however, with elongated male cerci that are differentiated into two or three branches of different shapes, *P. laeglae* in the Ivory Coast, *P. forcipata* in Central Africa (Cameroon, Central African Republic), and *P. magnicerca* and *P. tshuapa* sp. nov., both recorded from the Congo Basin in the Democratic Republic of the Congo (Figs 109, 111). These species also have a more or less undifferentiated 10th abdominal tergite, with a straight posterior margin to strongly globose but not bilobed as typical for many species of lineage 1.

The highest diversity of *Poreuomena* is found in forests between Gabon and Cameroon. The forests of this area persisted even during extremely arid times, for example during the Ice Ages as seen in various forest trees (Piñeiro et al. 2019) and could have served as refugia for *Poreuomena* (and other taxa, for example in plants, Linder 2014) explaining the high diversity and that numerous representatives of both lineages of *Poreuomena* are found in this area.

Outlook

Ultimately, molecular analyses should show the relationships of the species and lineages of *Poreuomena*, very likely supporting that forest remains of the once strongly-fragmented Guineo-Congolian area served as refugia for flora and fauna and a motor for diversification, analogous to the Eastern Arc Mountains in East Africa.

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