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Review of *Pterotiltus* Karsch, 1893 (Orthoptera, Acrididae, Oxyinae)

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Abstract. The genus *Pterotiltus* Karsch, 1893 is reviewed. There are 15 species previously described, of which only 8 are known from both sexes. The genus is confined to the Congo Basin and coastal West Africa, extending from Ghana to Uganda. The following taxonomic changes are recorded. The unique male holotype of *P. finoti* Dominique, 1900 has been lost. *Pterotiltus apicalis* Bolívar, 1905 is here restricted to the unique female holotype; all other specimens previously allotted to this taxon in the literature have been redetermined and are here transferred elsewhere. *Pterotiltus apicalis rubroantennatus* Ramme, 1929 is here restricted to its holotype male (designated *P. rubroantennatus* Ramme, 1929 stat. nov.), and the remaining members of the original type series are transferred elsewhere. *Pterotiltus inuncatus* var. *nigroantennata* Bolívar, 1908 was erroneously synonomized with *P. apicalis* by Ramme; we restore it from synonomy, as *P. nigroantennatus* Bolívar, 1908 nom. rev. et stat. nov. We designate lectotypes from the syntypes of *P. impennis* (Karsch, 1891), *P. inuncatus* (Karsch, 1892) and *P. miniatulus* Karsch, 1893. We describe three new species (*P. erythrocerus* sp. nov. and *P. sobrius* sp. nov. from Cameroon, and *P. biafrensis* sp. nov. from the mainland area (Rio Muni) of Equatorial Guinea), and also the previously unknown female of *P. coeruleocephalus* Bolívar, 1905 (Cameroon and E Nigeria). We distinguish northern and southern races of *P. inuncatus* Karsch, 1892 (Cameroon and E Nigeria), differing in colouration but sharing a unique phallic anatomy. We report the existence of four more undescribed species in the Democratic Republic of the Congo, Cameroon and Togo plus W Nigeria, but lack adequate material for their description. Finally, we give a key to the known species. The development of the male furcula varies within each species, and is not a valid specific character. Many species of the genus are known from very few specimens, often only the type series or even from unique holotypes. There is an urgent need for more collection, especially in view of the ongoing rapid destuction of their habitat.

Keywords. Africa, forest grasshoppers, systematics, new species.

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Introduction

The genus *Pterotiltus* Karsch, 1893 contains to date 15 described species, all from the wet forests of West and Central Africa. It needs revision, several species being known only from single sex types or from ancient and sometimes poorly preserved material. Descamps (1972) included *Pterotiltus* in his list of African genera then urgently requiring revision, and this need was stressed again by Ritchie (1987).

Taxonomic history

The genus was first described under the preoccupied name *Pyrgostolus* by Karsch (1891), with type species *P. impennis* from Barombi, W Cameroon. Karsch (1892) further described *P. inuncatus* from Buea,W Cameroon, and in 1893 *P. miniatulus* from Togo; in the latter paper Karsch replaced the genus name with the presently valid *Pterotiltus*. Dominique (1900) added *P. finoti* from "French Congo" (now Congo Republic plus Gabon), and Bolívar (1905, 1918) four more: *P. apicalis* from Fernando Po (now Bioko, Equatorial Guinea), *P. coeruleocephalus* and *P. impennis* var. *multicolor* from Cameroon, and *P. inuncatus nigroantennatus* from Belgian Congo (now the Democratic Republic of the Congo, DRC or DR Congo). Ramme (1929) described 6 new taxa, from Cameroon and the former French and Belgian Congos, in the collections of the Berlin Museum: *P. femoratus*, *P. apicalis*, *P. rubroanntenatus*, *P. berlandi*, *P. giorgii*, *P. occipitalis* and *P. minimus*. Thereafter, the genus appears to have escaped the attention of orthopterists until Hollis's (1975) review of the subfamily Oxyinae Brunner von Wattenwyl, 1893. Subsequently, Rowell (2005) described *P. hollisi* from Uganda, and Oumarou-Ngoute & Rowell (2024) added new spp. from Cameroon (*ngoylaensis*, *campoensis*, *bamboutos* and *minimoides*, and the previously unknown female of *minimus*). Differences in morphology induced us to erect a new genus, *Parapterotiltus*, for three species (*minimus*, *minimoides* and *bamboutos*) originally described in *Pterotiltus* (Oumarou-Ngoute & Rowell 2024).

Pterotiltus has spent most of its taxonomic existence to date in the tribe Oxyini Brunner von Wattenwyl, 1893 of the Oxyinae. However, it is currently excluded from the 2 tribes of the subfamily Oxyinae recognized by the OSF (Orthoptera Species File) (Cigliano *et al.* 2016 et seq.), together with several other wet forest oxyine genera of similar habitus and lifestyle (the African *Badistica* Karsch, 1891, *Caryanda* Stål, 1878, *Cylindrotiltus* Ramme, 1929, *Digentia* Stål, 1878, and *Gerista* Bolívar, 1905, plus several Asian genera). A subfamily Caryandinae was proposed (Yin & Liu 1987) to accomodate *Caryanda* and the Asian genus *Lemba* Huang, 1983, but subsequent molecular-systematic and anatomical research (Ma & Huang 2006; Hu *et al.* 2016; Song *et al.* 2018; Li *et al.* 2020; Rowell & Oumarou-Ngoute in prep.) has tended to confirm their traditional placement in the Oxyini, the status which we adopt here.

Natural history, distribution

Hollis (1975) redefined the genus and wrote the following comment: "Species of this genus are forest-living and seem to represent the culmination of adaptation to forest life in the Oxyinae. The wings are completely reduced, many of the species have adopted aposematic colouration, the hind tibiae are cylindrical and have lost all trace of flattening or expansion, and the ovipositor valves have become smooth and obviously adapted to specialised oviposition sites". Rowell (2005) documented epiphyllous oviposition on the food plants (Marantaceae and Commelinaceae) in Uganda in *P. hollisi*, and in view of the uniform ovipositor anatomy it can be presumed that this behaviour is typical of the entire genus.

The known distribution of the genus extends across equatorial Africa from Ghana to Rwanda and Uganda and includes all of the northern side of the Congo Basin. There are so far only three published records from south of the Congo River, including one (Dirsh 1966) from Angola, but this probably merely reflects inadequate collecting; it is quite probable that the genus extends across the entire Congo Basin. The present centre of distribution, where the largest number of known species is recorded, is western Cameroon. *Pterotiltus* very probably extends north from the DR Congo or east from Cameroon

into the southern part of the Central African Republic, south from Uganda into NW Tanzania and north from Uganda or the DR Congo into South Sudan, but has not yet been recorded from these countries in any publication.

All species of *Pterotiltus* seem to have a similar lifestyle – they are found in the herbaceous understorey at the edges of rain forests and in light gaps therein. None so far are known to be canopy dwellers, or to feed on woody plants; the structure of the hind foot, with a very short second tarsal segment (only 12–15% of total length of the foot) also suggests that they are not arboreal. Several species are brightly coloured, as is common in flightless oligophage grasshopper species of rain forest light gaps (Rowell 1978), but there is no evidence that they are distasteful or aposematic, as speculated by Hollis (1975).

Aims of this paper

We originally hoped to revise the genus in its entirety but were prevented from a complete coverage by the inability to borrow the types of four taxa (*apicalis* Bolívar, 1905, *coeruleocephalus* Bolívar, 1905, *berlandi* Ramme, 1929, and *finoti* Dominique, 1900) from their repositories (respectively Madrid, Madrid, Paris and Nantes). Also, there is a general shortage of material of the known species, which are often known only from the type series; this lack severely limits taxonomic research. We were unfortunately prevented from making new collections from the anglophone (south-western) areas of Cameroon by internal hostilities over the past decade, but we were able to collect in some francophone areas of that country. We here review the previously described species, describe several new ones, and give a key to the species.

The genus is unusually uniform in its external morphology – the existing species divisions are based almost exclusively on differences in provenance, size and colouration; only three species (*impennis*, *finoti* and *coeruleocephalus*) sometimes have a distinctive development of the external male terminalia. In determining species boundaries, we have therefore concentrated on the male internal genitalia, especially their distinctive epiphalli, valvular plates, and ventral aedeagal sclerites. The male and female reproductive structures are mostly undescribed to date (see, however, Dirsh 1956; Hollis 1975; Rowell 2005; and Oumarou-Ngoute & Rowell 2024).

The previously described species of *Pterotiltus* are often based on a very small number of specimens, sometimes on unique holotypes. Our examination of the phallic anatomy of these species suggests that most of them probably are indeed distinct species, but there are usually no data on the variability of the species in the wild, and few on their geographical distribution. The most obvious conclusion of our review is that extensive new collections are required to substantiate and expand our knowledge of almost all the older species, which by modern taxonomic standards are often only putative. In view of the ongoing rapid destruction of the African wet forests this collection is urgent. In a few instances, we describe below new species from among the older specimens already available in museums, or alterations in the status of existing taxonomic names. With recently collected material, we have been able to take advantage of larger sample sizes than were available for the historic species.

Material and methods

Newly collected specimens were captured by Oumarou-Ngoute in Cameroon and by Rowell in Uganda, and wherever possible photographed in colour while alive. Standard taxonomic procedures were followed; dried specimens were relaxed in water, the phallic complex dissected out, macerated in 8% KOH, and muscle tissue removed manually. The preparation was then neutralised in 5% acetic acid and stained with acid fuchsin. Drawings were made with the aid of a stereo microscope with a drawing tube. Measurements were obtained from pinned specimens with a digital microscope stage (Mitutoyo), reading to 0.01 mm, and an eyepiece graticule. Values were tabulated and analysed in Excel (Microsoft). Macrophotography used a Motic S600 camera connected to either a Wild M400 macroscope or a Wild

M5 stereo microscope. Drawings and photographs were edited and refined in Adobe Photoshop CS5, ver. 23.3.1.

In the text below, some colonial era place names shown on specimen labels have been replaced by their modern Cameroonian equivalents: e.g., the German form Kamerun by Cameroon or Cameroun, the German form Jaunde by the currently used French form Yaoundé, Jsongo by Isongo, and Victoria by Limbe. The abbreviations DRC and CAR are occasionally used in the text for the Democratic Republic of the Congo and the Central African Republic respectively, and CRS for the Cross River State of Eastern Nigeria. The geographical coordinates given for museum specimens are only approximate, being secondarily derived from maps or gazetteers; none are present on the specimen labels.

Abbreviations

Tables of measurements

E-E	=	width across compound eyes in dorsal view
F	=	length of hind femur
FD	=	depth of hind femur in lateral view
IOS	=	interocular space
L	=	body length, frons to tip of abdomen
Means M/F	=	ratio of male mean to the female mean, an index of sexual dimorphism; normalised, ratio of male to females after allowing for the size difference between the sexes (as seen in the mean values for Pm and Pf). A value of 1.00 indicates no relative difference between the sexes; values deviating from 1.00 by 10% or more are thought significant. For example, in Table 1 (p. 16, *P. impennis*) the male antenna is 1.39 times as long as the female antenna, but 1.61 times as long after normalisation. The male femur is only 0.9 times as long as the female femur, but after normalisation is 1.05 times as long, effectively the same length
N	=	number of specimens measured
P	=	length of pronotum in dorsal midline
Ta1–3	=	length of tarsi 1–3

Foot Formula shows the structure of the hind foot, giving the lengths of each of the three tarsi as percentages of the total length of the foot. Thus, in Table 1, the formula is: 34% – 16% –51%, indicating that the 1st (proximal) tarsal segment accounts for 34% of the length of the foot, and the third (most distal) segment 51% of the foot, whereas the second tarsomere makes up only 16% of the foot. A longer second tarsomere (ca 30%) is characteristic of arboreal grasshoppers, and the values cited here indicate that the species is probably not arboreal.

Diagrams of the phallus

AP	=	anterior process of epiphallus
C	=	cingulum
CAP	=	cingular apodeme
CR	=	cingular ramus
EJD	=	ejaculatory duct
EJS	=	ejaculatory sac
ENFLX	=	endophallic flexure
ENP	=	endophallic plate
ENPR	=	endophallic process
EPI	=	epiphallus
FLX	=	endophallic flexure
GP	=	gonopore process
L	=	lophus of epiphallus

OS = oval sclerite of the epiphallus
PCM = post-cingular membrane
SS = spermatophore sac
VAS = ventral aedeagal sclerite
VF = ventral flange of ventrolateral sclerite
VLS = ventrolateral sclerite
VLVP LL = valvular plate lateral lobe
VLVP ML = valvular plate medial lobe
VLVP = valvular plate

Depositories

IITAB = International Institute for Tropical Agriculture, Cotonou, Benin
MfN = Museum für Naturkunde, Berlin, Germany
MNCN = Museo Nacional de Ciencias Naturales, Madrid, Spain
MNHN = Muséum national d'Histoire naturelle, Paris, France
MUMZ = Makerere University Museum of Zoology, Kampala, Uganda
NHMUK = The Natural History Museum. London, UK
NTM = Muséum d'Histoire naturelle, Nantes, France
ONC = Personal collection of C. Oumarou-Ngoute
RBINS = Royal Belgian Institute of Natural Sciences, Brussels, Belgium
RC = Personal collection of C.H.F. Rowell
RMCA = Royal Museum for Central Africa, Tervuren, Belgium

Results

Taxonomy

Class Insecta Linnaeus, 1758
Order Orthoptera Latreille, 1796
Family Acrididae MacLeay, 1821
Subfamily Oxyinae Brunner von Wattenwyl, 1893

Genus ***Pterotiltus*** Karsch, 1893

Pygostolus Karsch, 1891: 192 (junior homonym of *Pygostolus* Haliday, 1833, Hymenoptera).
Pterotiltus Karsch, 1893: 108 (replacement name for *Pygostolus* Karsch, 1891).

Type species

Pygostolus impennis Karsch, 1891. (The name *Pygostolus* was preoccupied, replaced with *Pterotiltus* by Karsch 1893).

Generic diagnosis

Modified from Dirsh (1965), and Hollis (1975).

Etymology

From the Greek "*pteros*", "wing" or "fin", and "*tiltos*", "shredded, ruined", presumably an allusion to the microptery or aptery of the genus.

Description

Small to medium size (average body length males 14–22 mm, females 18–27 mm). Integument often rugose and pitted on head, and on thoracic and proximal abdominal tergites, but otherwise smooth and shiny.

Head. Antennae filiform, 22 segments, longer than head and pronotum together, especially in males (after allowing for body size differences, the male antennae are up to half as long again as those of the female). Fastigium of vertex roughly triangular, short, wider than long, sloping forwards, slightly concave, sometimes with a weak medial carinula or groove; the obtuse-angular apex runs smoothly into the frontal ridge. Frons oblique and sometimes slightly incurved in male, in female almost vertical or only slightly oblique; frontal ridge clearly defined in its upper half with a medial sulcus, but weak or absent in lower half. Lateral facial carinae complete. Eyes small, almost round, strongly convex, slightly more protuberant in males than in females; interocular space in males narrower, in females slightly wider, than antennal scape.

Thorax. Pronotum cylindrical, without carinae, or with only a slight trace of a medial carina; three deep, wide sulci crossing dorsum, often with large transverse convexities between them. Metazona short, maximally about one-third length of prozona, usually much less, its posterior margin straight or slightly concave. Anterior pronotal margin weakly produced in the midline, overhanging the occiput. Transverse furrows between meso- and metanota and between metanotum and first abdominal tergite wide and deep. Prosternal process simple, conical or cylindrical, but always pointed at apex. Mesosternal interspace open, about as wide as long or sometimes longer than wide, mesosternal lobes rounded. Metasternal interspace nearly closed. Elytra and wings micropterous, vestigial, or absent. Hind femur slender, its tip exceeding the end of the abdomen. The lower lobes of the hind knee acutely pointed, as is typical of almost all members of the Oxyinae.

Legs. Hind tibia only moderately expanded distally; internal tibial spurs larger than external spurs. Usually 7 external, 9 internal hind tibial spines. External apical spines always present. Arolium large.

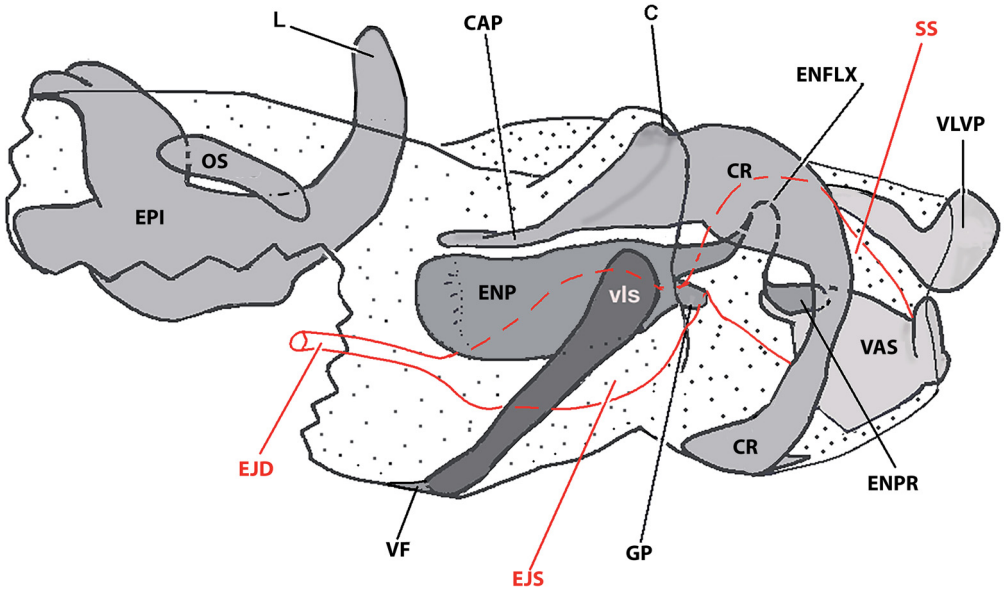


Fig. 1. *Pterotiltus* spp. Diagramatic sketch to show the anatomy of the fully extended phallus when viewed from the left hand side. Sclerites are shaded, ectophallic membrane shown in stipple. The genital duct (ejaculatory duct → ejaculatory sac → spermatophore sac) that runs medially through the phallus, is indicated in red. All the species of the genus have a phallus of this type, although there are interspecific differences in the structure of some of the sclerites, especially the valvular plate and the ventral aedeagal sclerites, and to a lesser extent in the epiphallus and the ventral flange of the ventrolateral sclerite. For explanation of abbreviations, see Material and methods (pp. 4–5).

Abdomen. Tympanum small, open. Tenth abdominal tergite of male partially divided, usually with a minute furcula, but in some species or individuals the paired projections fuse to a greater or lesser extent, to form a single medial process or a medial tubercle. Male supra-anal plate widely triangular, very short. Cercus laterally compressed, wide at base, narrowing to an acute or spine-like apex, triangular in lateral view, straight or slightly incurved in dorsal view. Male subgenital plate very short, rounded.

Phallic complex (Fig. 1). Epiphallus with divided bridge (Hollis 1975), ancorae absent or greatly reduced, and large lophi; the outer lophi are long, slender, blade-like and curved forwards. Smaller inner lophi additionally present in some species. Epiphallic membrane also contains a unitary ventrolateral sclerite, encircling the ventral half of the phallus. The anterior edge of this sclerite is usually somewhat produced forward in the ventral midline, forming a small, sclerotized plate in the membrane, here referred to as the ventral flange; it varies in shape between species. Cingular valves absent, presumed fused and elaborated together with the arch sclerite into the roughly selliform valvular plate (Hollis 1971, 1975) covering the aedeagus dorsally and partially laterally. In most species of *Pterotiltus* this plate is ornamented with complex cuticular folds and lamellae, often of species-specific form. Endophallus with a slender sclerotized flexure, terminating abruptly in short spatulate endophallic processes that are appressed to the ventral aedeagal sclerites. Aedeagus composed of the valvular plate and the ventral aedeagal sclerites, together with the sheathing ectophallic membrane. The ventral aedeagal sclerites too are often species-specific in shape. Their posterior extremities are the ventral aedeagal "valves".

Female reproductive structures (Figs 2, 24A, 50F–G). Dorsal valves of ovipositor laterally compressed, with tapering apices, leaf-shaped in lateral view, often deeply grooved on their dorsal edges; ventral valves smooth, slender, straight, rod-like, sometimes dorsally flattened or slightly grooved. Egg-guide prolonged horizontally rearwards as a stiff rod between the ventral valves, up to half the length of the latter, straight or weakly curved, sharply pointed. Ventral surface of female subgenital plate flat or smoothly rounded. Bursa copulatrix large, sac-like, spermatheca with small apical diverticulum and a large curved subapical diverticulum (Fig. 2C–D).

Key to species of *Pterotiltus*

All species are extremely similar in external morphology, this key is therefore based on colouration in life and provenance. It applies to males only, unless otherwise stated, but the two sexes are usually similarly coloured. As colouration is often labile, especially in museum specimens, a serious determination should always be checked by a phallic examination and detailed comparison with the description of the species.

1. Hind knee blue-black or black in lateral view 2
– Hind knee red or brown in lateral view 3

2. Antennae black with white tips. Dorsum of pronotum black with about 4–6 pale (white or yellow) spots .....***P. hollisi*** Rowell, 2005 (S & W Uganda, p. 60)
– Antennae green basally, flagellum red. Dorsum of head and thorax blue and red ....***P. campoensis*** Oumarou-Ngoute & Rowell, 2024 (S Cameroon, p. 72)
– Antennae brownish green; upper frons, genae, dorsum of pronotum black; metathoracic tergum bright yellow, small montane species .... ***P. inuncatus*** (Karsch, 1892) (northern race) (NW Cameroon, E Nigeria, CRS, p. 16)

3. Hind knee brown 4
– Hind knee red 5

4. Frons and genae yellow. In female, femora of fore and middle legs red, hind femur green, hind tibia blue, apex of abdomen yellow-green (male unknown) ..... ***P. giorgii*** Ramme, 1929 (NCentral DR Congo, p. 49)
– Thorax & 1st abdominal tergite uniform light brown colouration, head black and white, abdomen and legs green, antennae black with white tips ..... ***P. occipitalis*** Ramme, 1929 (Cameroon, N DR Congo, West Uganda, p. 51)
– Antennae blackish brown, with paler brown tips several segments in length. Genae and spots of lateral pronotal lobes white. Otherwise colouration only black or green ..... ***P. sobrius*** sp. nov. (C & W Cameroon, p. 85)

5. Hind knees red/brown, antennae mostly black 6
– Hind knees red/brown, antennae mostly brown 7
– Hind knees red, antennae solid red, no pale tips 8

6. Antennae black. Abdominal apex red; frons and genae white; hind femora green with prominent darker chevron markings; hind tibia blue green; male furcula replaced by a vertical medial process ..... ***P. impennis*** (Karsch, 1891) (Cameroon, Nigeria, CRS, p. 10)
– Antennae black with minute pale tips. Abdominal apex red; head, thoracic and most abdominal tergites black, metazona yellow or white. Hind femora green, hind tibia pale blue ..... ***P. miniatulus*** Karsch, 1893 (NE Ghana, NW Togo, p. 22)
– Antennal flagellum shiny black, tips unknown. Frons and genae yellow, hind tibia green. Abdominal tip red ..... ***P. nigroantennatus*** Bolívar, 1908 stat. nov. (Central DR Congo, p. 33)
– Antennae black, with prominent white tips (fading in dried specimens). Frons and genae white, legs green, apex of abdomen red. Head and thorax black, strongly tinged with blue in fresh specimens. Polymorphic for male furcula/median tubercle ..... ***P. coeruleocephalus*** Bolívar, 1905 (W Cameroon, E Nigeria, p. 36)
– Antennal flagellum black basally, tip segments shading to light brown. Legs and apex of abdomen green. Hind knee red or reddish brown. Hind tibia dark green. In fresh specimens compound eye with a violet cast. Large robust species ..... ***P. ngoylaensis*** Oumarou-Ngoute & Rowell, 2024 (E Cameroon, p. 66)

7. Antennae brown, femora of pro- and meso-thoracic legs red, hind tibia black ..... ***P. biafrensis*** sp. nov. (coastal Rio Muni, Equatorial Guinea, p. 92)
– Antennae brown, small yellow tips. Abdominal apex red. Hind femur green, but red at base. Hind tibia blue-green ..... ***P. femoratus*** Ramme, 1929 (SW Cameroon, p. 45)
– Antennae brown, white tips. Female abdomen red, hind femur and tibia green, condyle red. (Male unknown) ..... ***P. apicalis*** Bolívar, 1905 (Bioko Island, Equatorial Guinea, p. 28)
– Antennae light greenish brown. Metathoracic tergite and abdominal tergites 1–4 bright yellow or red, frons and genae white, small montane species ..... ***P. inuncatus*** (Karsch, 1892) (southern race) (SW Cameroon, p. 19)
– Antennae light brown (tip colour unknown). Frons and genae light brown. Legs green, hind knee reddish brown, hind tibia olive. Apex of abdomen red in female, perhaps in male too. Labrum and clypeus of female red. (Male colouration uncertain) ..... ***P. berlandi*** Ramme, 1929 (Rio Muni, Equatorial Guinea (see text pp. 56_57 for discussion; p. 57)

8. Antennae red, frons and lower genae yellow, legs green, hind tibia blue grey, apex of abdomen green ..... **"Faradje male"** (NE DR Congo, p. 97)
– Antennae red, Frons and lower genae white..... 9

9. Antennae red, frons and genae white. Abdomen tip male red (female unknown) .... ***P. rubroantennatus*** Ramme, 1929 stat. nov. (W Cameroon, p. 30)
– Antennae red, frons white with green mottle. Abdomen tip green, legs green, hind tibia blue-green with red condyle ..... ***P. erythrocerus*** sp. nov. (Cameroon, p. 77)

Species diagnoses

We first treat the previously described species in their chronological order of description.

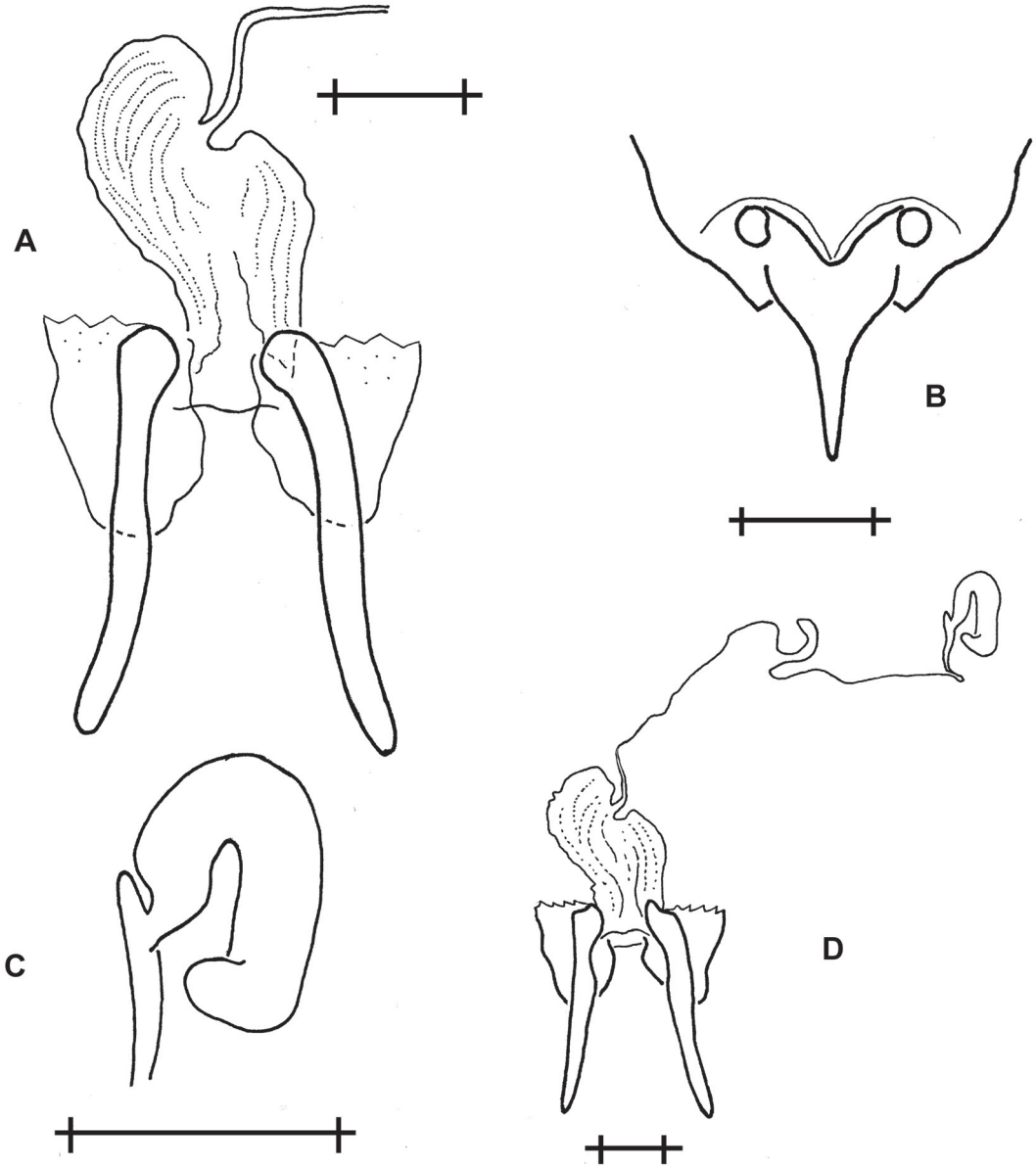


Fig. 2. *Pterotiltus* spp. Female reproductive structures (from Rowell 2005). **A**. Bursa copulatrix. **B**. Subgenital plate, internal surface. **C**. Spermatheca. **D**. Spermatheca, spermathecal duct, bursa copulatrix. The female anatomy is similar in all *Pterotiltus* spp. Compare, e.g., with Fig. 50. The species shown here is *P. impennis* (Karsch, 1891). Scale bars = 1 mm.

1. ***Pterotiltus impennis*** (Karsch, 1891) (type species of genus)
Figs 2–7; Table 1

Pygostolus impennis Karsch, 1891: 192. (Preoccupied, not *Pygostolus* of Haliday, 1833 (Hymenoptera)).
Pterotiltus impennis Karsch, 1893: 108, synonym (nom. nov. for *Pygostolus impennis*).
Pterotiltus impennis var. *multicolor* Bolívar, 1905: 228. Syn. Kirby 1910: 386.

Pterotiltus impennis var. *multicolor* – Ramme 1929: 313. — Johnston 1956: 259.
Pterotiltus impennis – Sjöstedt 1910: 8. — Dirsh 1965: 235. — Johnston 1956: 258; 1968: 173. — Hollis 1975: 226, fig. 64 (p. 227) (epiphallus). — Rowell 2005: figs 2–4 (male and female internal genitalia).

Type material

Lectotype (designated here)
CAMEROON • ♂; Barombi Station; [4°40′0″ N, 9°24′0″ E]; [1889 approx.]; S. Preuss leg.; MfN, DORSA BA000506S01.

Paralectotypes
CAMEROON • 1 ♂; same data as for lectotype; MfN, DORSA BA000506S02 • 3 ♀♀; same data as for lectotype; MfN, DORSA BA000506S03 to DORSA BA000506S05. (DORSA BA000506S05 is illustrated in Fig. 4A–C.)

Other material examined

CAMEROON • 2 ♂♂; Mukonye, near Kumba; [4°34′39″ N, 9°30′24″ E]; 15–18 Feb. 1938; S.G. Eisentraut leg.; MfN • 2 ♂♂; same data as for preceding; 23–25 Feb. 1938; S.G. Eisentraut leg.; MfN • 1 ♂; Barombi Crater; [4°40′0″ N, 9°24′0″ E]; 1 Oct. 1971; C.H.F. Rowell leg.; RC 71015 • 1 ♀; same data as for preceding; 30 Sep. 1971; RC 71006 • 2 ♀♀; Dja faunal reserve; [3°0′ N, 13°0′ E]; 23 Jul. 1976; T.E. Rowell leg.; in swamp; RC 76009, 76010 • 3 ♂♂; Kumba; [4°38′0″ N, 9°27′0″ E]; 2015 [no other data]; A. Simeunotchom leg.; ONC 1172017, 1152017, 1182017 • 2 ♀♀; same data as for preceding; ONC 1142017, 1122017 •3 ♂♂; Tombel; [4°44′47″ N, 9°40′13″ E]; 2015 [no other data]; A. Simeunotchom leg.; ONC 292017, 272017, 282017 • 1 ♀; same data as for preceding; ONC 262017 • 2 ♂♂; Haut Nyong Division, Lobéké National Park; [2°16.667 N, 15°38.775 E]; 8 Dec. 2023; C. Oumarou-Ngoute leg.; ONC 7492023D, 7502023D • 1 ♀; same data as for preceding; ONC 7482023D .

NIGERIA • 1 ♂; Osomba (Akampka LGA); 1 Jun. 1986; J. Reid leg.; NHMUK • 1 ♂; same data as for preceding; 11 Jan. 1986; NHMUK • 10 ♀♀, 7 ♂♂; Bacoco, nr Calabar; 26 Oct. 1984; J. Reid leg.; NHMUK • 1 ♂; Calabar-Ekong Road, 80 km NE of Calabar; 3 May 1982; J. Reid leg.; NHMUK.

Description (Figs 3–5)

Male
Medium-sized (for measurements see Table 1 below, p. 16). Integument mostly smooth and shiny, but densely punctate on head and face, pronotum, and on thoracic and proximal abdominal tergites.

Head. Antennae filiform, longer than head and pronotum together, mostly black, but blue-black proximally and at extreme tip. Frons, mouthparts and genae white, with small blue-green markings on clypeus and labrum. Vertex and occiput blue-green, with a black triangular marking medially, the apex narrowing towards the interocular space. Eyes shiny black in life (drying to dull brown). Postocular stripe black, continuing backwards on to the upper part of the pronotal lobes.

THORAX. Pronotum predominantly black, but with the lower half of the lateral lobes white (continuing the line of the genae); disc of pronotum black with two large blue-green medial patches, one situated between the anterior margin and the second sulcus, and the other between sulci 3 and 4; metazona blue green. Fore and middle legs leaf green, all femora yellow-green, tarsi blue green. Hind coxae green, hind femora yellow green, darkening towards the knee, with a conspicuous dark green chevron pattern on both inner and outer faces. Hind knees and proximal part of hind tibiae, red; distal hind tibiae and

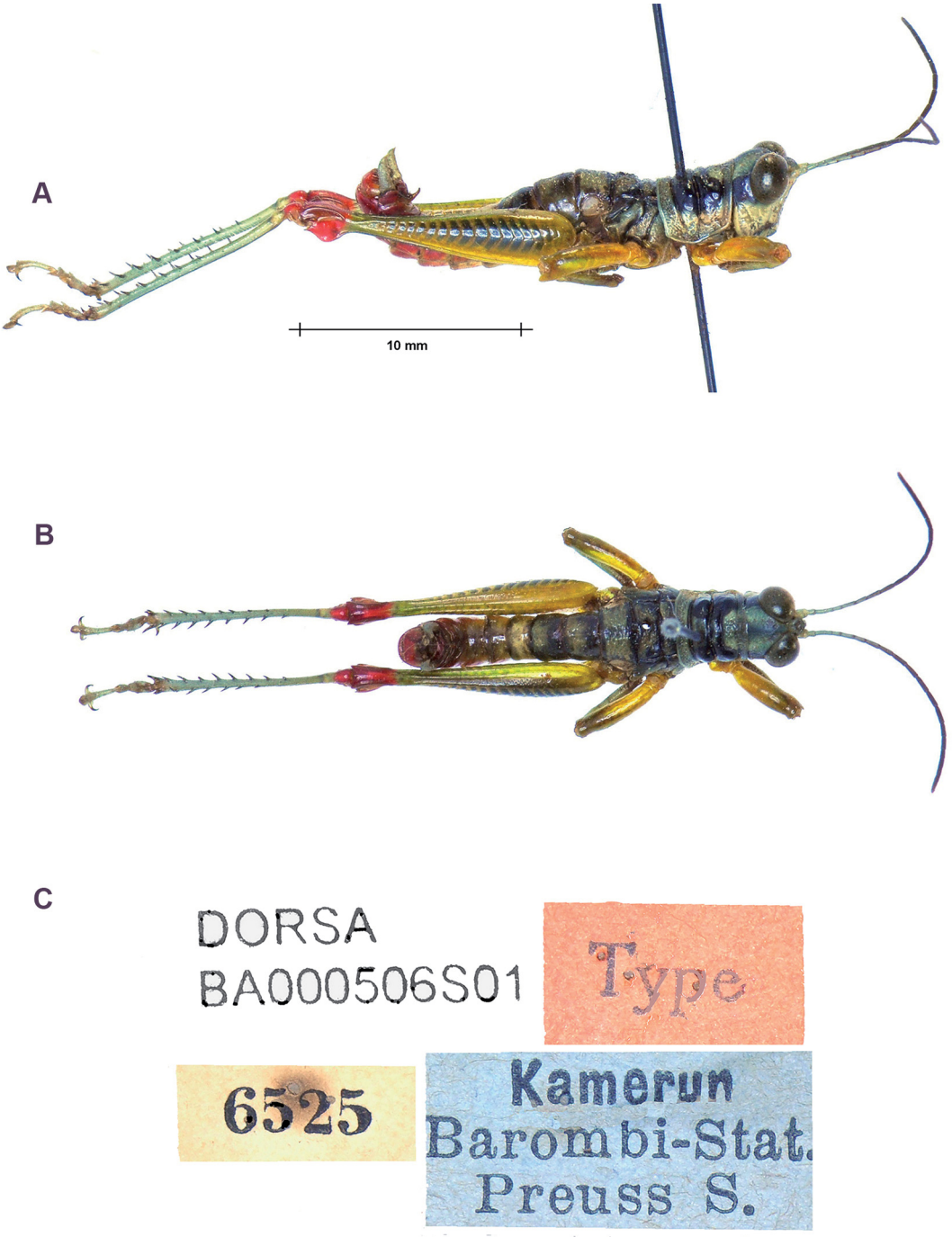


Fig. 3. *Pterotiltus impennis* (Karsch, 1891), lectotype, ♂ (MfN, DORSA BA000506S01). **A**. Lateral view; the medial process of the 10th abdominal segment is clearly visible. **B**. Dorsal view. **C**. Labels.

tarsi light blue green: the hind tibiae are somewhat expanded laterally towards their tips. Tibial spines (7 external, 9 internal) and spurs brownish black. Tegmina greatly reduced to almost imperceptible scales on the mesothoracic tergites, black or colourless. Wings absent.

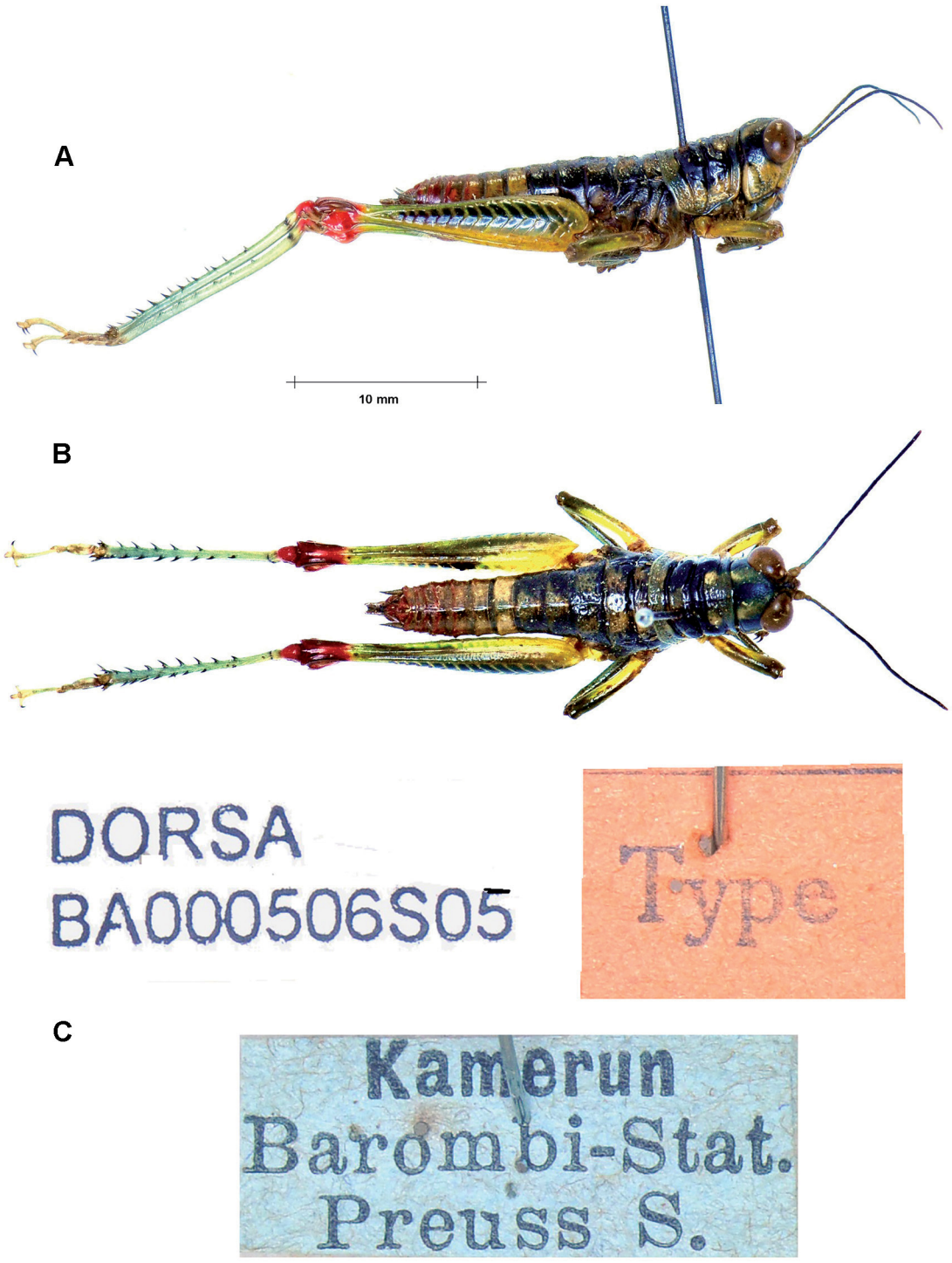


Fig. 4. *Pterotiltus impennis* (Karsch, 1891), paralectotype, ♀ (MfN, DORSA BA000506S05). **A**. Lateral view. **B**. Dorsal view. **C**. Labels.

Abdomen. Abdominal tergites 1–3 coloured similarly to pronotum, i.e., tergites black with a medial green or blue-green marking. Tympanum open, white. Abdominal tergite 4 is yellow, tergites 5 & 6 light reddish brown, tergite 7 to tip of subgenital plate bright red. Male cerci blue green, slightly inwardly curved, the dorsal edge straight, the lower edge curving upwards to form a point apically. The points of the furcula of the male 10th abdominal tergite are fused into a short vertical medial process, minutely bifid at the tip. This feature so far seems to be invariant between individuals, and allows instant specific recognition of the male.

Phallic complex. The phallus was described by Rowell (2005). The epiphallus (Fig. 6B–D) is distinctive within the genus, with a strong bridge and well-developed internal peaks on the lophal ridge (the "inner lophi" of Hollis 1975). The large 'outer' lophi are typical of the genus, being blade-like, more or less vertical, but strongly curved forwards (cephalad) towards their tips. The ventrolateral sclerite is robust (Figs 6–7) but its ventral flange is small and weakly bilobed (Fig. 7A, C) The valvular plate is small and less prominent than in other species of the genus; it is tectiform, short, with two rearward pointing projections and a transverse medial ridge on dorsal surface, with only limited lateral extensions (Fig. 7B). There are endophallic processes at the ventral end of the flexure abutting the ventral aedeagal sclerites (Fig.1). The tips of the processes are visually clear in stained preparations, but seem to be firmly fixed to the sclerites – perhaps even fused? Note that in *impennis* the bridge of epiphallus has two weakly sclerotized bumps laterally – see Fig. 6B–C.

Female

In most respects similar to male, though larger, but red tip of abdomen less strikingly and more diffusely coloured. Ovipositor and internal reproductive structures as in generic description (Fig. 2)

Measurements

See Table 1.

Fig. 5. *Pterotiltus impennis* (Karsch, 1891). Living male, Cameroon, Barombi Mbo (photo Ulf Bjelke).

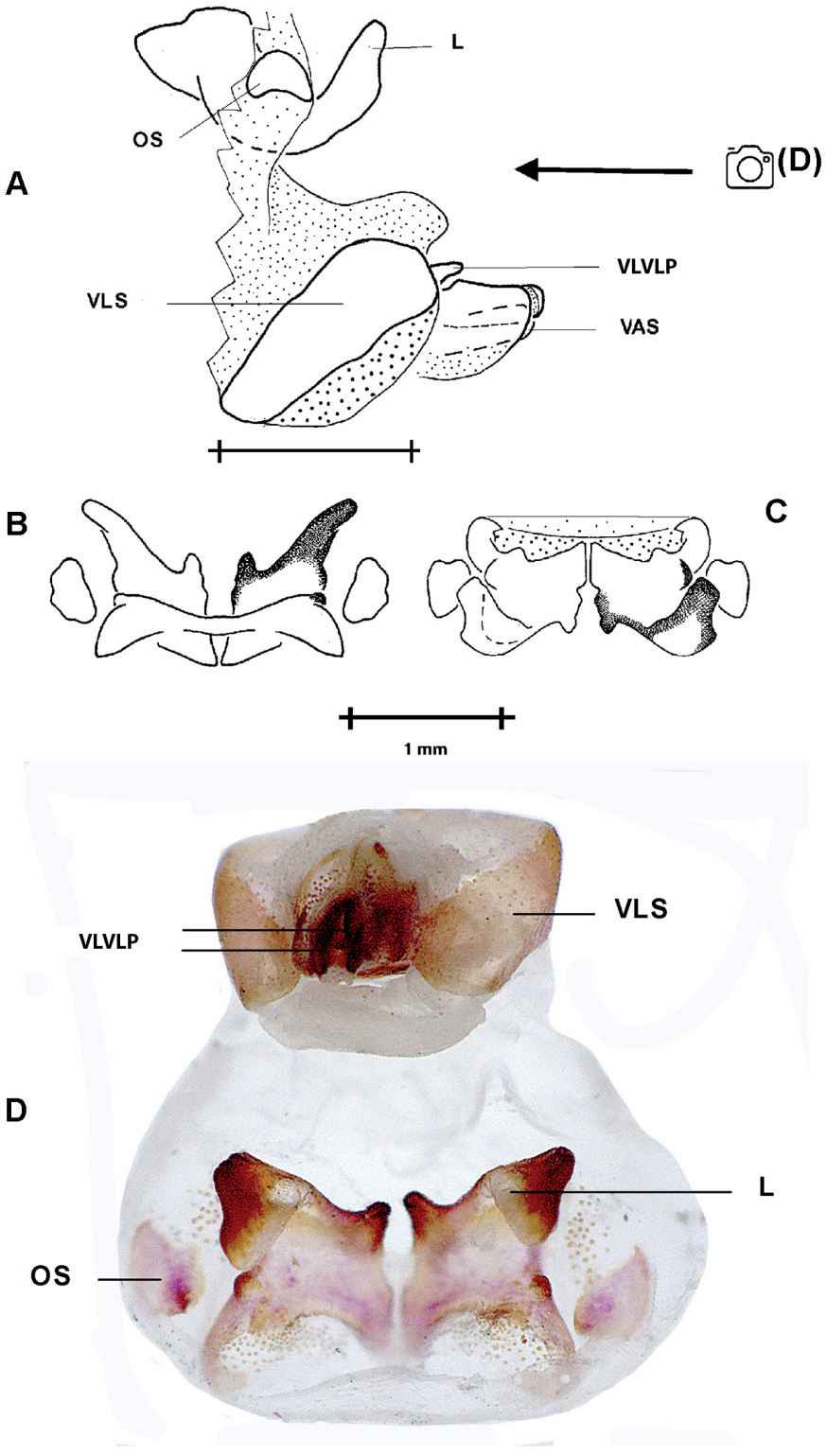


Fig. 6. *Pterotiltus impennis* (Karsch, 1891). **A**. Phallic complex, lateral view, partially extended. **B**. Epiphallus, axial view. **C**. Epiphallus, dorsal view (A–C from Rowell 2005). **D**. Microphotograph of phallic complex, viewed as shown by the arrow in A above. The epiphallus is partially extended, seen in axial aspect. Abbreviations: see Material and methods.

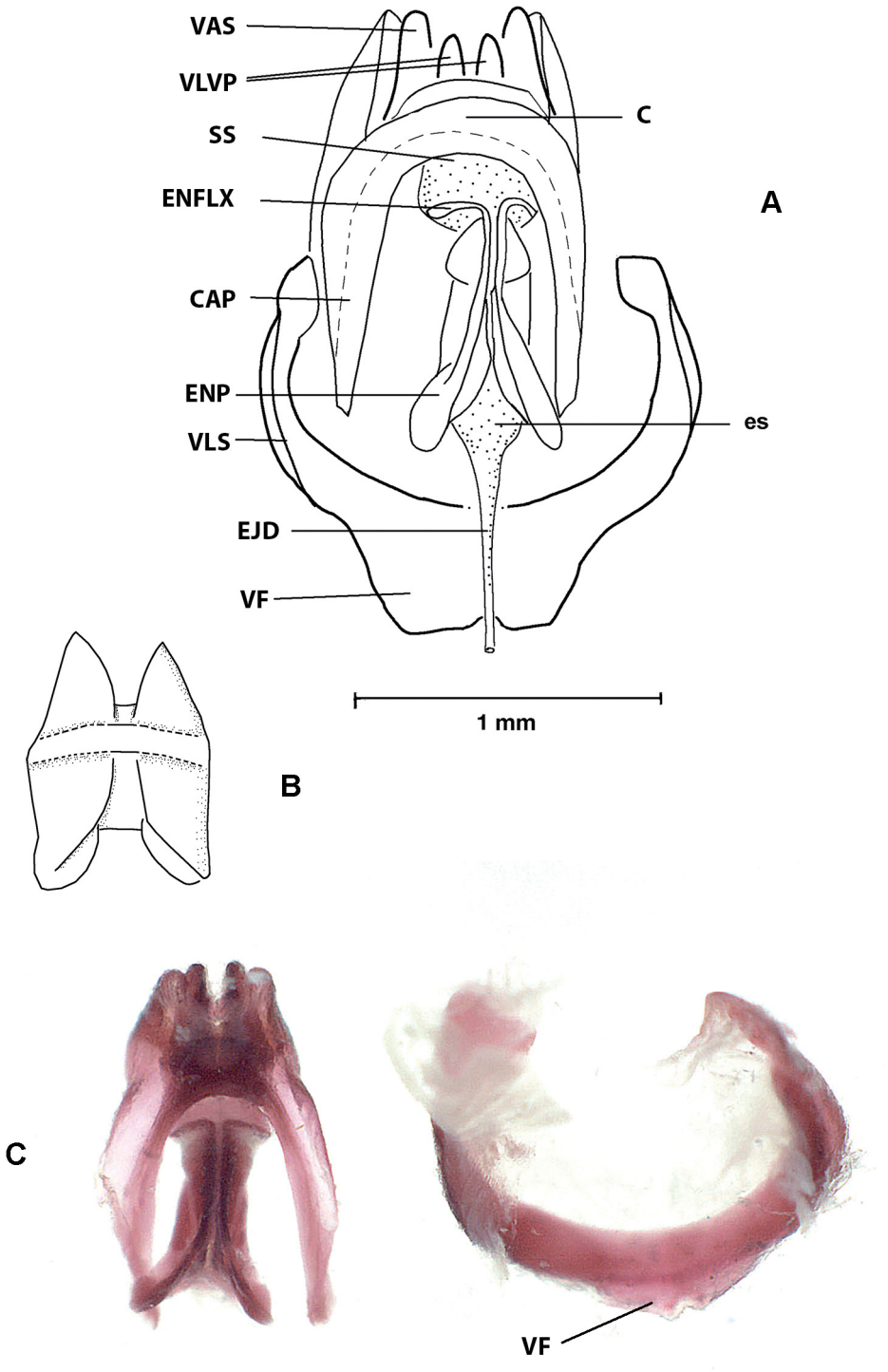


Fig. 7. *Pterotiltus impennis* (Karsch, 1891). **A**. The distal portion of the extended phallus is here shown in dorsal view after the ectophallic membrane has been slit medially and reflected laterally, exposing the ventrolateral sclerite and the ectophallic and endophallic components. **B**. The valvular plate dissected free from the cingulum, viewed from above. **C**. Microphotograph of the sclerites shown in A, stained in acid fuchsin. Note the small ventral flange, developed on the anterior margin of the ventrolateral sclerite. Remnants of the phallic membrane obscure the tips of the sclerite. Abbreviations: see Material and methods.

Table 1. Measurements in mm of *Pterotiltus impennis* (Karsch, 1891). The 9 specimens measured here are all from the type series in the MfN. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.59	16.41	12.30	0.37	4.02	12.24	2.64	1.17	0.44	1.67	3.47
Maximum	3.86	20.50	14.32	0.50	4.12	12.99	2.69	1.34	0.64	1.96	3.76
Means	3.72	17.55	13.65	0.42	4.09	12.59	2.66	1.23	0.56	1.84	3.63
N	5	5	4	5	5	5	5	5	5	5	5
				Foot formula			34%	16%	51%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	4.03	20.26	8.62	0.46	4.10	12.53	2.86	1.17	0.57	2.11	3.90
Maximum	4.74	23.48	10.62	0.63	4.61	15.11	3.19	1.45	0.77	2.49	4.71
Means	4.34	21.78	9.84	0.52	4.30	13.94	2.97	1.33	0.65	2.26	4.24
N	4	4	4	4	4	4	4	4	4	4	4
				Foot formula			31%	15%	53%		
Means M/F	0.86	0.81	1.39	0.81	0.95	0.90	0.90	0.92	0.87	0.82	
Normalised	1.00	0.94	1.61	0.94	1.10	1.05	1.04	1.07	1.01	0.95	

Designation of lectotype

From the 5 original syntypes we designate as male lectotype the specimen shown in Fig. 3A–C, with number DORSA BA000506S01.

Distribution

Recorded from West and Central Cameroon and Eastern Nigeria (Cross River State).

Ecology

Many but not all records are from swamp forest. Several of the NHMUK Nigerian specimens are labelled as being found on ferns and there is one record of it eating an unidentified species of fern in captivity. This is perhaps the commonest species of the genus, it is certainly the most frequently collected and currently the best represented in museum collections.

Status of taxonomic material

Good. Both sexes known, plentiful museum material, modern localities identified.

2. ***Pterotiltus inuncatus*** (Karsch, 1892)

Figs 8–11; Table 2

Pygostolus inuncatus Karsch, 1892: 72 (syn. Karsch 1893). (Preoccupied, not *Pygostolus* of Haliday, 1833 (Hymenoptera)).

Pygostolus inuncatus – Karsch 1893: 108 synonym (nom. nov.) *Pterotiltus*.
Pterotiltus inuncatus – Kirby 1910:387. — Ramme 1929: 315. — Chopard 1945: 177 — Dirsh 1956: 276; 1961: 401, fig.24; 1965: 235. — Johnston 1956: 259; 1968: 173. — Hollis 1975: 226, fig. 67. — Mestre & Chiffaud 2006: 245.

non *Pterotiltus inuncatus* – Bolívar 1908: 106. (Misidentified – Bolívar named it *Pterotiltus inuncatus* var. *nigroantennata*. This specimen (RBINS, examined) is definitely not conspecific with *inuncatus*

Karsch, 1892. We consider this to be a separate taxon: *P. nigroantennatus* Bolívar, 1908 stat. nov. See p. 33).

Type material

Lectotype (designated here)
CAMEROON • ♂; Buea; [4°10′0″ N, 9°14′0″ E]; 1–10 Apr. 1891; S. Preuss leg.; MfN, DORSA BA000804S01.

Paralectotypes
CAMEROON • 4 ♂♂; same data as for lectotype; MfN, DORSA BA000804S02 to DORSA BA000804S05 • 1 ♀; same data as for lectotype; MfN, DORSA BA000804S06.

Other material examined

CAMEROON • 1 ♂; Buea; [4°10′0″ N, 9°14′0″ E]; 20 May 1904; Glauning S. leg.; MfN, MDORSA 00003 • 1 ♂; Mt Cameroon, Musake; [4°10′15″ N, 9°18′50″ E]; 6350 feet [= 1935 m a.s.l.]; 9 Jan. 1932; M. Steele leg; MfN, also labelled BM 1934-240 (presumably originally from NHMUK collection) • 3 ♀♀; Mt Cameroon, Buea; [4°10′0″ N, 9°14′0″ E]; 900–1200 m a.s.l.; 10–17 Oct. 1910; E. Hintz leg.; MfN • 6 ♂♂; Mt Cameroon, Post and Telegraph Road; 4700 feet [= 1433 m a.s.l.]; Dec. 1960; N.D. Jago leg.; NHMUK • 2 ♂♂; Kumba; [4°38′0″ N, 9°27′0″ E]; 2015 [no other data]; A. Simeunoutchom leg.; ONC 1122017, 1102017 • 1 ♀; same data as for preceding; ONC 252017.

Description (of the original syntypes, belonging to the southern population; see Figs 8–9)

Small for the genus (see Table 2 for measurements).

Head. Vertex and occiput black, eyes now brown (but are black in life). Postocular stripe dark blue-black. Fastigium olive brown. Antennae, blackish brown, in life tinged greenish basallly; tips slightly flattened and light brown. Frons, frontal ridge, clypeus and lower genae cream (white in life). Labrum, outer face of mandibles, mottled blue-grey and black. Palps green.

Thorax. Pronotum mostly black. A medial patch of dirty white between anterior margin of pronotum and sulcus 2. Lighter colour on the anterior ventral angle of pronotum and part of the prothoracic episternum. Metazona very short, mostly cream/white, including posterior ventral angle. Mesothoracic tergite black with narrow red posterior margin. Pleura blue/grey and black, shading to cream near coxal aperture, flecked with red. Elytra vestigial, squamoid, not quite reaching posterior margin of mesothoracic segment, whitish. Metathoracic tergite solid red, integument somewhat pitted. Wing rudiment reduced to a cuticular ridge. Pleura blue-black dorsally, cream coloured ventrally. All legs were probably green (as in living specimens), but now yellowish. Hind knee red. Hind tibia red proximally by knee, then green distally. Hind tibia expanded laterally distally. Tibial spines and spurs greenish black.

Abdomen. Tergites 1–4 solid red, remaining segments green. Male has a small but distinct furcula, separation of points 0.3 mm (Fig. 10A).We have not seen individual variation in the furculae of this species.

Phallic complex. The phalli of specimens DORSA BA000804S01 and DORSA BA000804S05 were extracted and prepared. The male epiphallus shows the typical genus form, with a divided bridge and forwardly sloping blade-shaped lophi (Fig. 10B). It is more gracile than the epiphalli of other species – reflecting the small size of this species relative to most other *Pterotiltus* spp. The valvular plate is selliform and distinctive, with the posterior extremity formed into two diverging and downwardly directed lobes (Fig.10C). The ventral flange (Fig.10E) is well developed, doubling the width of the ventrolateral sclerite in the ventral midline.

Female (Fig. 9)

Similar to male but differs in colouration of metathoracic and abdominal tergites. These have only diffuse red markings, tending to black in the midline. The pronotal patterning is less distinct.

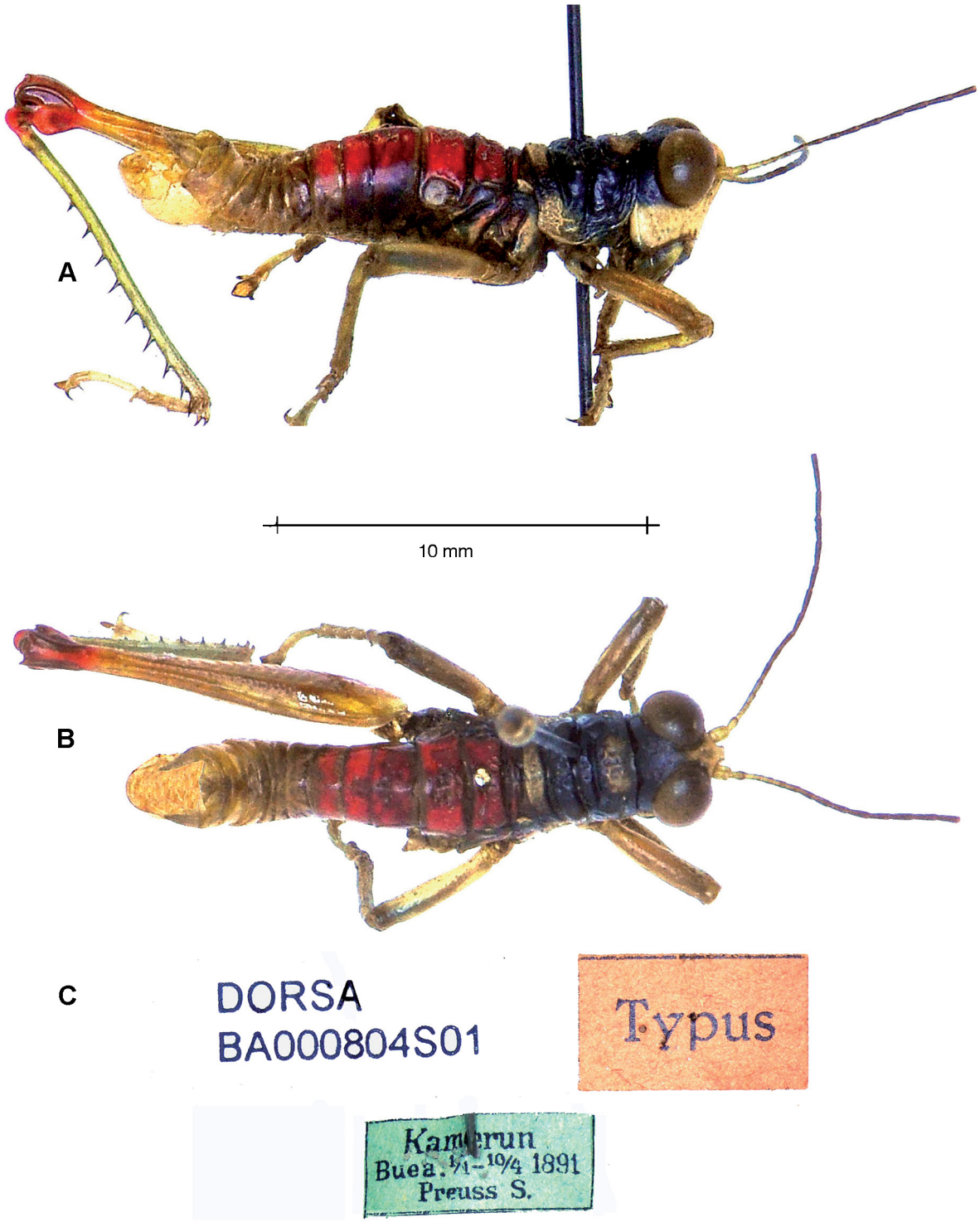


Fig. 8. *Pterotiltus inuncatus* (Karsch, 1892), lectotype, ♂ (MfN, DORSA BA000804S01). **A**. Lateral view. **B**. Dorsal view. **C**. Labels. These are southern race specimens.

Polymorphism

This species occurs in two colour forms. Recent material from Kumba, Cameroon, and photographs from Mt Koupé, Cameroon, and from E Nigeria (Fig. 11A–D), are specimens which differ in colour pattern from the MfN specimens (Figs 8–9) and from the 1960s NHMUK specimens (all of which are from Buea area, or the southern slopes of Mt Cameroon). In the former (more Northern) specimens the terga of the metathorax and 1st abdominal segments are coloured bright yellow, rather than red as in the (Southern) types (see Figs 7–8), and the head is almost completely black. There is a narrow band of blueish white on the lower frons, but it does not extend to the genae, which are black. The hind knees can be black or red, and this is not simply correlated with the colouration of the head and abdominal tergites.

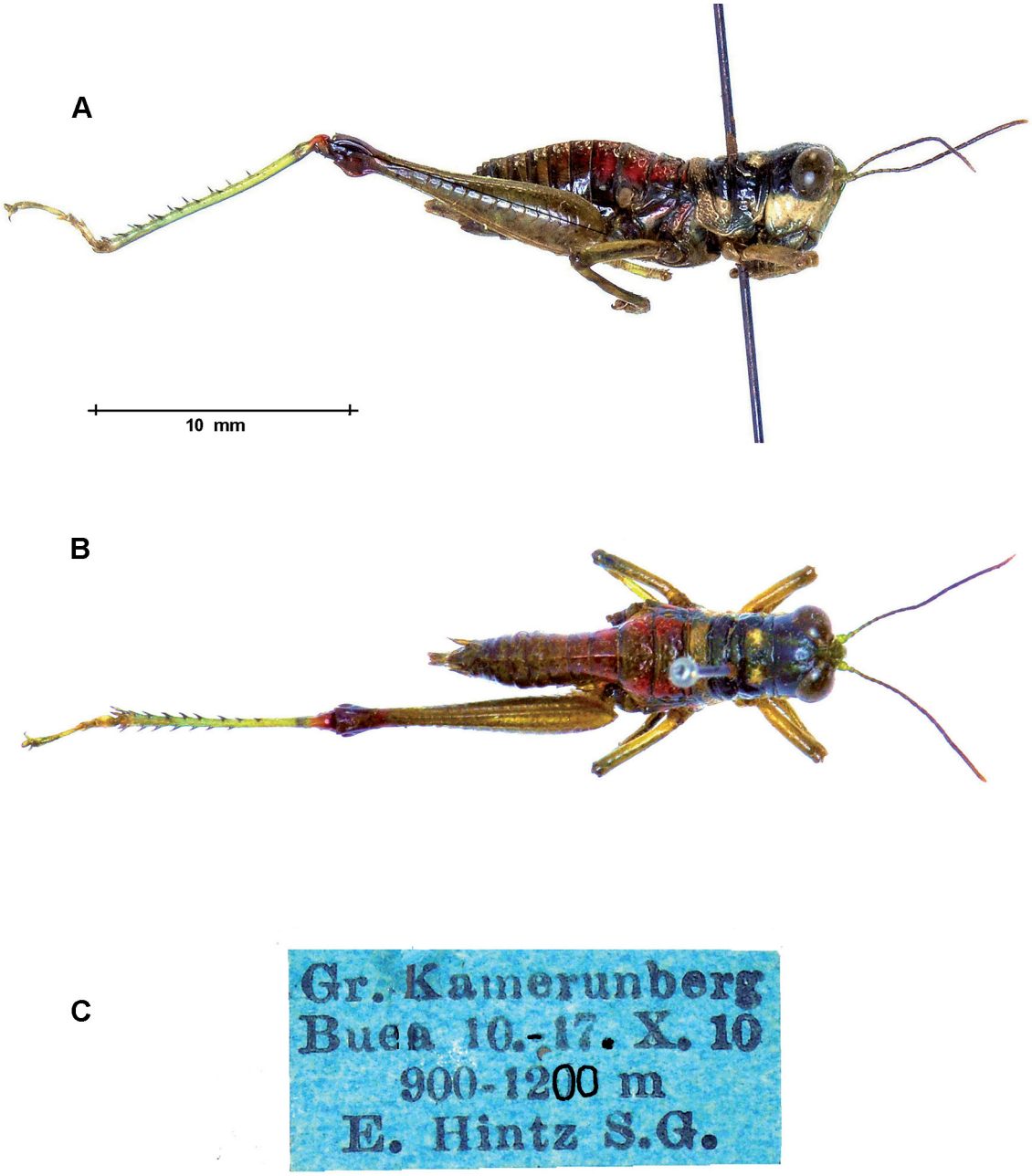


Fig. 9. *Pterotiltus inuncatus* (Karsch, 1892), non-type, ♀ (MfN). **A**. Lateral view. **B**. Dorsal view. **C**. Labels. These are southern race specimens.

Both the southern (all-red abdominal tergites, white frons) and the Nigerian (red & yellow tergites, black frons) populations have red knees, while the northern Cameroonian specimens (Mt Koupé & Kumba, red & yellow tergites, black frons) have black ones. Within the southern form (Figs 8–9) both red and black knees can be found. However, the phallus is uniform in all localities.

Measurements

See Table 2.

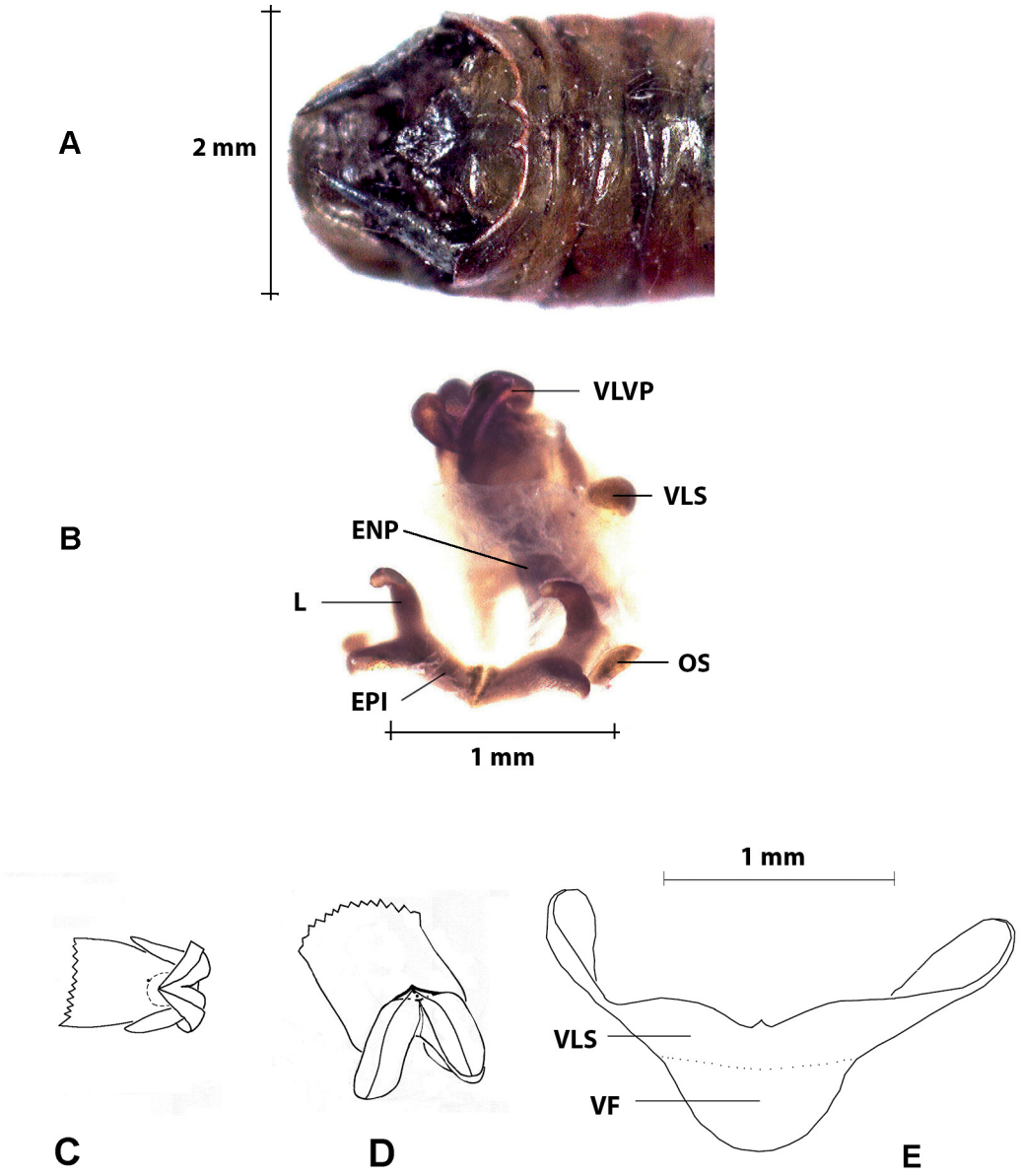


Fig. 10. *Pterotiltus inuncatus* (Karsch, 1892). **A–B**. Lectotype, ♂ (MfN, DORSA BA000804S01). **A**. Terminalia in dorsal view. The margin of the 10th abdominal tergite has been digitally lightened to emphasize the furcula. **B**. Phallus in perspective oblique view. **C–E**. Non-type, ♂ (specimen damaged, discarded). **C**. Valvular plate dissected free from cingulum, dorsal view. **D**. As C, but oblique dorso-axial view. **E**. Ventrolateral sclerite (vls) dissected from phallic membrane and flattened for drawing. Abbreviations: see Material and methods.

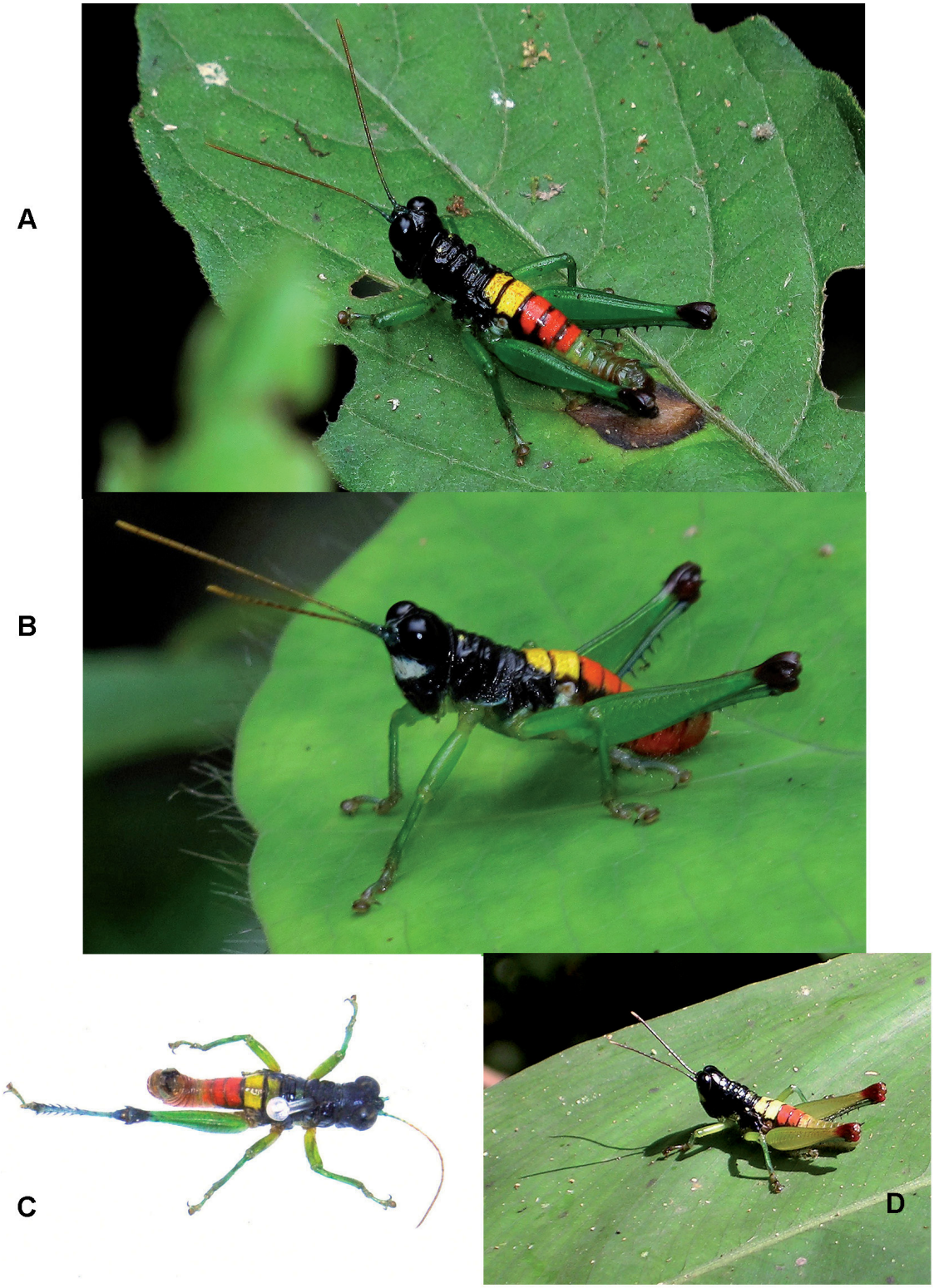


Fig. 11. *Pterotiltus inuncatus* (Karsch, 1892), males of the northern colour variant. **A–B**. Cameroon, Mt Koupé (photos Ulf Bjelke). **C**. Cameroon, Kumba. **D**. Nigeria, Cross River State, Old Ndejibe Hill (5°33′50″ N, 8°51′28″ E) (photo Lincoln Fishpool). Note red hind knees in D, black knees in A–C.

Table 2. Measurements (in mm) of *Pterotiltus inuncatus* **(**Karsch, 1892). The measured specimens are 5 male syntypes and 4 females, that include one syntype and 3 non-types from the type locality (Buea). Abbreviations as in Material and methods.

MALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	2.72	13.15	9.17	0.37	2.59	9.98	2.11	0.98	0.41	1.67	3.15
Maximum	2.90	14.93	10.05	0.49	3.44	10.18	2.22	1.09	0.53	1.90	3.34
Mean	2.83	14.48	9.74	0.42	3.30	10.16	2.17	1.05	0.48	1.77	3.30
N	5	5	3	5	5	5	5	5	5	5	5
				Footformula			32%	15%	54%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	3.29	16.47	7.62	0.46	3.85	11.57	2.55	0.96	0.59	2.05	3.60
Maximum	3.74	18.03	8.91	0.59	3.95	11.73	2.65	1.32	0.66	2.29	4.23
Mean	3.49	17.28	8.06	0.56	3.90	11.65	2.58	1.13	0.62	2.18	3.93
N	4	4	4	4	4	4	4	4	4	4	4
				Footformula			29%	16%	55%		
MeansM/F	0.81	0.84	1.21	0.75	0.85	0.87	0.84	0.93	0.77	0.81	0.84
Normalised	1.00	1.03	1.49	0.93	1.05	1.08	1.04	1.15	0.96	1.00	1.04

Designation of lectotype

We designate as male lectotype the specimen shown in Fig. 8A–C, with number DORSA BA000804S01. The lectotype and all the paralectotypes are in the MfN, Berlin. The phallus of the male lectotype has been dissected, and the preparation is mounted on the pin of the specimen.

Distribution

Recorded from southwestern Cameroon, and from the Oban Highlands of E Nigeria (Cross River State). In both countries it is found principally in highland areas (ca 1000 m a.s.l. and above). The type series, Hintz's females, and the NHMUK sample all come from the southern slopes of Mt Cameroon; Kumba and Mt Koupé lie to the north and west of this area.

Status of taxonomic material

Good. Both sexes known, plentiful museum material, modern localities identified.The geographical variation in colouration and pattern still needs investigation.

3. ***Pterotiltus miniatulus*** Karsch, 1893

Figs 12–14; Table 3

Pterotiltus miniatulus Karsch, 1893: 108.

Pterotiltus miniatulus – Kirby 1910: 387. — Ramme 1929: 312. — Johnston 1956: 259. — Dirsh 1965: 236. — Hollis 1975: 226, fig. 65. — Mestre & Chiffaud 2006: 245. — Hollier 2010: 19 (one male syntype – now a paralectotype – in Geneva Museum – not examined for this study).

non *Pterotiltus miniatulus* – Bolívar 1905: 226 (misidentified; we describe this specimen below, p. 92, as *P. biafrensis* sp. nov.).

Type material

Lectotype (designated here)
TOGO • ♂; Bismarckburg [nr Yégué]; [8.1833° N, 0.6833° E]; Jan. 1891; R. Büttner S. leg.; MfN 5595, DORSA 000805S01.

Paralectotypes
TOGO • 3 ♂♂; Bismarckburg [nr Yégué]; [8.1833° N, 0.6833° E]; 20 Sep.–15 Oct. 1890 and 1 Jun.–15 Jul. 1891; R. Büttner S. leg.; MfN, DORSA 000805S02 to DORSA 000805S04 • 2 ♀♀; same data as for preceding; 1 Jun.–15 Jul. 1891; MfN, DORSA 000805S05, DORSA 000805S06.

Other material examined

GHANA • 1 ♂; Volta Region, 2 miles E of Chiare [probably a misspelling of Shiare]; [8°18′ N, 0°36′ E]; 23 Dec. 1963; N.D. Jago leg.; NHMUK • 1 ♂; Volta Region, 6 miles S of Nkwanta; [latter at 8°16′0″ N, 0°31′0″ E]; 23 Dec. 1963; N.D. Jago leg.; NHMUK.

Description (made from the lectotype and paralectotypes; Figs 12–14)

Of medium size for the genus (see measurements in Table 3).

Male

Head. Antennae mostly black, but greenish at base and minutely tipped with yellow at the extreme tip. Frons, frontal ridge and genae yellow (possibly white in life?) densely sprinkled with black pitting. Labrum and outer face of mandibles, black. Fastigium, vertex, occiput, and post-ocular stripe, black. Palps yellow, probably green in life.

Thorax. Pronotum, thoracic and proximal abdominal segments with ground colour shiny black. Anterior margin of pronotum blotched with golden yellow; metazona and posterior ventral angle entirely yellow. Tegmina and wings absent. In dried specimens the femora of all three pairs of legs are dull orange or yellow (they were also so described by Karsch 1893); tibiae and tarsi, however, are green, and the femora too may well be green in life. The (comparatively fresh) Ghanaian specimens have blue-green tibiae (Fig. 13) , and the mesothoracic legs are greenish. Fore legs and hind femora, however, are orange, as in older material. Hind knee and most proximal part of hind tibia red. Hind tibiae pale blue green and are progressively expanded laterally over the distal ⅔ of their length.

Abdomen. First 4 abdominal tergites black, decreasing in intensity towards the rear. Posterior margin of 1st abdominal tergite and all intersegmental membranes yellow. Abdominal tergites 5 & 6 yellowish, tergite 7 to tip of subgenital plate red. Cerci green, narrowing progressively to a finely pointed conical tip.

Phallic complex. All the males in the type series are immatures, apart from one (DORSA 000805S04) which is an intersex, probably as a result of nematode parasitism (see Rowell 2000), and so were unsuitable for a phallic preparation. Two non-type males from Ghana were obtained from the NHMUK for phallic dissection – one had no phallus (previously extracted), the other was relaxed and the phallus successfully extracted. Epiphallus (Fig. 14C) of the usual *Pterotiltus* type, but with only outer lophi, that are slim, pointed and forwardly curved. No inner lophi present. The ‘oval’ sclerites of epiphallus are L-shaped, bridge is rather narrow, ancorae absent.

Female

Closely similar to male in colouration and pattern, but the red colour of the posterior abdomen less clearly demarcated and less brilliant.

Distribution

Mestre & Chiffaud (2005) list Ghana, Togo and Nigeria as the distribution of *miniatulus*, but we know of no evidence that it occurs in Nigeria. All confirmed recorded specimens come from a small area on the Ghana / Togo border zone, roughly between Nkwanta (Ghana) and Yégué (Togo).

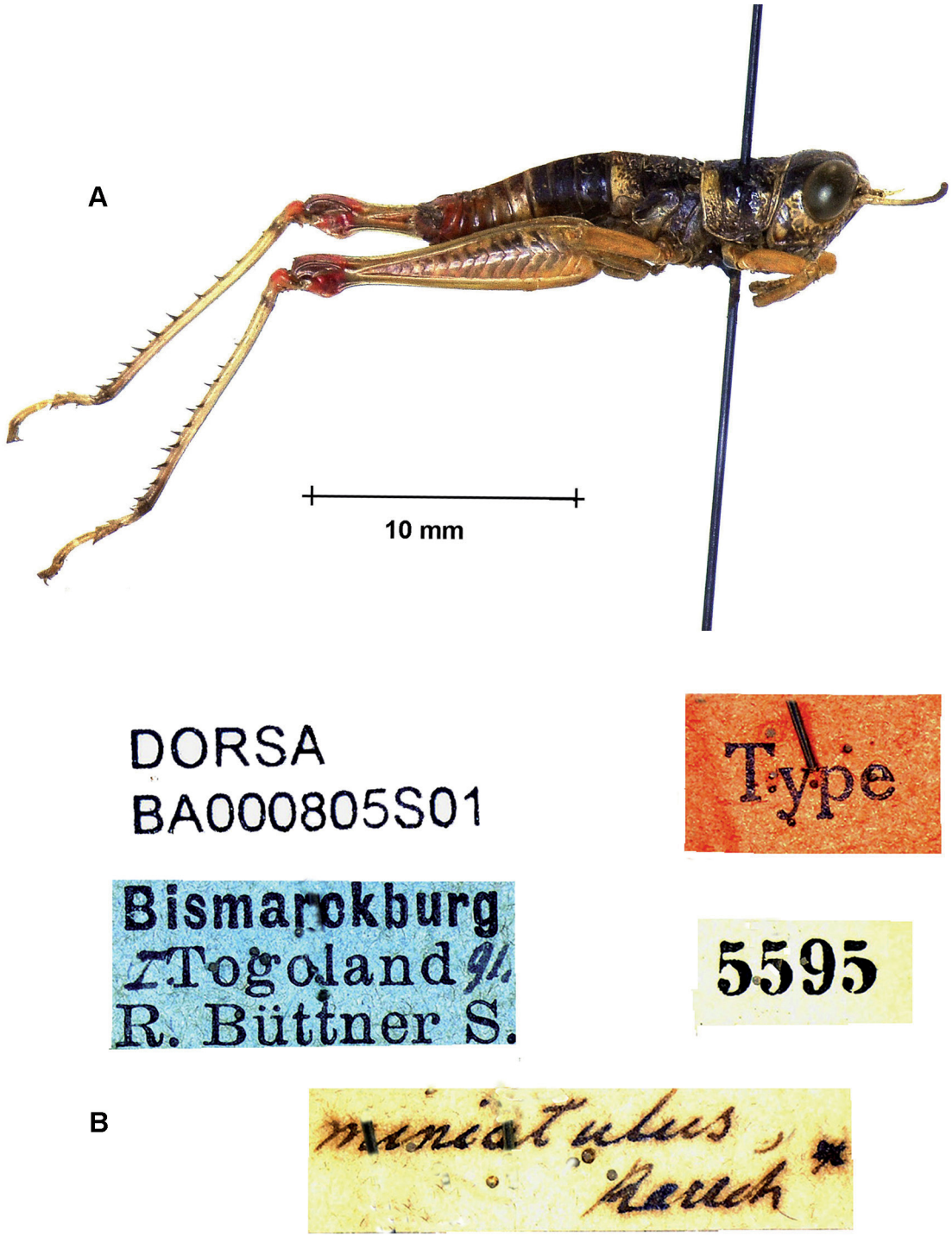


Fig. 12. *Pterotiltus miniatulus* Karsch, 1893, lectotype, ♂ (MfN, No. 5595, DORSA 000805S01). **A**. Lateral view. **B**. Labels.

In the literature, however, it has been recorded not only from Togo (Karsch 1893) and northeastern Ghana (Jago 1968), but also from the continental part (Rio Muni) of Equatorial Guinea (Bolívar 1905). This suggests a surprisingly disjunct distribution!

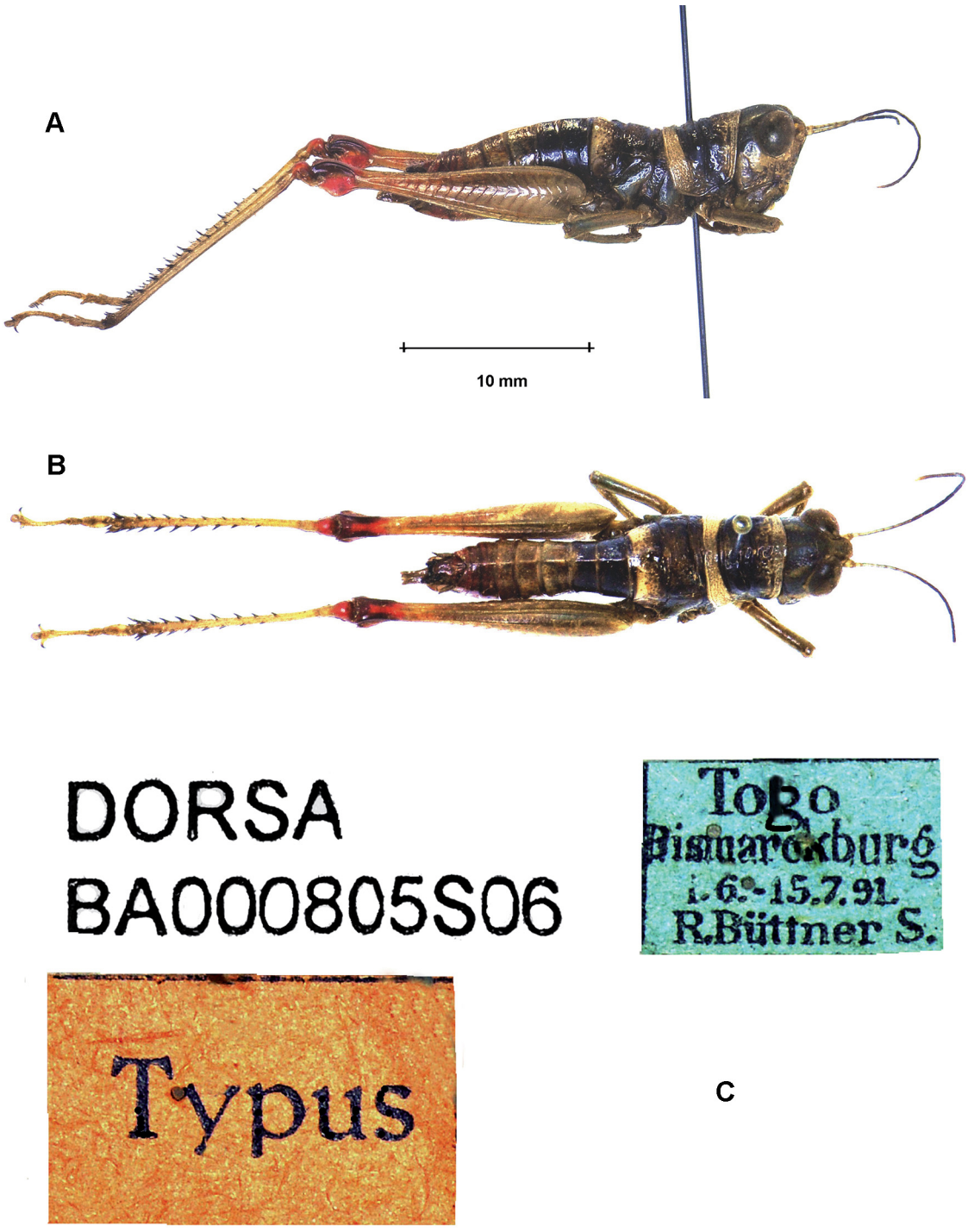


Fig. 13. *Pterotiltus miniatulus* Karsch, 1893, paralectotype, ♀ (MfN, DORSA 000805S06). **A**. Lateral view. **B**. Dorsal view. **C**. Labels.

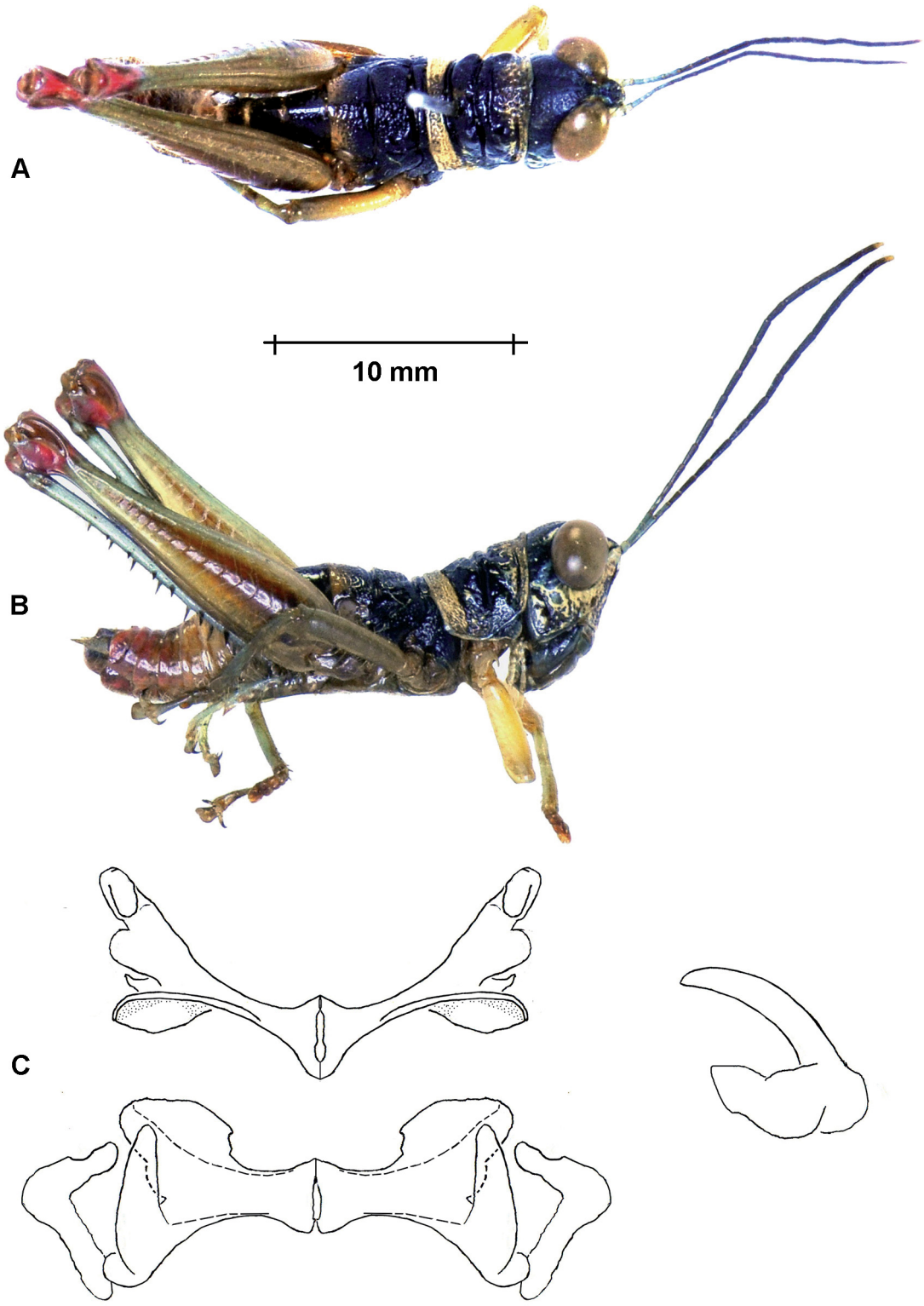


Fig. 14. *Pterotiltus miniatulus* Karsch, 1893, non-type, ♂, Ghana (NHMUK). **A**. Dorsal view. **B**. Lateral view. In B, the presumed natural colour of the hind tibia is seen, and the tiny yellow tip of the antennae. **C**. Epiphallus, in axial, dorsal and lateral views.

Table 3. Measurements (in mm) of *P. miniatulus* Karsch, 1893. The measured specimens are the lectotype and 3 male paralectotypes (from Togo) plus two non-type males from Ghana, and two female paralectotypes. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.14	16.28	9.00	0.40	3.76	11.03	2.54	1.18	0.51	1.86	3.60
Maximum	3.68	17.74	13.11	0.53	4.19	12.67	2.86	1.41	0.56	2.04	3.82
Mean	3.32	17.19	10.45	0.46	3.94	11.68	2.63	1.27	0.53	1.93	3.72
N	6	5	4	6	6	5	5	5	5	4	4
				Foot formula			34%	14%	52%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	4.30	23.69	12.02	0.76	4.71	14.93	3.09	1.62	0.65	2.48	4.78
Maximum	4.36	23.77	12.48	0.90	4.92	15.62	3.41	1.65	0.73	2.49	4.84
Mean	4.33	23.73	12.25	0.83	4.82	15.28	3.25	1.64	0.69	2.49	4.81
N	2	2	2	2	2	2	2	2	2	2	2
				Foot formula			34%	14%	52%		
Mean M/F	0.77	0.72	0.85	0.56	0.82	0.76	0.81	0.78	0.77	0.77	0.77
Normalised	1.00	0.94	1.11	0.72	1.06	0.99	1.05	1.01	0.99	1.01	1.00

However, Bolívar (1905) identified the Equatorial Guinean specimen on the basis of Karsch's published description only without examining it, and wrote:"Solo existe un macho que parece referirse bien a la especie citada". This specimen (a male), with Bolívar's label, is preserved in the Madrid museum (Fig. 54). Examination shows that it differs from the West African *miniatulus* in its phallic structures and in colouration. We conclude that it is is not *miniatulus* but an undescribed species of the genus, and we describe it below (p. 92) as *P. biafrensis* sp. nov. Accordingly, the distribution of *miniatulus* is properly just E Ghana and W Togo. The Equatorial Guinean record is erroneous.

Designation of lectotype

We here designate as lectotype the specimen shown in Figs 12–13; male, DORSA 000805S01, in MfN.

Status of taxonomic material

Adequate, both sexes known, but needs more collection of fresh specimens and a description of colouration in life.

4. ***Pterotiltus finoti*** Dominique, 1900

Pterotiltus finoti Dominique, 1900: 207.

Pterotiltus finoti – Kirby 1910: 386. — Johnston 1956: 259. — Dirsh 1965: 236 — Hollis 1975: 226.

Type material

Holotype (not examined)
REPUBLIC OF THE CONGO • ♂; Linzolo; 4.41° S, 15.11° E; R.P. Luec leg; NTM [lost].

Description

Dominique's description of the external morphology is mostly concerned with what we now know to be generic characters, with very few that might be specific. However, the holotype luckily had a

distinctive morphology of the male 10th tergite, such that it might be recognized from the original description: as in *P. impennis*, the male furcula is fused, forming a bifid medial process, but the fork is appreciably wider and less elongate than in *impennis*, and with widely spreading apices ("Il forme deux dents courtes, assez écartées"). Unfortunately, it is not certain that Dominique's description would apply to all individual males of *finoti*, or allow them to be identified as such, because some species of *Pterotiltus* (*coeruleocephalus*, *occipitalis*, q.v.) show marked variation between individual specimens in their extent of furcular fusion.

No information on colouration could be given by Dominique, as the specimen was in alcohol and completely lacking in colour. Sadly, the three figures of this specimen in the original publication (Dominique 1900: pl. III figs 11–13) are uninformative, though they confirm the generic identification.

Measurements (from Dominique 1900)

Length of body: 22 mm; length of posterior femur: 14 mm.

Remarks

The type locality is SW of Brazzaville, on the north bank of the Congo River. The unique holotype was deposited in the Muséum d'Histoire naturelle, Nantes, France (NTM). After repeated enquiries, we received in 2022 a letter from Dr F. Meurgey of that institution stating that the holotype could not be found in the collection and must be presumed lost.

Status of taxonomic material

Disastrous. In the absence of a type specimen, the taxon has effectively ceased to exist. Requires new collection and designation of a neotype. Even if the holotype were to be rediscovered, the female is unknown.

5. ***Pterotiltus apicalis*** Bolívar, 1905
Fig. 15

Pterotiltus apicalis Bolívar, 1905: 226.

Pterotiltus apicalis – Kirby 1910: 387. — Ramme 1929: 315. — Johnston 1956: 258. — Dirsh 1965: 236. — Hollis 1975: 226, fig. 63; mentions *apicalis* as an examined holotype, thus designating it as lectotype by inference of type.

non *Pterotiltus apicalis* – Ramme 1929: 315 (erroneously synonomized, actually *Pterotiltus nigroantennatus* Bolívar 1908 nom. rev. et stat. nov.).
non *Pterotiltus apicalis* – Ramme 1929: 315 (misidentified, Ramme erected *Pterotiltus apicalis rubroantennatus* for this specimen, now *P. rubroantennatus* stat. nov.).
non *Pterotiltus apicalis* – Johnston 1956: 258 (erroneously synonomized, actually *Pterotiltus nigroantennatus* Bolívar 1908 nom. rev. et stat. nov.).
non *Pterotiltus apicalis* – Hollis 1975, fig. 63 (the figure shows an epiphallus, but no male specimen has ever been recorded, it is not known what species Hollis drew).

Type material

Lectotype

EQUATORIAL GUINEA • ♀; Bioko island, Sta. Isabel; [3°44′44″ N, 8°46′28″ E]; Jul. 1901; Escalera leg; MNCN; MNCN_Ent 119719.

Description

Bolívar's original description (here in translation) is largely devoid of discriminating specific characters:

[Body blackish brown. Anterior part of head, pronotum (except for the large medial transverse surface), first abdominal segment, but not the apical half, yellow, the feet olive yellow; hind knee red; hind tibia olive, except for blue-black spines; condyle reddish with a small brown ring underneath it. Antenna brown with white tips. Eyes chestnut brown]. From the photo of the Madrid lectotype (Fig. 15) the following addition can be made: posterior margin of 6th abdominal segment, and all more distal segments of abdomen, red in colour.

The antennae were originally described as brown with white tips; Fig. 15 shows that the antennal tips have now aged to yellow-brown.

We could not borrow the lectotype and so are unable to refine further the original description.

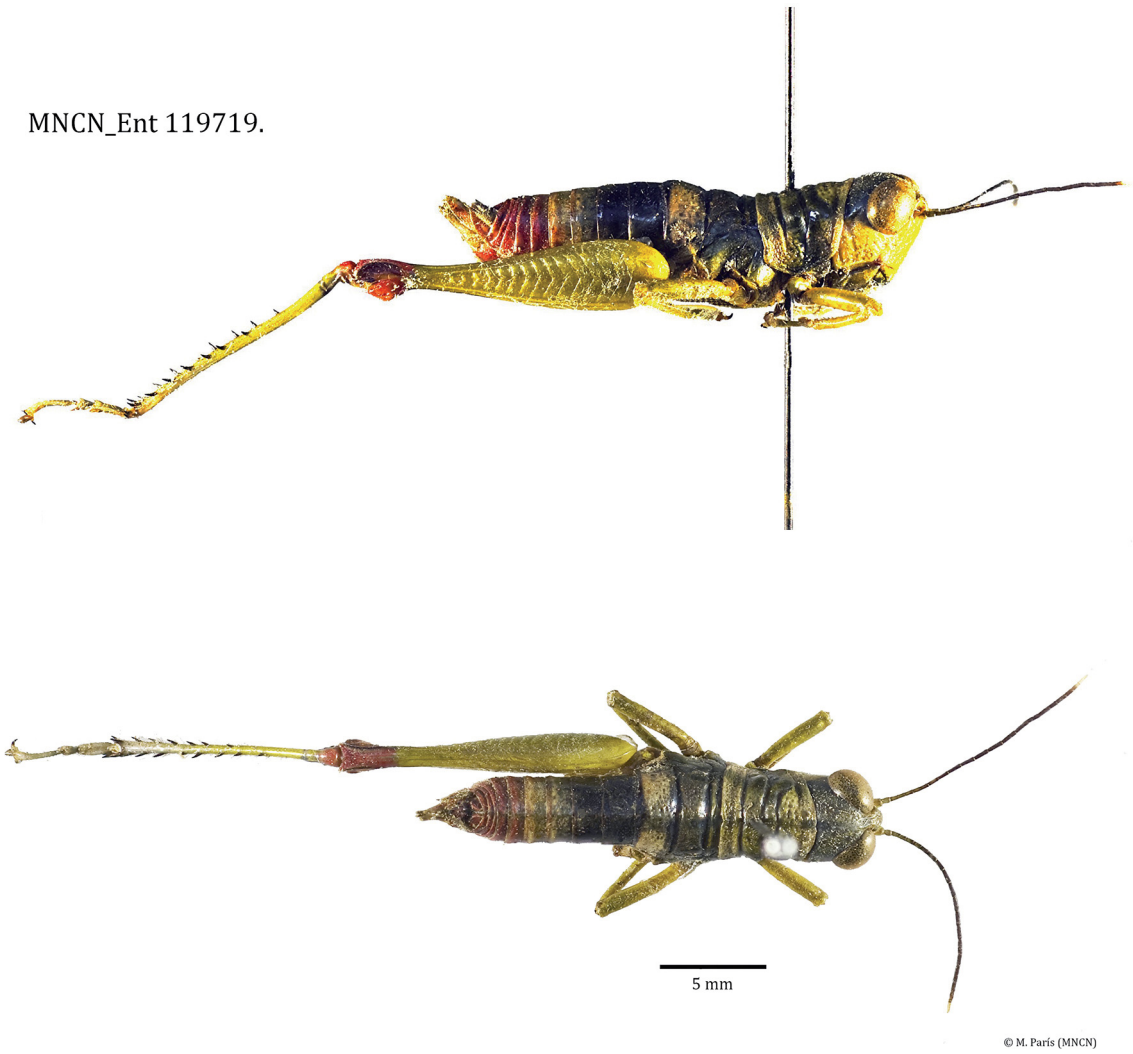


Fig. 15. *Pterotiltus apicalis* Bolívar 1905, lectotype, ♀ (MNCN_Ent 119719), in lateral and dorsal view. Photos M. París, reproduced with permission from the MNCN.

Measurements

Bolívar (1905) gives the following values: length of body 22 mm; pronotum 4 mm; hind femur 14 mm.

Remarks

Photographs of the lectotype have been obtained (Fig. 15), but the type itself could not be physically examined. Bolívar (1905) is explicit that his name "*apicalis*" referred to the pale colouration of the tips of the antennae of his type specimen. Unfortunately, this is a character that occurs repeatedly elsewhere in the genus, and so is not diagnostic of this species. His name does not refer to the striking red colouration of the tip of the abdomen or of the hind knees of his type specimen, as might otherwise be assumed. Since 1905, this name has been applied erroneously to several diverse specimens, that are here re-assigned to other taxa.

Distribution

Bioko was formerly known as Fernando Po, and Santa Isabel is now a district of Malabo, the capital city of Equatorial Guinea. As the lectotype is a female, and there are no other members of the type series, we have no knowledge of the male phallic structures or terminalia and therefore cannot determine whether this species is confined to Bioko, or occurs also on the nearby African mainland, e.g., in mainland Equatorial Guinea or in Cameroon or Gabon. However, there is currently no material from these countries to suggest that *apicalis* might be found there; at present it appears that *apicalis* is indeed endemic to Bioko.

Status of taxonomic material

Poor. Male unknown, unique lectotype female. Further collections of *P. apicalis* on Bioko, especially of males, are essential to define this species adequately.

6. ***Pterotiltus rubroantennatus*** Ramme, 1929 stat. nov.
Fig. 16; Table 4

Pterotiltus apicalis rubroantennata Ramme, 1929: 315.

Pterotiltus apicalis rubroantennatus – Johnston 1956: 258. — Mestre & Chiffaud 2009: 105.

This taxon was first erected as a subspecies of *P. apicalis* by Ramme for mainland African specimens in the Berlin and other European museums. It agrees in some aspects with Bolívar's description of *P. apicalis*, but has red (not brown) antennae and sometimes other additional red markings. All of Ramme's original syntypes are conserved in MfN Berlin and have been examined for this review. We consider that Ramme's type series includes three different species, corresponding to his holotype male, his paratype male, and his paratype females.

Type material

Holotype

CAMEROON • ♂; Cross River, Ossidinge Station; [5°53′15″ N, 9°7′39″ E]; 18–20 Oct. 1901; H. Glauning leg.; MfN, DORSA BA000507S01.

Redescription

The holotype is more than 120 years old – the original colouration is sometimes difficult to determine. See Fig. 16A–B.

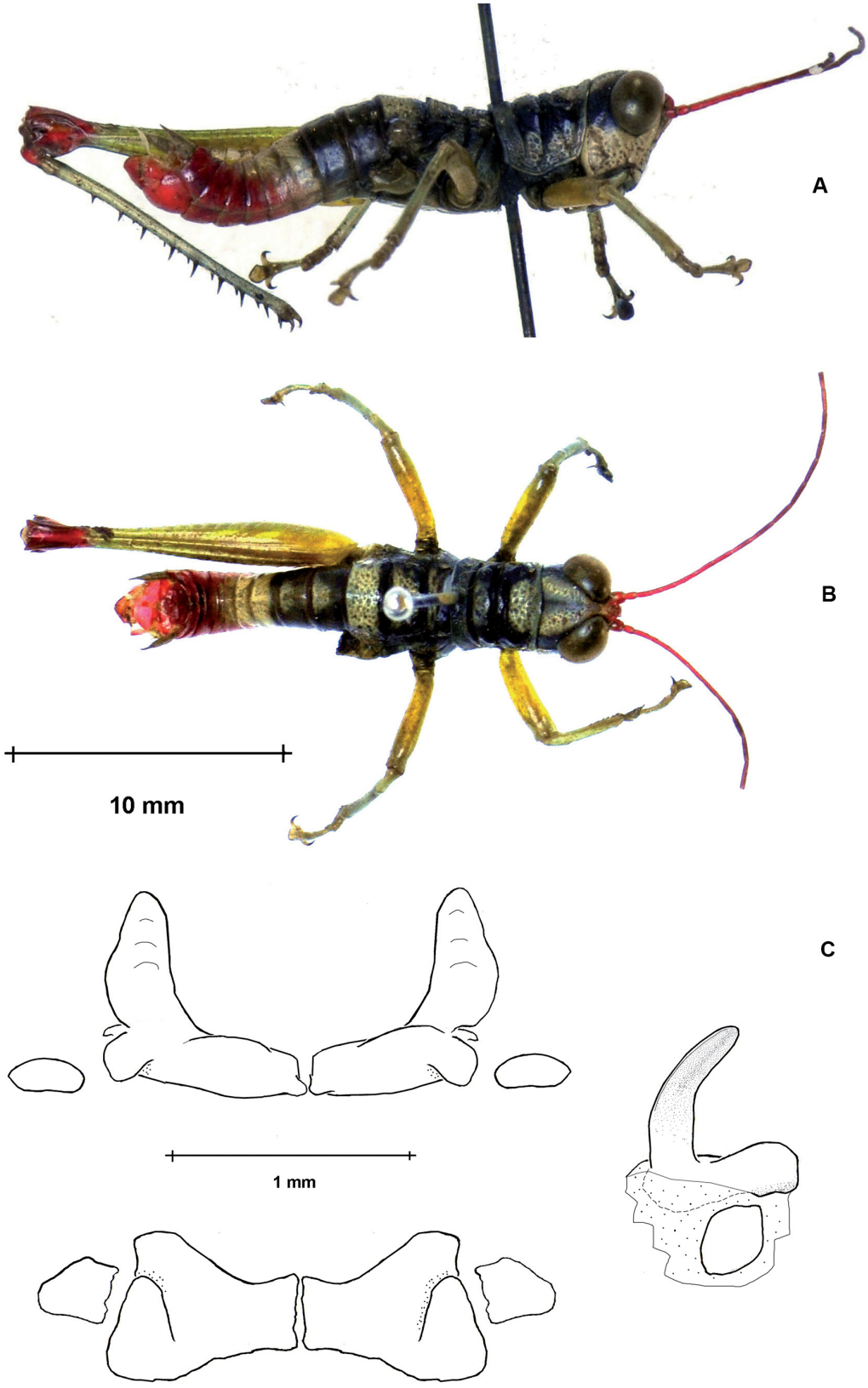


Fig. 16. *Pterotiltus rubroantennatus* Ramme, 1929 stat.nov., holotype, ♂ (MfN, DORSA BA000507S01). **A**. Lateral view. **B**. Dorsal view. **C**. Epiphallus and oval sclerites in axial, dorsal and lateral views.

Table 4. Measurements (mm) of the holotype of *Pterotiltus rubroantennatus* Ramme, 1929 stat. nov. The hind tarsi are missing, and the antennae are broken. Abbreviations as in Material and methods.

MALE	P	L	Ant	IOS	E-E	F	FD	Ta1-3
	3.66	18.88	(>10)	0.36	4.09	12.22	2.6	missing

Head. Fastigum and antennae red. Eyes brown, probably were black in life. Surface of fastigium finely pitted. Frons, clypeus, and upper portion of labrum: white. Lower portion of labrum: red. Palps – now yellow, probably were green in life. Genae and outer sides of mandibles, white. Postocular stripe: black. Vertex and inter-ocular space: integument coarsely pitted. These areas are a slightly weaker colour (black) than the postocular stripe – perhaps were originally blue-black? There are two patches of a lighter yellowish colour on the occiput (Fig. 16B), converging forwards towards the interocular space.

Thorax. Pronotum: ground colour black. The white band of the lower genae continues weakly on to lower part of pronotal lobes, forming a band fading out towards the rear. Disc of pronotum basically black, but with a large medial pale spot – originally blue-white? – anterior to sulcus 2, extending to anterior margin of the pronotum, and another between sulci 3 & 4. Posterior margin of the metazona green. Thoracic pleura grey blue: might have been blue-black originally? Meso- and metathoracic nota black, each with large medial white patch. Tegmina and wings absent.

Legs. Pro and mesothoracic legs – coxa & trochanter – dirty green. Femora: yellow, possibly were originally green. Tibiae & tarsi: green. Hind leg – coxa & trochanter: probably were green. Femur – probably green, or possibly yellow. Knee red. Tibia – green, but condyle red. Tarsi – missing.

Abdomen. Abd. 1 tergite: anterior and posterior segmental margins are black, remaining area is a white or blue-white medial patch. Tympana large, circular and open. Abd. tergites 2–3, and 4-partim: black, with small medial patches of blueish white. Abd. tergites 4-partim, 5, 6-partim: yellow. Abd. tergite 6-partim to subgenital plate red, including the supra-anal plate. Cerci green. Posterior margin of Abd. tergite 10 has a furcula of two very small processes, separation 0.32 mm, with a very slight medial notch between them.

Phallic complex. Epiphallus – see Fig. 16C. Outer lophi tapering, curved, blade-like. Inner lophi absent. The outer lophi are wider in axial view than is commonly the case in this genus. To preserve the unique specimen, we did not further dissect the phallic complex, and so cannot describe the valvular plate, the ventral aedeagal sclerites or the ventrolateral sclerite.

Measurements

See Table 4.

Remarks

This specimen has red antennae, like the Cameroon females of Ramme's *apicalis rubroantennatus*, but unlike them also has a red abdomen, similar to that of the female holotype of *apicalis* – we speculate that this was the main reason he used that name. Ramme had no other Cameroon males – his only other male (which he named a paratype) was from very distant Faradje (DR Congo) – see p. 97. We now know that the female paratypes of Ramme's series belong to a Cameroonian population, the males of which differ considerably from his holotype (no red on abdomen and a different epiphallus) and are clearly a different species, described below (p. 77) as *P. erythrocerus* sp. nov.

There is no evidence that Ramme's specimens share anything more than generic characters with Bolívar's *apicalis*, so we propose that this name be dropped from Ramme's taxon and that it be raised to full specific rank, giving the name *P. rubroantennatus* Ramme, 1929 stat. nov. for his holotype.

Status of taxonomic material

Poor. No female from the Cross River population is known. Further collections including females and a redescription are necessary. To date, due to ongoing hostilities in Cameroon, we have not been able to access the Cross River area for a modern collection.

Distribution

The unique male holotype defines the type locality. Ossidinge Station was a now vanished German colonial military post near the Nigerian border, between the villages of Agborkum and Oban, about 30 km downriver from the present-day town of Mamfe. Mamfe replaced Ossidinge in 1909, and was originally known to the German administration as Ossidinge II (https://en.wikipedia.org/wiki/Ossidinge, accessed Nov. 2023). It is quite possible that this species extends from the type locality downriver into Nigeria or south into the (Cameroonian) Korup Forest reserve. At Mamfe, 30 km upstream from the type locality, we have recently found a different species of this genus, *P. sobrius* sp. nov. (see p. 85), but not *P. rubroantennatus.*

7. ***Pterotiltus nigroantennatus*** Bolívar, 1908 nom. rev. et stat. nov.
Figs 17–18; Table 5

Pterotiltus inuncatus var. *nigroantennata* Bolívar, 1908: 106. Erroneously synonomized with *apicalis* by Ramme 1929: 315 and by Johnston 1956: 258.

Type material

Holotype

DEMOCRATIC REPUBLIC OF THE CONGO • ♂; Kwango Province, Popocabacca; [5°42′ S, 16°35′ E]; F. Loos leg.; RBINS.

Other material examined

DEMOCRATIC REPUBLIC OF THE CONGO • 1 ♂; Haute Tshuapa, Yolo; Jun. 1937; Buckinckx leg.; RMCA.

Description (see Fig. 17)

Bolívar's 1908 description is a very short note: in its entirety, it reads: "A *P. inuncato* colore tantum differt: antennis nigris, capite superne omnio fusco olivaceo; pronoti lobis lateralibus fascia extern flava medio interrupta, pedibus viridibus. Statura (male) paulo majore. Loc.: Popocabacca (F. Loos)".

This specimen differs from all other "*apicalis*" s. lat. specimens in several aspects of colouration, especially its strikingly shiny black antennae (unfortunately broken), and in its epiphallic structure (Fig. 18A); it is also somewhat larger than the Ossidinge holotype of *rubroantennatus*. The valvular plate of this individual is of a common type, with a pair of vertical medial lobes, and sheathing concave lateral lobes. The ventral aedeagal sclerites are robust, laterally compressed, and apparently hollow – at least at their tips. It differs in other ways from the Cameroon populations – light markings in deep yellow (we think not just discoloured white), similar to those of the Faradje specimen (see Fig. 56 below) and has a completely yellow pronotal metazona, with no black pigment in its lateral region. Its darker pigmentation is green rather than black. Like the Ossidinge type it has a red tip to the abdomen.

Measurements

See Table 5.

Taxonomic remarks

The *P. nigroantennatus* holotype (Figs 17, 18A) bears an ID label of Ramme allotting it to *P. apicalis*. Ramme had in Berlin Karsch's type series of *P. inuncatus*, so was able to compare the two species, and

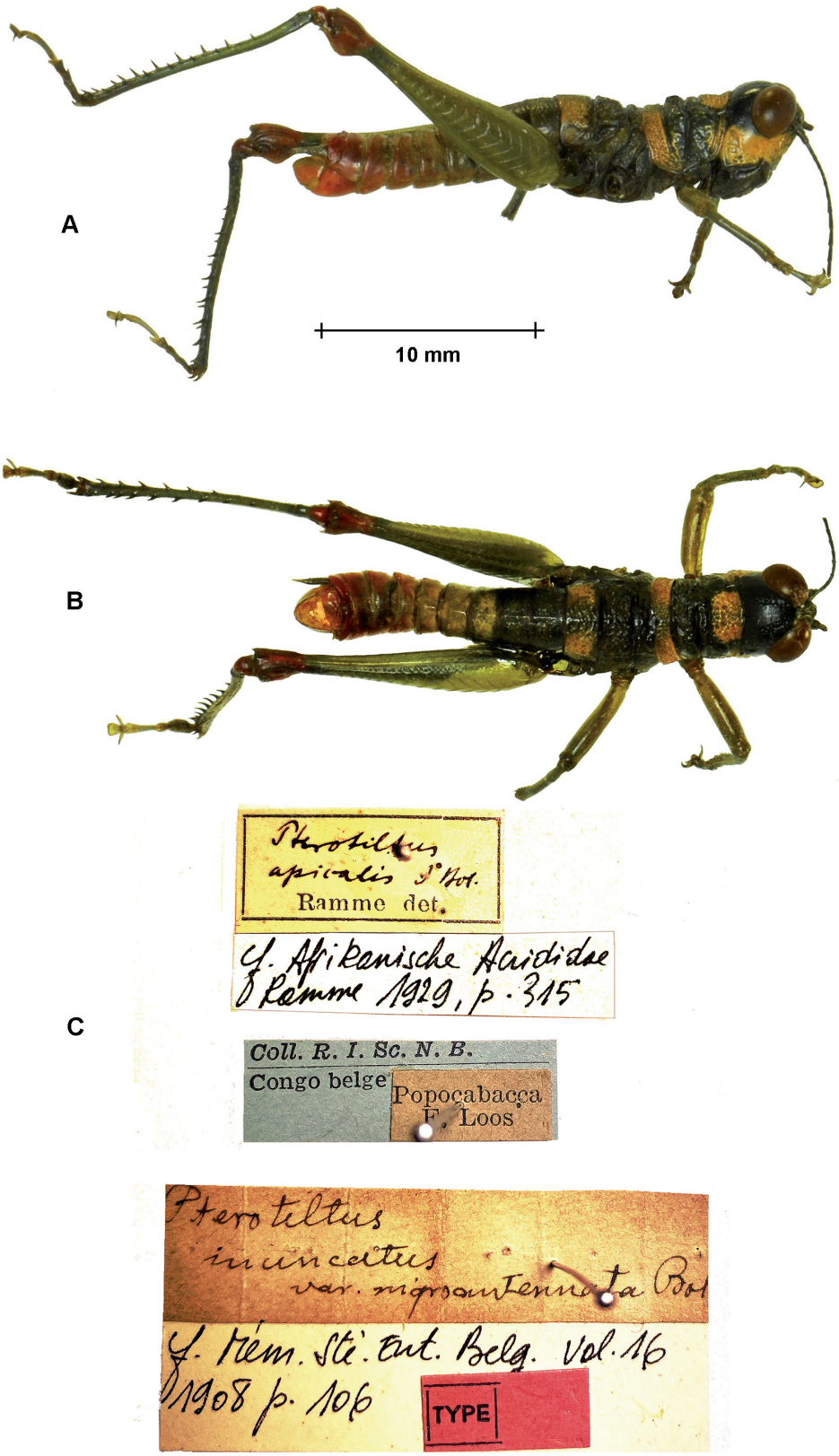


Fig. 17. *Pterotiltus nigroanntenatus* Bolívar, 1908 stat. nov., holotype, ♂ (RBINS). **A**. Lateral view. **B**. Dorsal view. **C**. Labels.

(Ramme 1929: 315) wrote correctly: "Bolívar's *P. inuncatus nigroantennata* has nothing whatever to do with Karsch's *inuncatus*". He labelled it *apicalis* (Fig. 17C) and speculated that it might be the male of *P. apicalis* from Bioko, the unique holotype of which is a female.

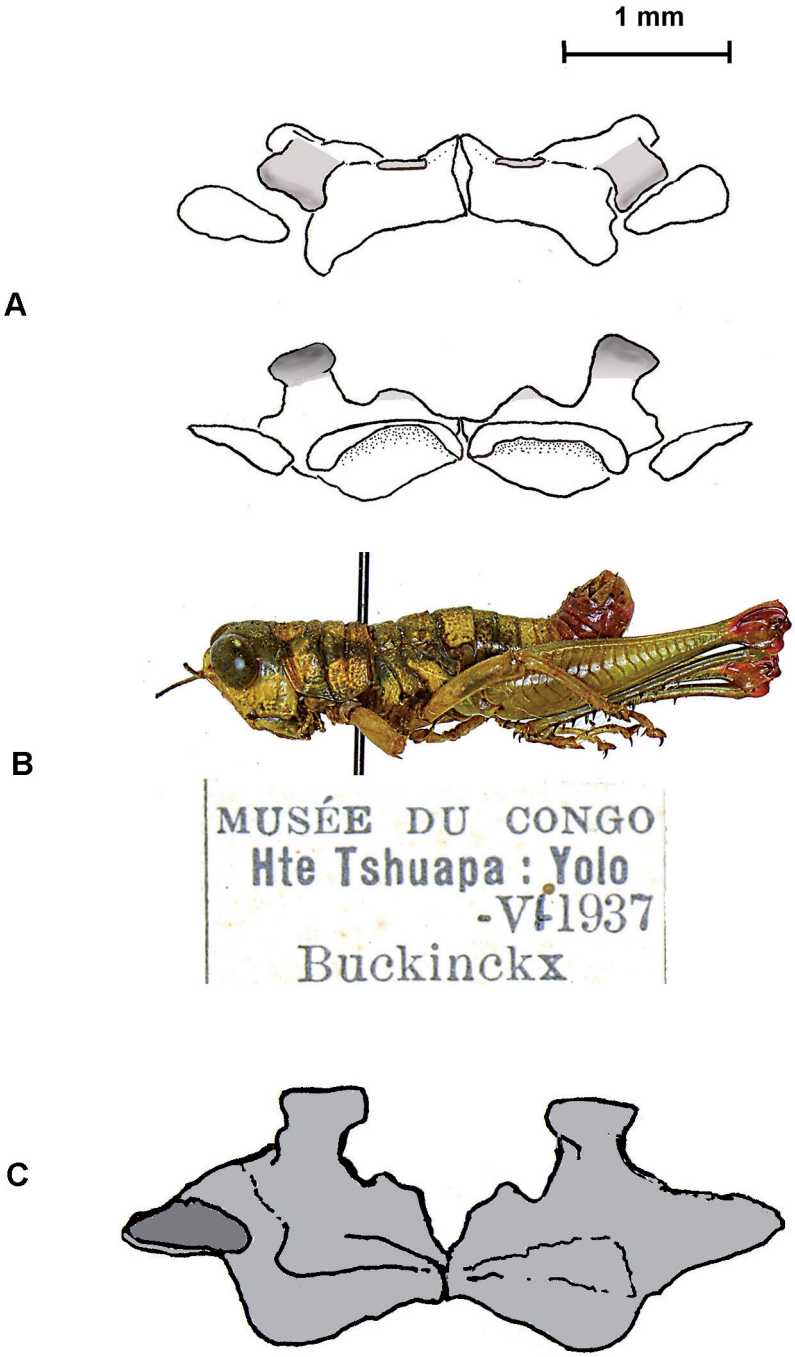


Fig. 18. A. *Pterotiltus nigroanntenatus* Bolívar, 1908 stat. nov., holotype, ♂ (RBINS). Epiphallus, dorsal and axial views. B–C. *Pterotiltus* sp. indet., Haute Tshuapa: Yolo (ex RMCA). This specimen may be conspecific with *Pterotiltus nigroanntenatus* Bolívar, 1908. **B**. Male, lateral view, and its labels. **C**. Epiphallus, axial view.

Table 5. Measurements (in mm) of *P. nigroantennatus* Bolívar,1908 stat. nov. Abbreviations as in Material and methods.

MALE	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
	3.96	23.52	?	0.6	4.53	13.12	2.8	1.59	0.6	2.1	4.29
N	1	1	0	1	1	1	1	1	1	1	1
				Foot formula			37%	14%	49%		

The holotype seems to be the specimen from DR Congo attributed to *apicalis* by Dirsh (1970): it is from the same locality, Popokabaka, and the same collector (F. Loos), though he makes no reference to Bolívar or his name for this taxon. Dirsh (1966) also mentions a specimen of "*apicalis*" from Chingufo, Angola (7°37′ S, 20°32′ E) – unfortunately the present authors have not been able to trace this specimen. These are some of the very few published records of the genus from the southern side of the Congo Basin. We here remove this species from synonomy with *apicalis*, under the name *P. nigroantennatus* Bolívar, 1908 nom. rev., stat. nov.

There is a possible second male specimen of this taxon, labelled "unidentified *Pterotiltus*", ID Dirsh, (examined) (Fig. 18B). The locality for this specimen, "Yolo", is possibly Yalola, on the Tshuapa River [00°13′ S, 23°13′ E]. Or it may be Yolonga, also on the Tshuapa [1°S, 22°41′ E]. These localities are also on the south bank of the Congo River, though a long way from Popokabaka, and much more northern. There is a better-known locality called Yolo in the DRC, an urban district of Kinshasa, but this locality is excluded by the specimen label, which specifies Haute Tshuapa.

The epiphalli of the Yolo and Popokabaka specimens are very similar (see Fig. 18), as is the general green and yellow colouration and the red abdomen. Unfortunately, the Yolo specimen lacks almost all of its antennae, so it cannot be determined whether it had the same eponymous shiny black flagella as the Popokabaka specimen. As this specimen is a unique example, we did not further dissect its phallus to examine the valvular plate or the ventral aedeagal sclerites, which might have given more information about its possible identity.

Status of taxonomic material

Poor. The female of this taxon is unknown, and the unique male holotype is damaged. Needs further collection.

8. ***Pterotiltus coeruleocephalus*** Bolívar, 1905
Figs 19–24; Table 6

Pterotiltus coeruleocephalus Bolívar, 1905: 227.

Pterotiltus coeruleocephalus – Kirby 1910: 386. — Ramme 1929: 313, designates the lectotype by inference of type. — Johnston 1956: 258. — Dirsh 1965: 236. — Hollis 1975: 226. — Mestre & Chiffaud 2009: 105.

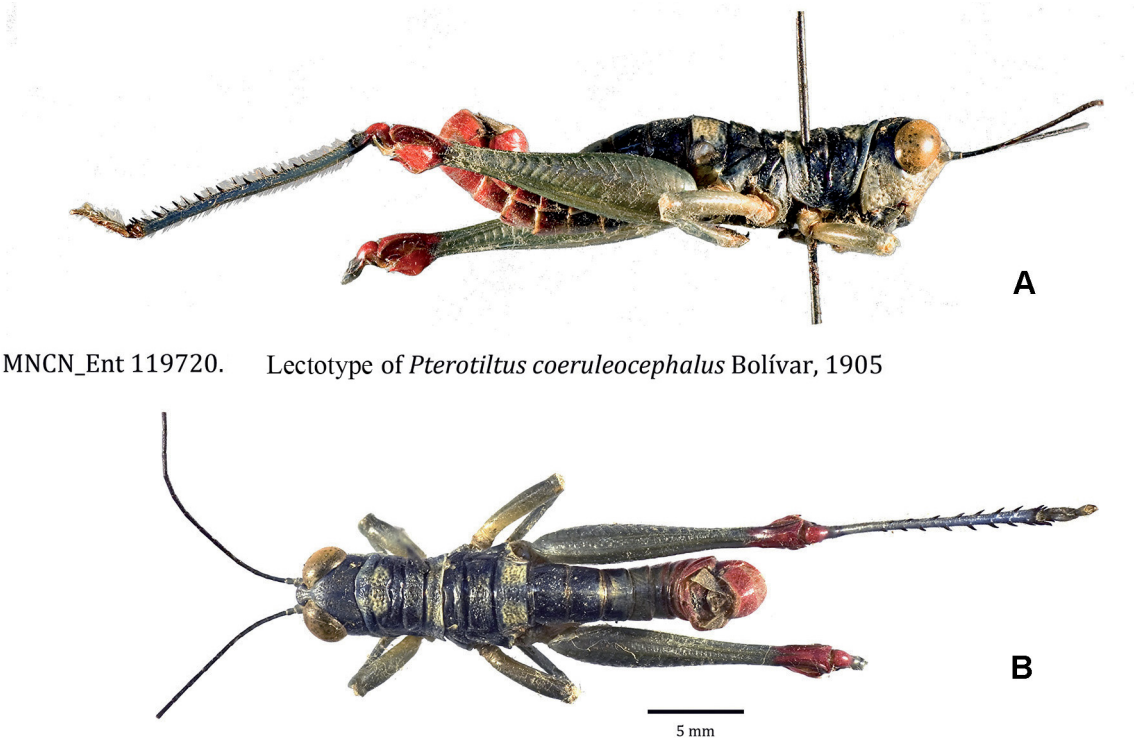
Type material

Lectotype

CAMEROON • ♂; no locality data; 1898–99; L. Conradt leg.; MNCN, MNCN_Ent 119720. We were unable to borrow this specimen, but were provided with good photographs of it (Fig. 19).

Other material examined

CAMEROON • 1 ♂; Bounépoupa; [4°04′49″ N, 10°02′15″ E]; 16 May 2023; C. Oumarou-Ngoute leg.; RC 192023MII • 1 ♀, same data as for preceding; RC 182023MII • 2 ♂♂; Littoral Division, Yabassi; [4°27′30″ N, 9°58′15″ E]; 15 Apr. 2015; C. Oumarou-Ngoute leg.; RC 2021035, 2021039 • 1 ♀; same data as for preceding; ONC 072023MII • 1 ♀; same data as for preceding; ONC 062023MII • 1 ♂; Littoral Division, Yabassi; 16 May 2023; C. Oumarou-Ngoute leg.; RC 172023MII • 1 ♂; same



MNCN_Ent 119720. Lectotype of *Pterotiltus coeruleocephalus* Bolívar, 1905

Fig. 19. *Pterotiltus coeruleocephalus* Bolívar, 1905, lectotype, ♂ (MNCN_Ent 119720). **A**. Lateral view. **B**. Dorsal view. **C**. Labels (photos M. París, MNCN)

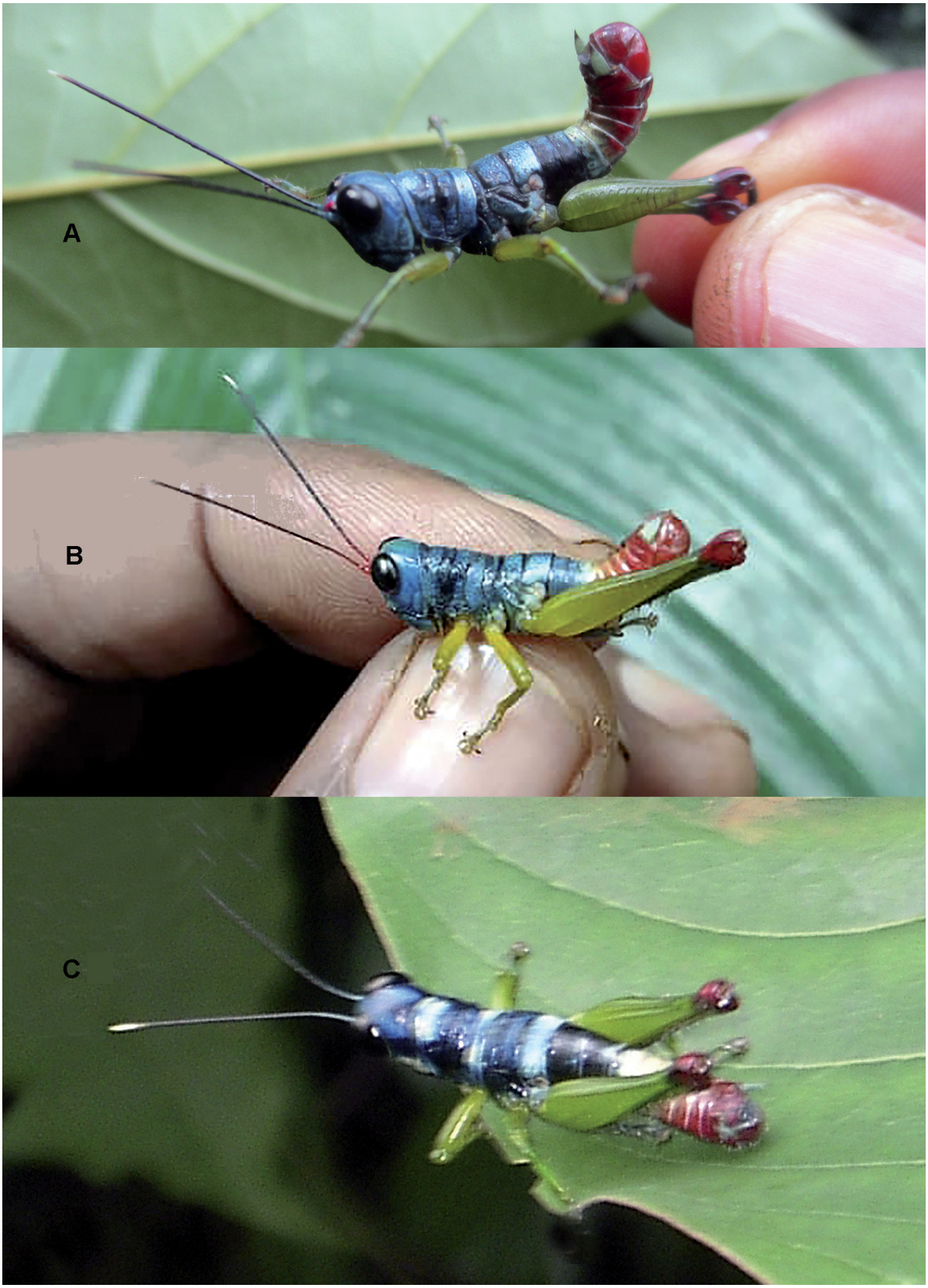


Fig. 20. *Pterotiltus coeruleocephalus* Bolívar, 1905, living males. **A**. W Cameroon, Littoral Division, Yabassi. **B**. E Cameroon, Lobéké Nat. Park. **C**. Nigeria, CRS, Ina River (photo Lincoln Fishpool).

data as for preceding; ONC 162023MII • 1 ♂; Littoral Division, Djawara; [3°04′ N, 10°08′ E]; 8 May 2023; C. Oumarou-Ngoute leg.; ONC 022023MII • 2 ♂♂; Haut Nyong Division, Lobéké National Park; [2°16.667 N, 15°38.775 E]; 8 Dec. 2023; C. Oumarou-Ngoute leg.; ONC 7492023D, 7502023D • 1 ♀; Haut Nyong Division, Lobéké National Park; [2°16.667 N, 15°38.775 E]; 8 Dec. 2023; C. Oumarou-Ngoute leg.; ONC 7482023D

NIGERIA • 1 ♂; Akwa Ibom State, Stubbs Creek Forest Reserve; [between 4°32′ N to 4°38′ N , 7°54′ E to 8°18′ E]; J. Reid leg.; Oct. 1988; NHMUK, CIEA 20564 (Fig. 21A) • 1 ♂; Cross River State, Calabar, nr Unget; 13 Oct. 1981; J. Reid leg.; NHMUK, CIEA 14152 (Fig. 21B–C) • 1 ♂; Cross River State, Calabar, Bakoko; [4°58′37″ N, 8°20′19″ E]; 5 Apr. 1985; J. Reid leg.; NHMUK, CIEA 20564.

Description

Male

Bolívar's 1905 description of the male (made from dried museum material) is mostly adequate. Freshly caught males are predominantly blue, with green legs, red abdomens and red hind knees. However, Bolívar omits some features which are probably only to be seen in fresh material. In life both sexes have red fastigia and blackish brown antennae with white tips (Figs 20, 22). In dried specimens (Figs 19, 21) the antennal tips darken and the red colouration on the head fades.

Head. Antennae filamentous, longer than head and pronotum together, blackish brown with white tips, but drying to darker, scape and pedicel dark green. Fastigium finely punctate, red. Vertex blue-black, with two strips of punctate cuticle converging forward towards the interocular space. Frontal ridge present dorsally above the medial ocellus, sulcate, with the lateral carinae red in colour, but obsolete below ocellus. In modern Cameroonian specimens (Fig. 20) frons dark green, densely punctate; palps, external surface of mandibles, labrum and clypeus dark green. Genae dark blue-green; there is no darker postocular stripe. In Nigerian specimens (Fig. 21) and in the Cameroonian lectotype (Fig. 19) frons and genae are, however, white. This may be another example of a geographic race, similar to that seen in *P. inuncatus*.

Thorax. Pronotum with 4 deep sulci, the posterior three crossing the disc. Cuticle inflated laterally between sulci 2 and 3. Cuticle anterior to 2nd sulcus and posterior to 4th sulcus pitted, but smooth between sulci 2 and 4. Metazona very narrow, only 1/16 length of prozona, its posterior margin almost straight, slightly embayed in the midline. Metathoracic tergite sparsely punctate, mesothoracic epimeron densely punctate, rest of thoracic pleura mostly smooth. Prosternal process cylindrical, erect, bluntly pointed. Wings and elytra absent, represented only by a faint wrinkle on the mesothoracic pleuron. All thoracic structures blue-black, except for the legs, which are green, and the hind knee and the condyle of the hind tibia, which are red. The pronotal metazona is a lighter blue than elsewhere and has a pair of ill-defined paler patches dorsolaterally.

Abdomen. Tergite of first abdominal segment sparsely punctate, dark blue-black with paler patches either side of the midline. Tympanum whitish. Tergites of second and third segments smooth and glossy, dark blue-black. Fourth segment yellowish. Fifth abdominal and all more distal segments red. Cerci cylindrical, tapering to an acute point, extending to the tip of the supraanal plate. Male 10th abdominal tergite with either a small furcula or a medial tubercle, or an intermediate structure caused by a diminished separation between the furcula tips (Fig. 24; see below under Taxonomic remarks).

The phallic complex (Fig. 23). Broadly similar to that of all other members of the genus, but has a number of special features. The epiphallus (Fig. 23A–D) is unusually deeply sculptured; the bridge, seen dorsally, is bordered by a long continuous sclerotised lophal ridge along its posterior margin, extending from the central division to the tip of the lophus – there are no 'peaked' inner lophi, but

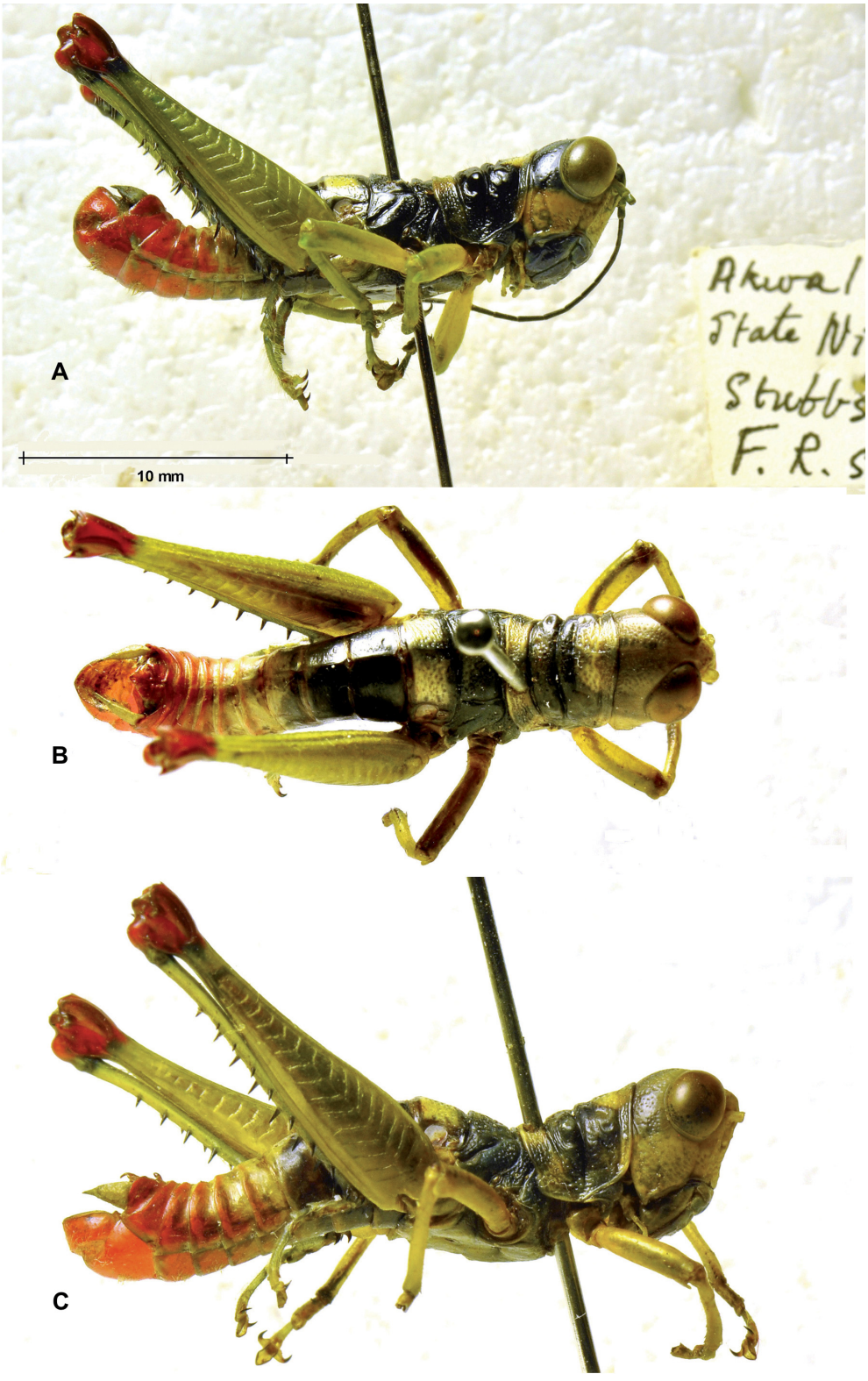


Fig. 21. *Pterotiltus coeruleocephalus* Bolívar, 1905, males from Eastern Nigeria (ex NHMUK). **A**. Akwa Ibom State, Stubbs Creek F.R. (CIEA 20564). **B–C**. Cross River State, Calabar, nr Unget (CIEA 14152). These all have a medial tubercle on abdominal tergite 10, as described by Bolívar, rather than a furcula. It is clearly visible in C. Compare with Fig. 24A.

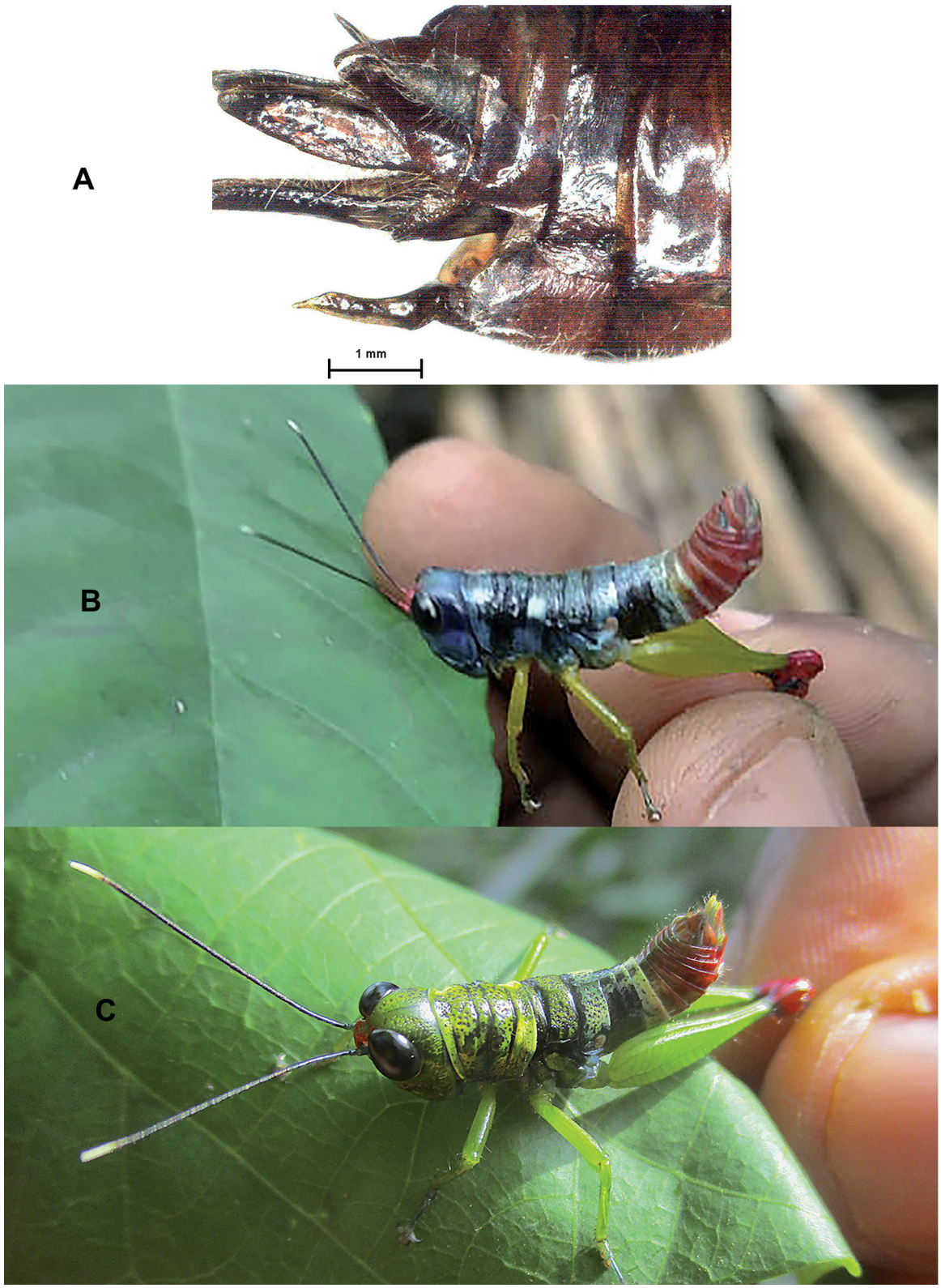


Fig. 22. *Pterotiltus coeruleocephalus* Bolívar, 1905, females. **A**. Lateral view of terminalia, showing the relatively short and sculptured egg guide below the ventral ovipositor valves. **B–C**. Living specimens. **B**. Cameroon, Lobéké National Park. Here, the females have the same predominantly blue colouration as the males. **C**. Cameroon, Yabassi. Here the females have a predominantly green ground colour,

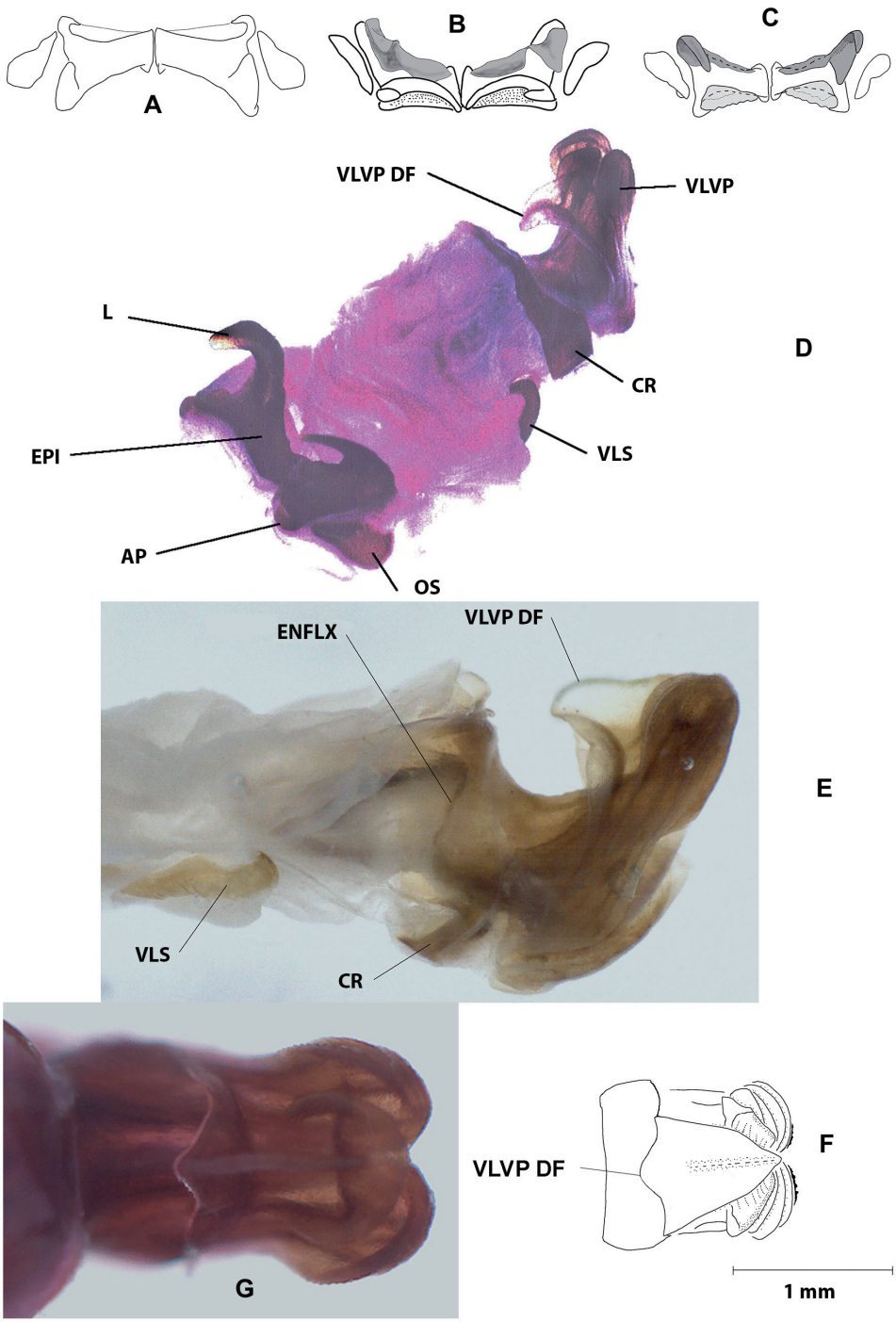


Fig. 23. *Pterotiltus coeruleocephalus* Bolívar, 1905, phallic complex. It is noticeable for a) the large size and form of the valvular plate, with a prominent dorsal fin, and b) the sclerotized lophal ridge of the epiphallus. **A–C**. Epiphallus in dorsal (A), axial (B) and oblique dorsal (C) views. **D**. Intact phallus, fully extended, stained with acid fuchsin, perspective dorsolateral view. **E**. Intact phallus, extended, unstained, lateral view. **F–G**. Valvular plate dissected free, two different dorsal views. In G the edge of the dorsal fin has been digitally lightened for ease of visualisation. Abbreviations: see Material and methods. Scale in F = 1 mm.

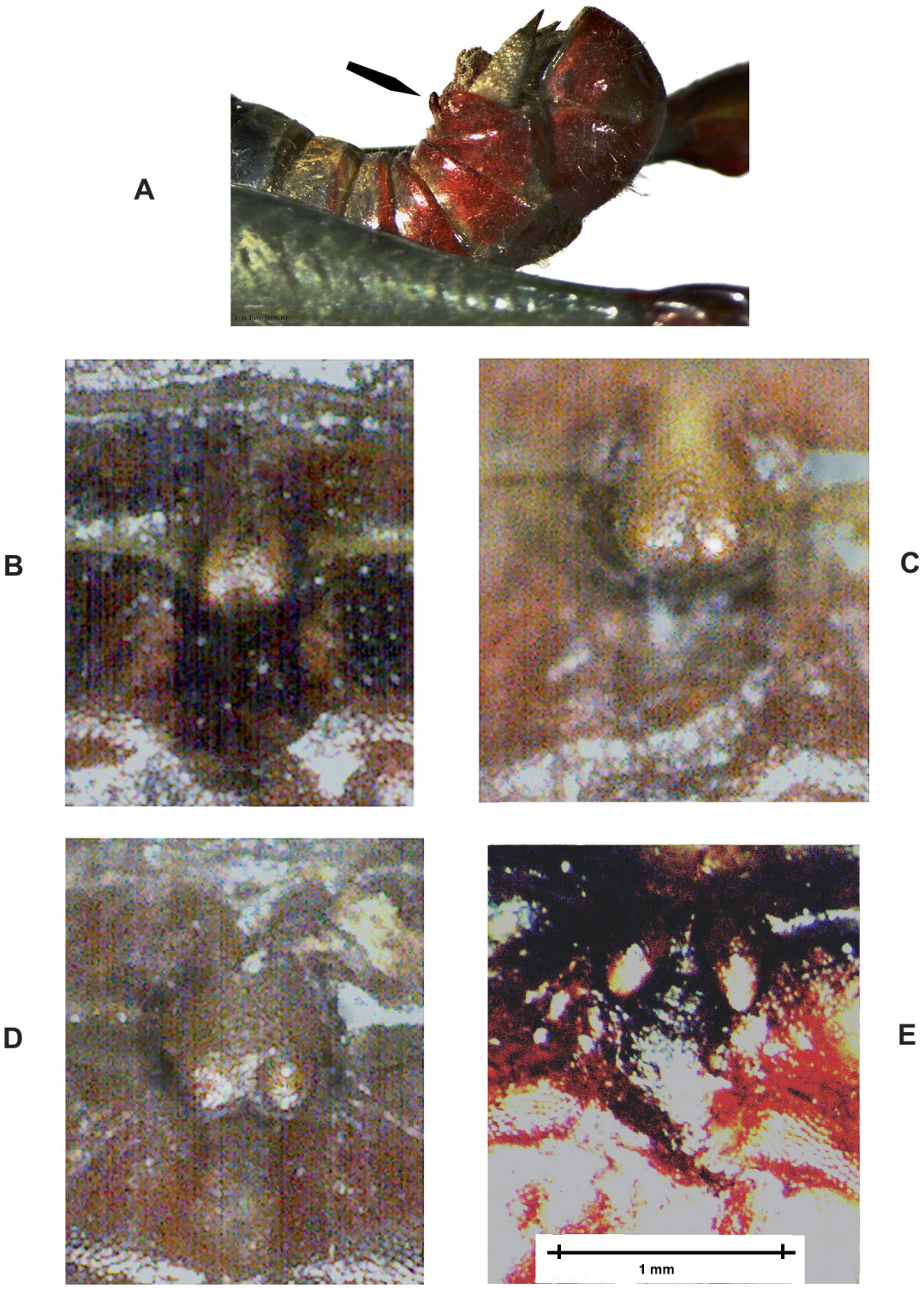


Fig. 24. *Pterotiltus coeruleocephalus* Bolívar, 1905, male furcula. **A**. Lateral view of terminalia of holotype, showing in profile (arrowed) the medial tubercle described by Bolívar (photo M. París, MNCN). **B–E**. Dorsal views of medial area of tenth abdominal tergite in four different males from Yabassi, Cameroon, showing the variation in spacing of the furcular prongs. In E (specimen no 2021039) the prongs are distinctly separated, forming a true furcula, whereas B–D show different degrees of fusion of the prongs, in B resulting in a medial tubercle rather than a furcula.

instead a continuous sclerotized lophal ridge. The anterior edge of the bridge is also markedly raised; in combination with the lophal ridge this means that the lowest point on the bridge is the transverse midline, running between the two ridges. This structure causes difficulties in portrayal - in axial view the lower part of the lophal ridge tends to be obscured by the elevated anterior margin. The valvular plate is greatly developed and ornamented with longitudinal folds laterally and with an erect hood-like membranous fin dorsally (Fig. 23E–G). It is larger than in all other species of the genus. As in other spp., the endophallic valves are formed by relatively large ventral aedeagal sclerites adjoined to the spatulate endophallic processes.

Female

The female has not been described previously; it is appreciably larger than the male and can be strikingly different in colouration. We have deposited a female specimen (spec. no. 182023MII) in the MfN. Females are generally similar to the males in colouration, but in the Yabassi sample are predominantly green, not blue, with a red abdomen (see Fig. 22C). Within the genus this sexual dimorphism in colouration is unique to this species. However, in a more easterly population in the Lobéké National Park the females are blue (Fig. 22B), like the males, so it appears that the dimorphism is confined to the females. Female terminalia as in generic description, but egg guide sculptured, laterally compressed, not cylindrical as in most species, sharply pointed, more than half the length of the ventral ovipositor valves.

Measurements

See Table 6.

Remarks

The lectotype (see photograph, Fig. 19) was not available to us, so we cannot define the species by the lectotypic internal genitalia. Bolívar's 1905 description of the male states that the specific name comes from the blue colouration of the head (this, however, is no longer visible on either the Madrid or the London specimens, though very striking in living males; see Figs 20, 22). His description stresses that the last abdominal tergite has no furcula, unlike most species of the genus, but in its place a small medial tubercle (Fig. 24A) which is not bifid (he uses the Latin "*haud*" [by no means]), thus differing from *impennis* and *finoti*, both of which have a median process bifid at the tip, apparently derived by fusion of the furcula prongs.

The Nigerian specimens (NHMUK), two of which are illustrated in Fig. 21, fit Bolívar's description perfectly, though since collection they have lost all trace of blue colouration; they all have a medial tubercle, like the Cameroonian holotype. These specimens come from Cross River State and the former Akwa Ibom State, both situated on the SE coast of Nigeria, close or adjoining to Cameroon.

In Cameroon, we have recently collected new material in Littoral Division (from Djawara, near Edea, from Bonépoupa, and from Yabassi). There are five males; all have a medial tubercle on the last abdominal tergite as described by Bolívar, but contrary to Bolívar's description the tubercle is clearly more or less bifid (Fig. 24) and is obviously formed by the fusion of two processes presumed to be homologous with those forming a furcula in other species of the genus; in one Yabassi specimen (spec. no. 2021039, Fig. 24E) the separation is enough to merit the structure being called a furcula, rather than a medial tubercle. The Nigerian specimens with a unitary tubercle and the Cameroonian specimens with a bifid tubercle differ in no other way, apart from the colour of their frons and genae. We have compared their phalli and found that they are identical and distinctive, unlike those of any other species. We conclude that the males of *coeruleocephalus* are variable with respect to the medial tubercle/furcula, and that this character as described by Bolívar is therefore not diagnostic of the species.

Apart from variation in the furcula, this species also shows more variation in colouration over its geographical range than usual in this genus: in addition to the polymorphism in body colour in the females,

Table 6. Measurements (in mm) of *Pterotiltus coeruleocephalus* Bolívar, 1905. The five measured specimens were all caught recently in Cameroon. Abbreviations: see Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.80	20.50	14.17	0.61	4.40	12.67	2.76	1.53	0.41	1.89	3.83
Maximum	4.42	23.32	17.04	0.65	4.74	14.21	3.31	1.74	0.74	2.43	4.91
Mean	4.01	22.16	15.15	0.62	4.54	1 3.25	2.96	1.60	0.61	2.18	4.40
N	3	3	3	3	3	3	3	3	3	3	3
				Foot formula			36%	14%	50%		
FEMALES	**P**	**L**	**nt**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	4.41	21.80	11.7	0.73	4.70	13.65	3.14	1.24	0.65	2.29	4.18
Maximum	4.75	31.91	12.46	0.90	4.98	14.23	3.22	1.72	0.71	2.60	5.03
Mean	4.58	26.86	12.10	0.82	4.84	13.94	3.18	1.48	0.68	2.45	4.61
N	2	2	2	2	2	2	2	2	2	2	2
				Foot formula			32%	15%	53%		
Mean M/ F	0.87	0.83	1.29	0.7	0.94	0.95	0.93	1.08	0.90	0.89	0.96
normalised	1.00	0.95	1.44	0.88	1.08	1.09	1.07	1.25	1.04	1.03	1.10

there are differences as described in the colour of genae and frons in different localities. However, the highly characteristic phallus seems to be invariant, suggesting that all these variations are intraspecific.

Distribution

Eastern and W Central Cameroon, SE Nigeria (Cross River State, Akwa Ibom State).

Status of taxonomic material

Adequate. Both sexes are now known, and modern localities. Adequate numbers of specimens present in museum collections.

9. ***Pterotiltus femoratus*** Ramme, 1929
Figs 25–27; Table 7

Pterotiltus femoratus Ramme, 1929: 314.

Pterotiltus femoratus – Johnston 1956: 259. — Dirsh 1965: 236. — Hollis 1975: 226. — Mestre & Chiffaud 2009: 105.

Type material

Holotype (designated by Ramme 1929)
CAMEROON • ♂; Victoria (now Limbe); [4°01′ N, 9°13′ E]; Jul. 1916–Aug. 1917; Cdr. F.H. Fitzroy, leg.; NHMUK (Fig. 25A–B).

Paratype (designated by Ramme 1929)
CAMEROON • 1 ♀; Moliwe, nr Victoria, Vorwerk Wirmannshöhe; [4°13′07″ N, 9°18′22″ E]; Freifrau G. von Malzan leg.; 10–20 Jun. 1907; MfN, DORSA BA000030S01.

Other material examined

CAMEROON • 1 ♂; Isongo; [4°4′14″ N, 9°1′8″ E]; 27 Feb.–7 Mar. 1938; S.G. Eisentraut leg.; NHMUK (Fig. 25C).

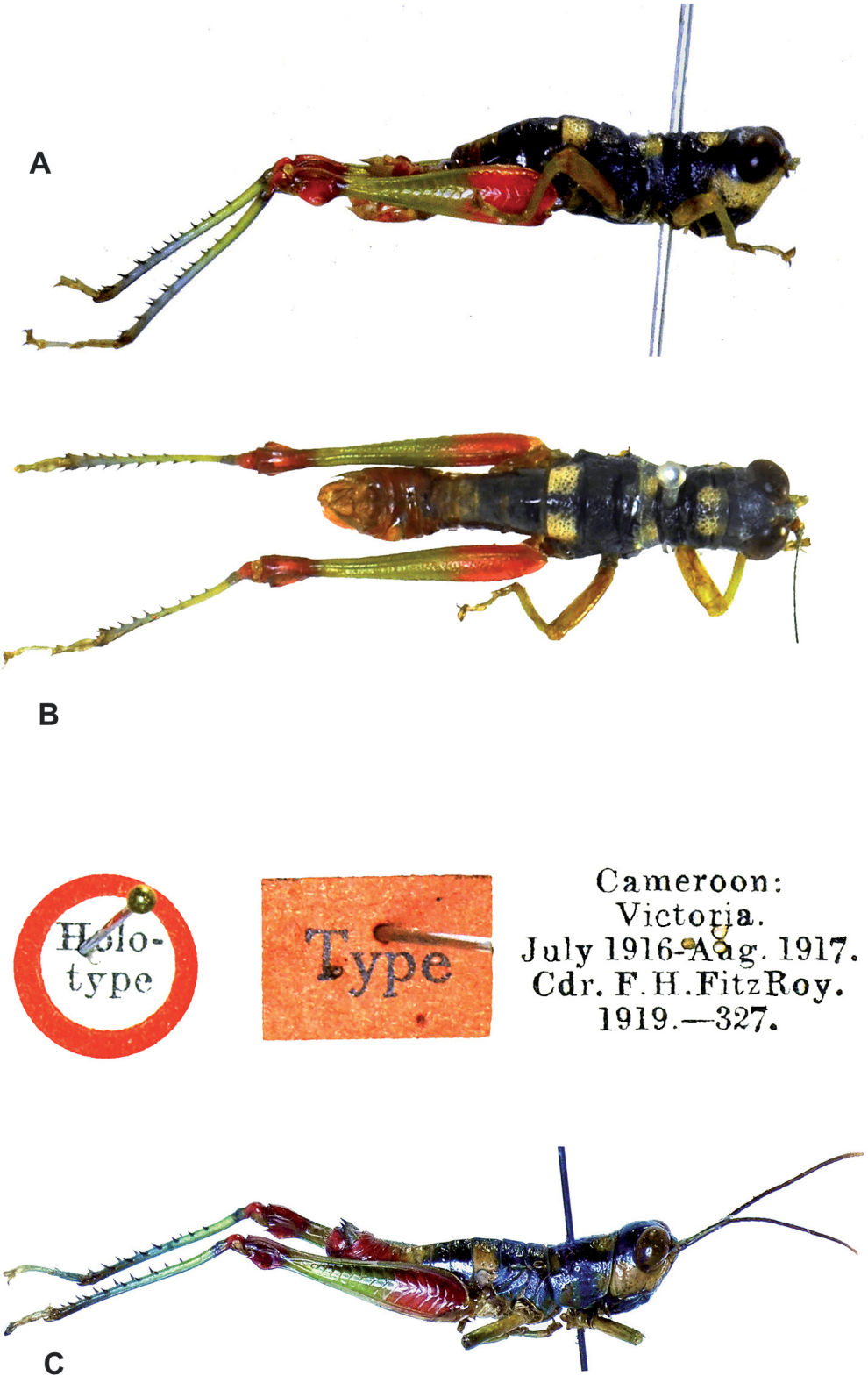


Fig. 25. *Pterotiltus femoratus* Ramme, 1929, males. **A–B**. Holotype (NHMUK). **A**. Lateral view. **B**. Dorsal view; the specimen labels are included. **C**. Non-type specimen from Isongo (NHMUK).

Redescription

Pterotiltus femoratus is readily recognized by its distinctive colouration (Figs 25–26). The head and anterior part of the body are blue-black, with paired yellowish patches on the pronotal disc and first abdominal tergite. The lower half of the frons and the genae are yellow (probably white in life). Antennae green in basal segments, then brown distally with paler yellow-brown tips. Abdominal tergites 1–5 blue-black. The hind margin of the 5th abdominal tergite is red, and this colour continues distally to the tip of the subgenital plate. The posterior margin of the male 10th abdominal segment has a single medial projection, probably derived from the fusion of the two processes of the furcula, as seen in several other species of the genus. Male cerci green, with a fine acuminate tip. Fore and middle legs green, hind femora red in basal third, then green, with a red knee. Condyle of hind tibae red, then the shaft is green distally, darkening to blue green and blackish at the tip. Hind tarsi green. Note: there are no photographs of living individuals of this species available, it may be that the natural colouration, here assessed from dry pinned specimens, is not accurately described.

Phallic complex. The male holotype (NHMUK) has been dissected, and has a phallus typical of the genus. The epiphallus (Fig. 27A) is distinctive: the bridge is reduced in width but provided with large anterior processes. The lophi are large, lobular, and curved forwards, and there is a slight sugggestion of

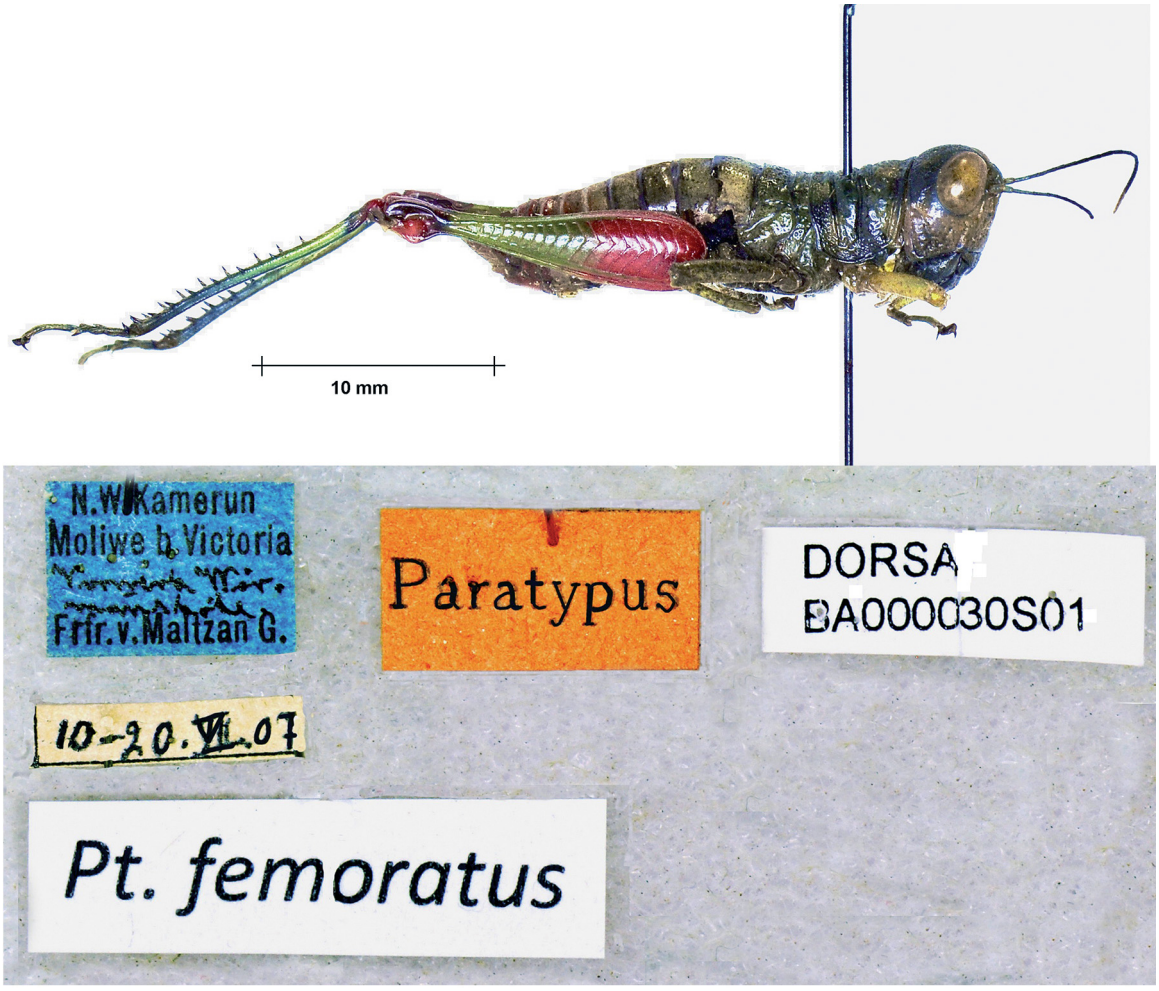


Fig. 26. *Pterotiltus femoratus* Ramme, 1929, paratype, ♀ (MfN, DORSA BA000030S01), lateral view, and its labels.

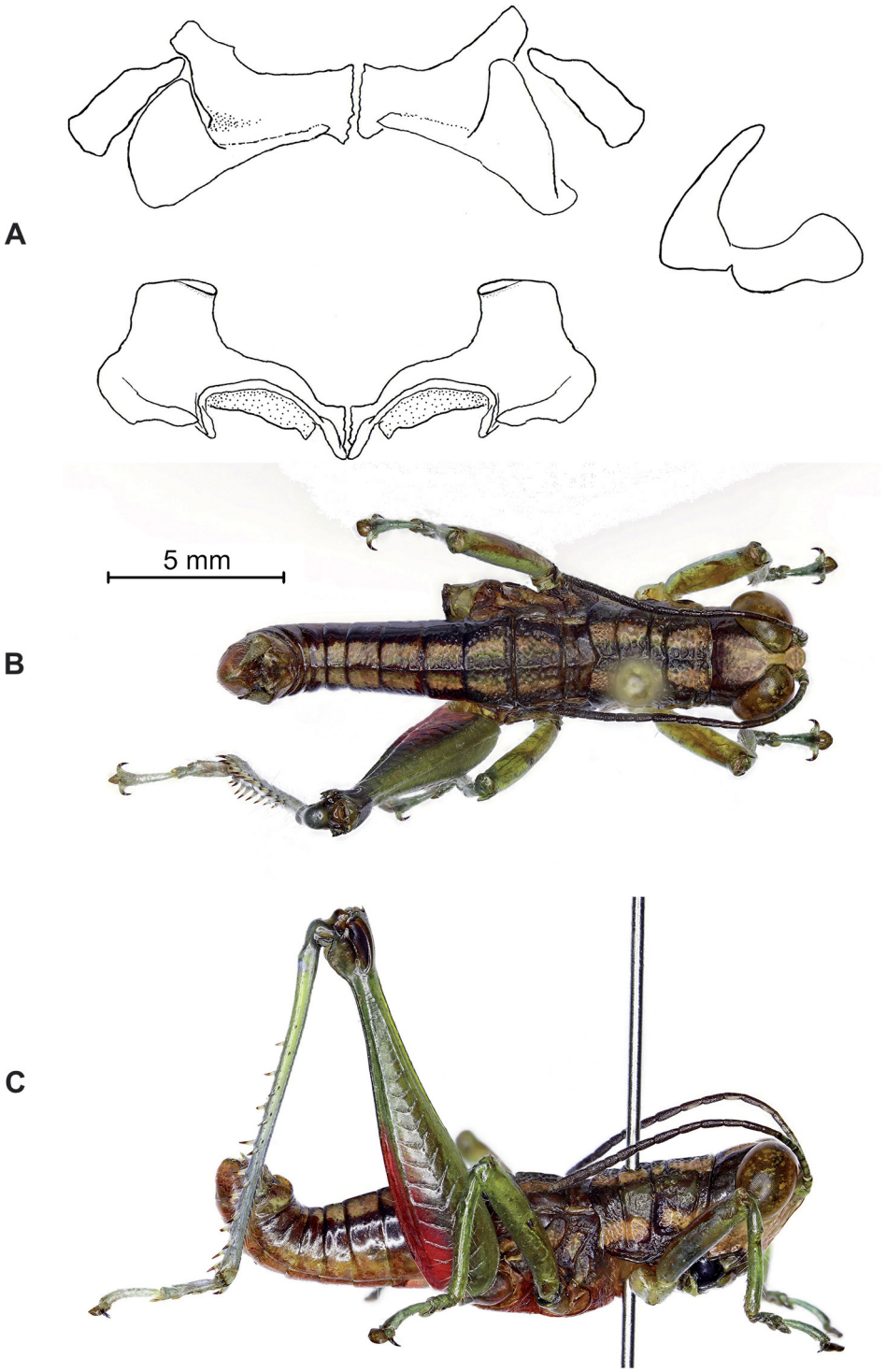


Fig. 27. A. *Pterotiltus femoratus* Ramme, 1929, holotype, ♂ (NHMUK), epiphallus in dorsal, axial and lateral views. **B–C**. *Pterotiltus femoratus*?, specimen from Cameroon, Mbalmayo, in the collection of the IITA (photo Georg Goergen). This may be a local variant of *femoratus*, or a similar but as yet undescribed species.

Table 7. Measurements (mm) of *P. femoratus* Ramme, 1929. Only three specimens could be measured: the holotype, a paratype female, and a non-type male. This small number makes the mean values suspect, and they do indeed diverge from those of other species. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	2.95	16.66	9.55	0.49	3.75	10.81	2.60	1.12	0.67	1.63	3.54
Maximum	3.34	20.27	12.00	0.49	4.40	12.54	2.80	1.42	0.70	1.72	3.72
Mean	3.15	18.47	10.78	0.49	4.08	11.68	2.70	1.27	0.69	1.68	3.63
N	2	2	2	2	2	2	2	2	2	2	2
				Foot formula			35%	19%	46%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
	4.62	24.05	10.42	0.67	5.01	14.20	3.55	1.63	0.65	2.41	4.69
				Foot formula			35%	14%	51%		
mean M/F	0.68	0.77	1.03	0.73	0.81	0.82	0.76	0.78	1.05	0.70	0.77
normalised	1.00	1.13	1.52	1.08	1.20	1.21	1.12	1.15	1.55	1.02	1.14

an "inner lophus" (sensu Hollis 1975), a secondary peak on the lophal ridge, medial to the lophi proper. The "oval" sclerites of the epiphallus are long and strap-like. The paucity of material prevented us from dissecting out the valvular plate and other phallic sclerites.

Measurements

See Table 7.

Distribution

All three examined specimens come from the southern edge of Mt Cameroon, S and W of Buea. Moliwe is/was a village a few km due south of Buea. Isongo is on the SW corner of the Buea peninsula, SW of Mt Cameroon, and is now an offshore oil prospecting site. There seem to be no other published records, but photographs (Fig. 27B–C) taken by Dr G. Goergen (IITA) of a specimen from Mbalmayo, South Central Cameroon, also appears to be this species. The base of its hind femur is red, a trait found only in this species. Note, however, some differences: the Mbalmayo insect has green hind knees, not red ones; the basal red patch on the hind femur is less extensive, and the pronotum is longitudinally striped in paler colour. This specimen may indicate the existence on the Central plateau of a local colour variant of *femoratus*, similar to the situation in *inuncatus* and *coeruleocephalus*. Or, it might be a different (as yet undescribed) taxon.

Status of taxonomic material

Moderate. Both sexes are known, but very few specimens are available. The status of the Central Cameroon (Mbalmayo) form is unclear – this requires more collecting.

10. ***Pterotiltus giorgii*** Ramme, 1929
Fig. 28; Table 8

Pterotiltus giorgi Ramme, 1929: 317.

Pterotiltus giorgii – Johnston 1956: 259. — Dirsh 1965: 236; 1970: 120. — Hollis 1975: 226. — Mestre & Chiffaud 2009: 105.

Type material

Holotype

DEMOCRATIC REPUBLIC OF THE CONGO • ♀; Yambata; [2°26′0″ N, 21°58′0″ E]; Feb.–Mar. 1914; De Giorgi leg.; RMCA.

No male specimen is known.

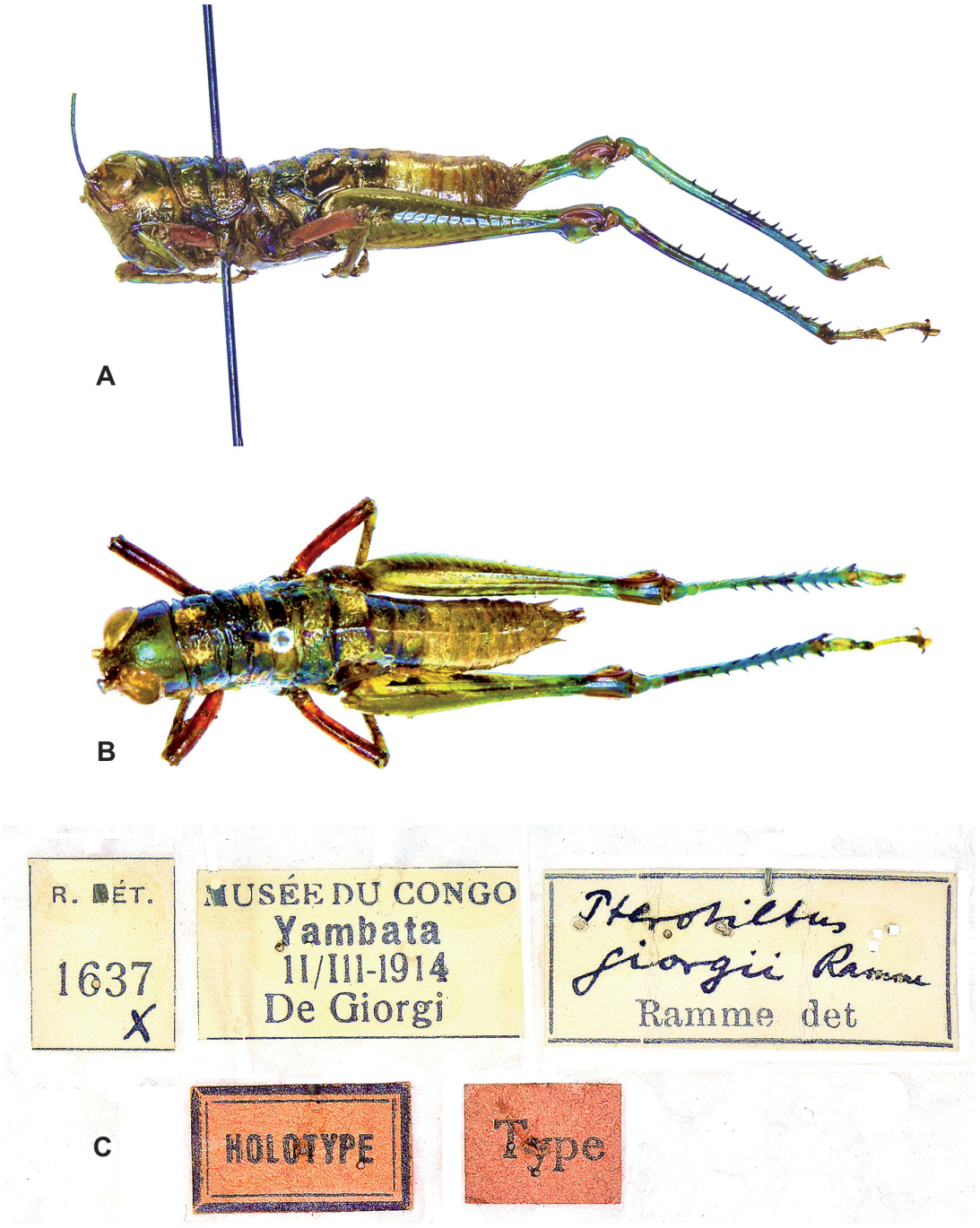


Fig. 28. *Pterotiltus georgii* Ramme, 1929, holotype, ♀ (RMCA). **A**. Lateral view. **B**. Dorsal view. **C**. Labels.

Table 8. Measurements (mm) of *P. giorgii* Ramme, 1929. Only the holotype could be measured. No other specimens are known. Abbreviations as in Material and methods.

FEMALE	P	L	Ant	IOS	E-E	FD	F	Ta1	Ta2	Ta3	Ta1+2+3
	4.52	23.61	?	0.88	4.74	3.05	14.59	4.72	0.80	2.71	8.23
N	1	1	0	1	1	1	1	1	1	s1	1
				Foot formula			0.57	0.10	0.33		

Description (from Ramme 1929)

Refers to female holotype only (Fig. 28). (Ramme labelled his Measurements as being from a male, apparently in error.)

[Fastigium slightly concave between the compound eyes, leading apically to a small medial depression, rounded at the front, floor pitted, and with a trace of a longitudinal carinula. Frontal ridge slightly concave above the medial ocellus, and obsolete below the latter. Frons coarsely pitted and wrinkled. The ridge between the 2nd and 3rd pronotal sulci inflated only at its lateral extremities. Otherwise, morphology fits the generic description].

Colouration (here newly described from holotype)

Top of head dark olive green, frons was probably yellow with olive mottle. Antennae broken, only fragments remain, but seem to be black. The yellow colour of the frons continues over the genae and joins a yellow band on the ventral edge of the pronotal lobes. Rest of pronotum mostly shiny black, but there are two pairs of dirty yellow spots at the anterior and posterior edges of the disc. Metanotum and first 3 abdominal segments blackish olive-green, with two yellow patches on the dorsum of Abd. 1. Rest of abdomen dirty yellow. Fore and middle legs have red femora and olive-green tibiae. Hind femur dark olive-green, this colour extending along dorsal ridge of knee too. Lateral lobes of knee reddish brown, both internal and external. Condyle of tibia also brown, but rest of tibia dark olive-green, shading to blue-green distally.

Measurements

See Table 8.

Distribution

Known only from the type specimen and type locality. Yambata is WNW of Kisangani, and SE of Bangui (CAR). It is on the N bank of the Congo River, near the CAR frontier.

Status of taxonomic material

Poor. Male unknown, female holotype has apparently been damaged since Ramme's description; LHS hind femur is reglued, antennae broken and LHS compound eye missing, now covered with glue. Requires new collections, including the unknown male.

11. ***Pterotiltus occipitalis*** Ramme, 1929
Figs 29–31; Table 9

Pterotiltus occipitalis Ramme, 1929: 317.

Pterotiltus occipitalis – Chopard 1945: 177. — Johnston 1956: 260. — Dirsh 1965: 236. — Hollis 1975: 228. — Mestre & Chiffaud 2009: 105. — Rowell & Hemp 2017: 86.

Type material

Holotype

CAMEROON • ♀; Yaoundé; [3.8480° N, 11.5021° E]; Jun.–Jul. 1897; S.G. von Carnap leg.; MfN, DORSA BA000032S01 (Fig. 29A).

Paratypes

DEMOCRATIC REPUBLIC OF THE CONGO • 1 ♀; Yambata; [2°26′0″ N, 21°58′0″ E]; Feb.–Mar. 1914; De Giorgi leg.; RMCA • 1 ♀; Beni; [0°30′ N, 29°28′ E]; Lt Borgerhoff leg.; RMCA • 1 ♂; Region du Bas-Uéle; 7–18 Nov. 1925; S.A.R. Prince Leopold leg.; RMCA 1827N (Fig. 30A).

Other material examined

CAMEROON • 1 ♂; Yaoundé, Nkolobisson; [3°87′ N, 11°52′ E]; 14 Jul. 1975; N.D. Jago leg; det. N.D. Jago 1975; NHMUK • 1 ♂; East Province, Haut Nyong Division, Lobéké Nat. Park; [2°15′0″ N, 15°45′0″ E]; 3 Dec. 2023; C. Oumarou-Ngoute leg; RC 7472023D • 2 ♀♀; same data as for preceding; RC 7462023D, 7432023D.

UGANDA • 2 ♂♂; Bundibugyo District, Semuliki National Park (Bwamba Forest), Sempaya-Ntandi trail; 770 m a.s.l.; [00°49′30″ N, 30°03′40″ E]; 17–18 Aug. 2006; C.H.F. Rowell leg.; RC 2006199 to 2006200 (Fig. 30C) • 3 ♂♂; same data as for preceding; MUMZ 2006198, 2006200, 2006201 • 1 ♀; same data as for preceding; RC 2006217 (Fig. 29C) • 1 ♂; Bundibugyo District, Semuliki National Park (Bwamba Forest), Bumaga-Ntandi trail; 700 m a.s.l.; [00°49′31″ N, 30°03′40″ E]; 22 Aug. 2006; C.H.F. Rowell leg.; RC 2006270 • 1 ♀; same data as for preceding; RC 2006271.

Description

Ramme's (1929) description is accurate but applies only to his discoloured museum specimens (Fig. 31A). In life the colouration is slightly different. We give here his original description (in translation), but amended to describe the colouration of the live animal, and with added comments in parentheses ().

[Fastigium slightly depressed between the eyes; the anterior part of the fastigium wrinkled, with a well-defined median groove (especially visible in males). Frontal ridge sulcate above the medial ocellus, but obsolete below the ocellus. The cuticle between the second and third pronotal sulci only slightly inflated laterally (less so than in most other species of the genus). Pronotal disc and the tergites of the metathorax and first abdominal segment roughly wrinkled, not at all shiny]. (Furcula of male well developed in some individuals, in others reduced to a slightly bifid medial process (Fig. 30D–E), similar to the situation seen in *P. coeruleocephalus* (p. 36, Fig, 24)). [The morphology otherwise corresponds to that of genus diagnosis].

Phallic complex (Fig. 31A). Typical of the genus, but the oval sclerites of the epiphallus are elongate and strap-shaped and the outer lophi are wider and more bluntly pointed than in other species (Fig. 31C). The valvular plate is quite small, and terminates posteriorly in paired short dorsal processes (Fig. 31B).

Colouration

[(Eyes shiny black, drying to brown). Fastigium, vertex and occiput black with a greenish tinge, the dark colour extending ventrally over the gena behind the eye as far as the bottom of the eye. (There is no discrete postocular stripe). Frons and ventral half of genae a shining white (yellowish in dried material), clypeus and labrum green or blue green. (Palps green). Antennae black, with white tips (drying to yellow). Thorax and proximal abdomen a uniform light brown, without other markings; base of abdomen with a slight olive tinge, (distal segments of abdomen leaf green). Hind femur green, knee light brown, hind tibia green, darkening distally, with light brown condyle. Tarsi light brown marked with green]. A very distinctive colouration: the live animal is a uniform light tobacco brown, with green legs and abdomen and a strikingly black and white head.

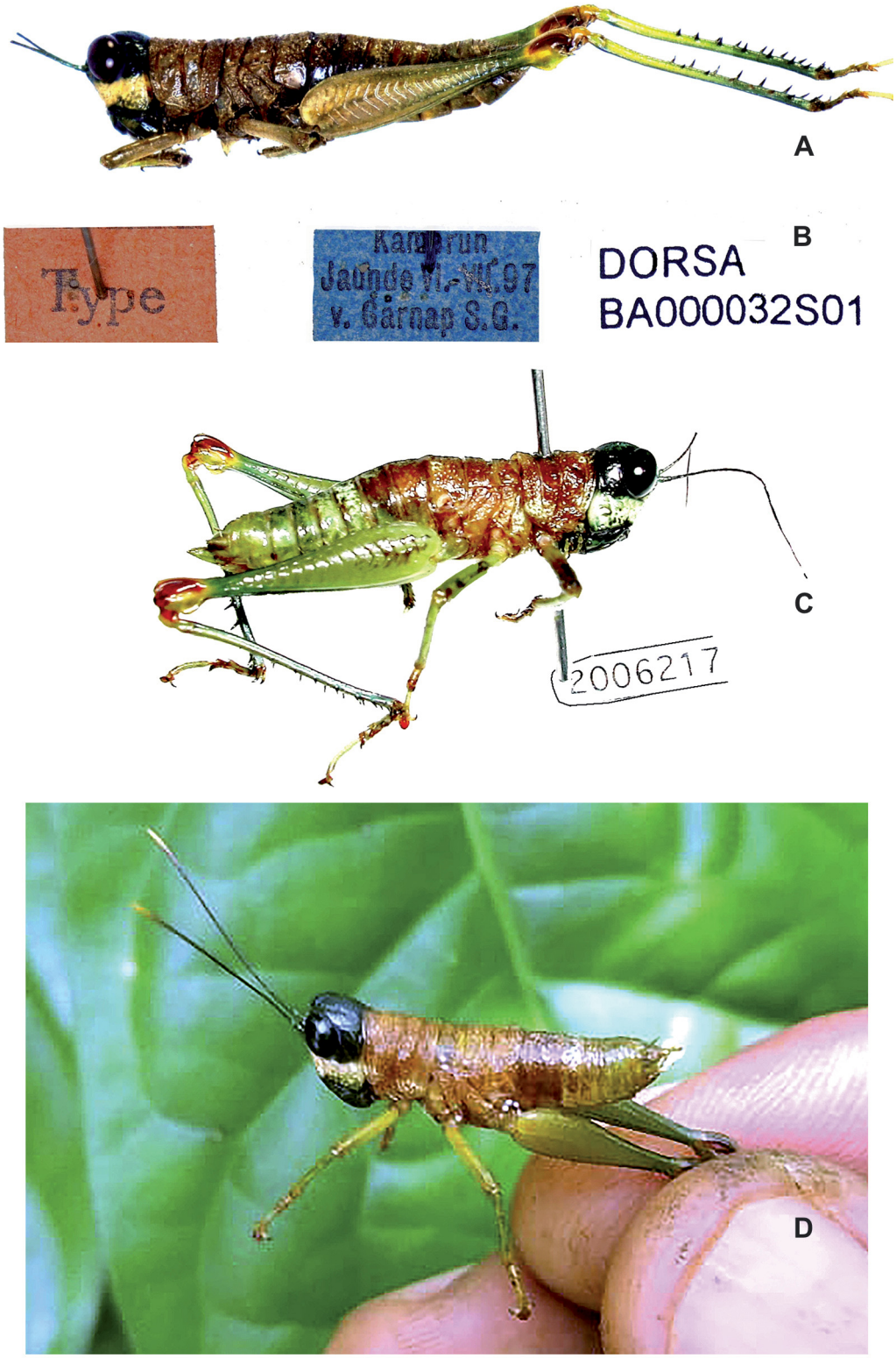


Fig. 29. *Pterotiltus occipitalis* Ramme, 1929, females. **A–B**. Holotype (MfN, DORSA BA000032S01). **A**. Lateral view. **B**. Labels. **C**. Freshly killed female, Semuliki, Uganda, to show natural colouration, especially the white – not yellowish! – frons and genae (specimen RC 2006217). **D**. Living female, Lobéké N.P. , Cameroon, December 2023.

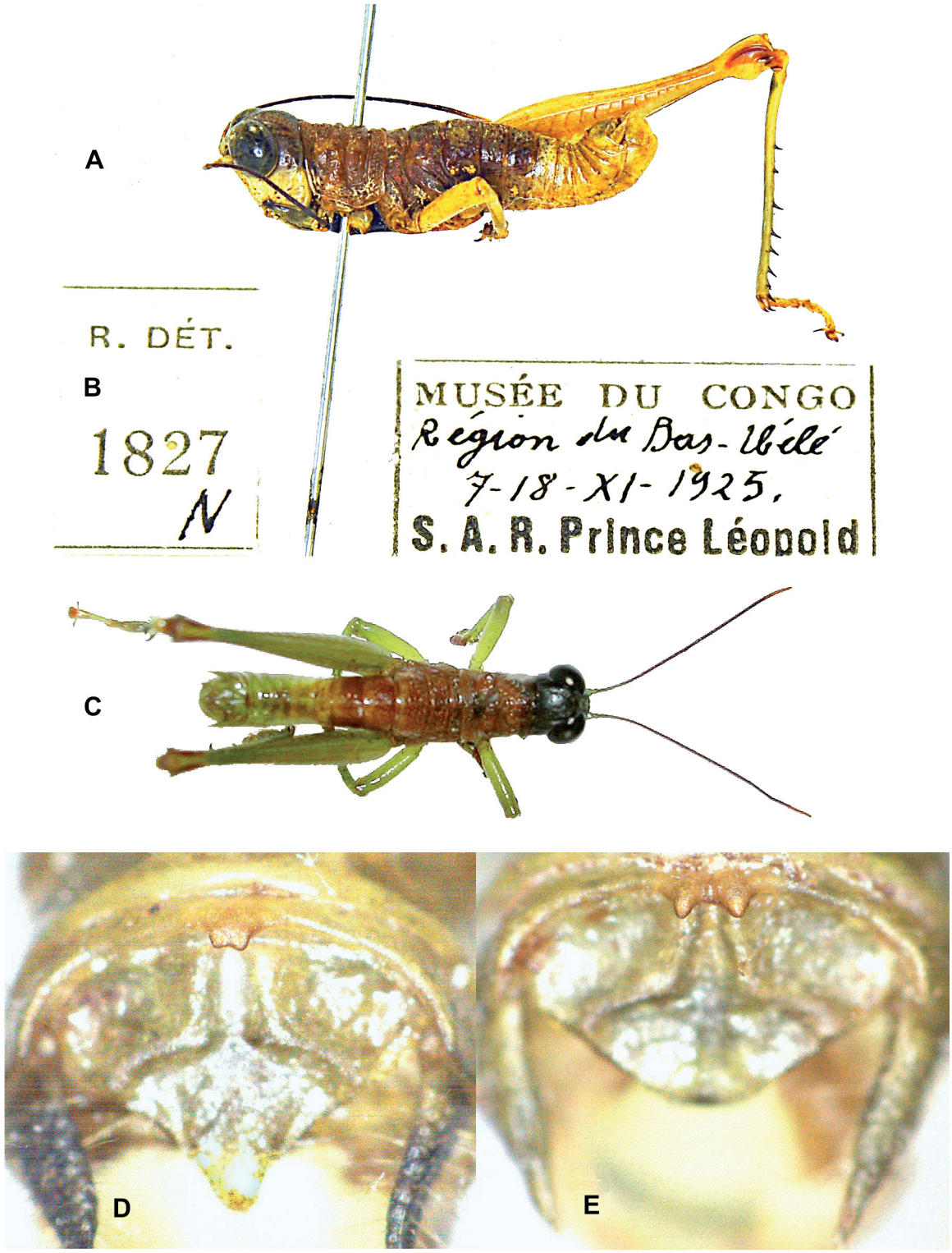


Fig. 30. *Pterotiltus occipitalis* Ramme, 1929, males. **A–B**. Specimen from Bas-Uéle, DR Congo (RMCA). **A**. Lateral view. **B**. Labels. **C**. Specimen from Semuliki, Uganda (RC, 2006199). Note conspicuous loss of green colouration in the older specimen. **D–E**. Terminalia of two Ugandan specimens (RC 2006199, RC 2006200) in dorsal view, showing variable development of the furcula.

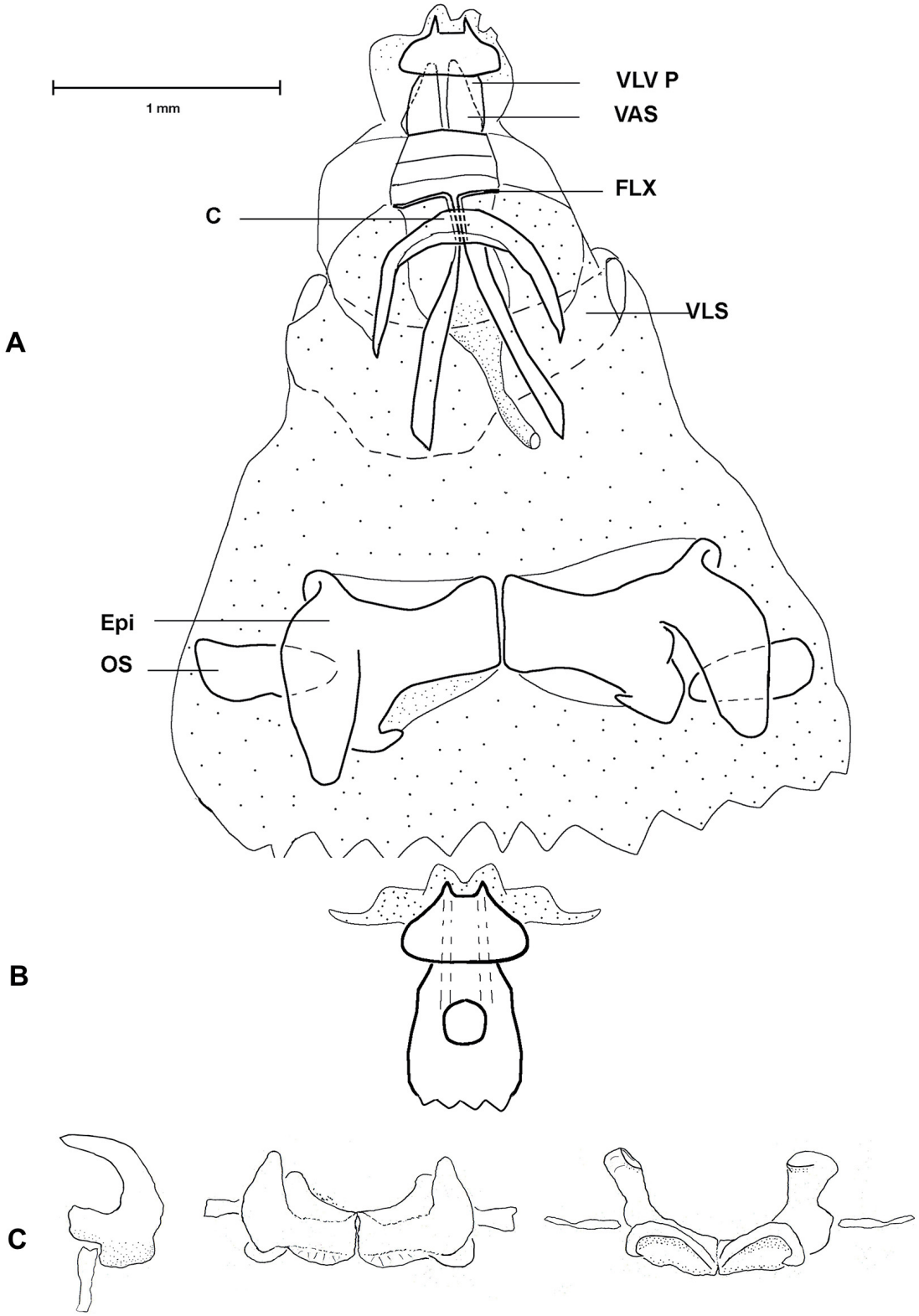


Fig. 31. *Pterotiltus occipitalis* Ramme, 1929, phallic complex. **A**. Intact but extended phallus, dorsal view. **B**. Valvular plate, dorsal view. **C**. Epiphallus, lateral, dorsal and axial views. Abbreviations: see Material and methods. The scale applies to A, but can be extrapolated to the other diagrams.

Table 9. Measurements (mm) of *P. occipitalis* Ramme, 1929. The 5 specimens measured are the female holotype and two males and two females from Semuliki, Uganda. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.30	17.08	12.02	0.41	3.79	11.44	2.48	1.28	0.53	1.86	3.78
Maximum	3.30	18.63	12.75	0.56	3.89	12.18	2.53	1.34	0.58	1.99	3.80
Mean	3.30	17.86	12.39	0.49	3.84	11.81	2.51	1.31	0.56	1.93	3.79
N	2	2	2	2	2	2	2	2	2	2	2
				Foot formula			35%	15%	51%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	3.66	20.45	9.60	0.61	4.32	12.57	2.68	1.41	0.62	2.13	4.19
Maximum	4	22.71	11.11	0.73	4.61	13.65	3.06	1.50	0.65	2.35	4.49
Mean	3.75	21.41	10.36	0.65	4.47	13.10	2.92	1.45	0.64	2.23	4.32
N	3	3	2	3	3	3	3	3	3	3	3
				Foot formula			34%	15%	52%		
Means M/F	0.88	0.83	1.20	0.74	0.86	0.90	0.86	0.90	0.87	0.86	0.88
Normalised	1.00	0.95	1.36	0.84	0.98	1.02	0.98	1.02	0.99	0.98	1.00

Measurements

See Table 9.

Distribution

Previously recorded from Yaoundé (Cameroon) (Ramme 1929; Jago 1975 (specimen label in NHMUK, not published)) and Mt Cameroon (Chopard 1945); Yambata, Beni (both Ramme 1929), Bas Uélé (Dirsh 1970) (all DR Congo); and Semuliki (W Uganda) (Rowell & Hemp 2017). We have recently captured both sexes in the Lobéké National Park in far eastern Cameroon, near the CAR and DRC frontiers. Presumably occurs in suitable localities along the entire north bank of the Congo River from Cameroon to Uganda, the widest known range in this genus. To date there are no south bank records.

Ecology

In the Semuliki Valley of W Uganda *P. occipitalis* occurs syntopically with *P. hollisi* on *Marantachloa leucantha* (K.Schum.) Milne-Redh. and *Pollia* sp. in light gaps created by forest elephants in wet forest dominated by ironwood (*Cynometra alexandri*) (Rowell & Hemp 2017). Usually, a single light gap harbours only one species of *Pterotiltus*, but there are some that contain both. Individuals of *occipitalis* tend to be grouped together on the foodplant.

Status of taxonomic material

Adequate, both sexes are known, and modern localities.

12. ***Pterotiltus berlandi*** Ramme, 1929
Figs 32–34; Table 10

Pterotiltus berlandi Ramme, 1929: 316.

Pterotiltus berlandi – Johnston 1956: 258. — Dirsh 1965: 236; 1970: 120. — Johnston 1968: 173. — Hollis 1975: 226 (note: misspelt as *Pterotiltus berlandti*).

non *Pterotiltus berlandi* – Dirsh 1955: 68 (misidentification, most probably *P. hollisi*).

Type material

Holotype

EQUATORIAL GUINEA • ♂; San Benito; 1885; L.P.L. Guiral leg; MNHN, MNHN-EO-CAELIF 3339. (Only photo seen, Fig. 32, specimen unavailable to us).

Paratype

EQUATORIAL GUINEA • 1 ♀ (Fig. 33); same data as for holotype, but "Riv. San Benito"; MfN, DORSA BA 000029S01.

Description

Examination of the female paratype (Fig. 33) confirms Ramme's description of a predominantly olive green and yellow animal with a red distal abdomen. Hind knees seem to be only partially reddish (on lobes and in midline in dorsal view), otherwise green. (Ramme described the knees as brownish, specifically not red). The female paratype differs from all other specimens of the genus in that the clypeus and upper labrum are bright red (well seen in the photo by S. Ingrisch shown in the OSF (Fig. 33C)). In that photo there is a trace of red on the apex of fastigium too.

The male holotype (Fig. 32) is in very poor condition, with almost no trace of the original colouration, and we were not permitted to borrow or dissect it. We therefore cannot say anything about its phallic structures.

Ramme's (1929) description of the holotype reads: [Head light brown; Antennae broken, light brown; pronotum, metanotum and basal half of abdomen dirty olive and light brown, apical half of abdomen red. Fore and middle leg missing. Hind femur yellowish-olive, knee somewhat brownish, tibia olive].

(We think the Paris male holotype may have had red knees, perhaps a red vertex, and a red subgenital plate, though now very discoloured). Antennae are missing.

Measurements

See Table 10.

Distribution

The type locality is extremely vague. All that can be said with certainty is that it was in the lower valley of the Rio San Benito in Rio Muni. The collector was Léon Pierre Louis Guiral, a French explorer (1858–1885). He led an expedition up the Rio San Benito (also called the Mbini) in what is now Rio Muni (the mainland territory of Equatorial Guinea). His journey was described by Künkel d'Herculais (1889), who relates that the party only penetrated some 150 km upstream before retreating to the coast again. This distance would not suffice to bring them out of Rio Muni into what is now Gabon, but was then known (to Europeans) as French Congo, the name appearing on the specimen labels. According to Wikipedia, there was much trespasss by French colonists from French Congo into the Rio Muni enclave in the late nineteenth century, which was when Guiral was active. The Treaty of Paris (1900), between France and Spain, first regularised Rio Muni's present-day boundaries.

Dirsh (1955, 1970) refers to a specimen (RMCA Tervuren, examined (Fig. 34)) from Muhavura Mountain, Rwanda, that he examined and labelled *P. berlandi.* The present authors consider it likely that this is a misidentification of *P. hollisi*, and the matter is treated under that name below.

Status of taxonomic material

Poor. Further specimens, especially new males, would be necessary to characterize this species. Its uncertain provenance makes this rather unlikely to occur.

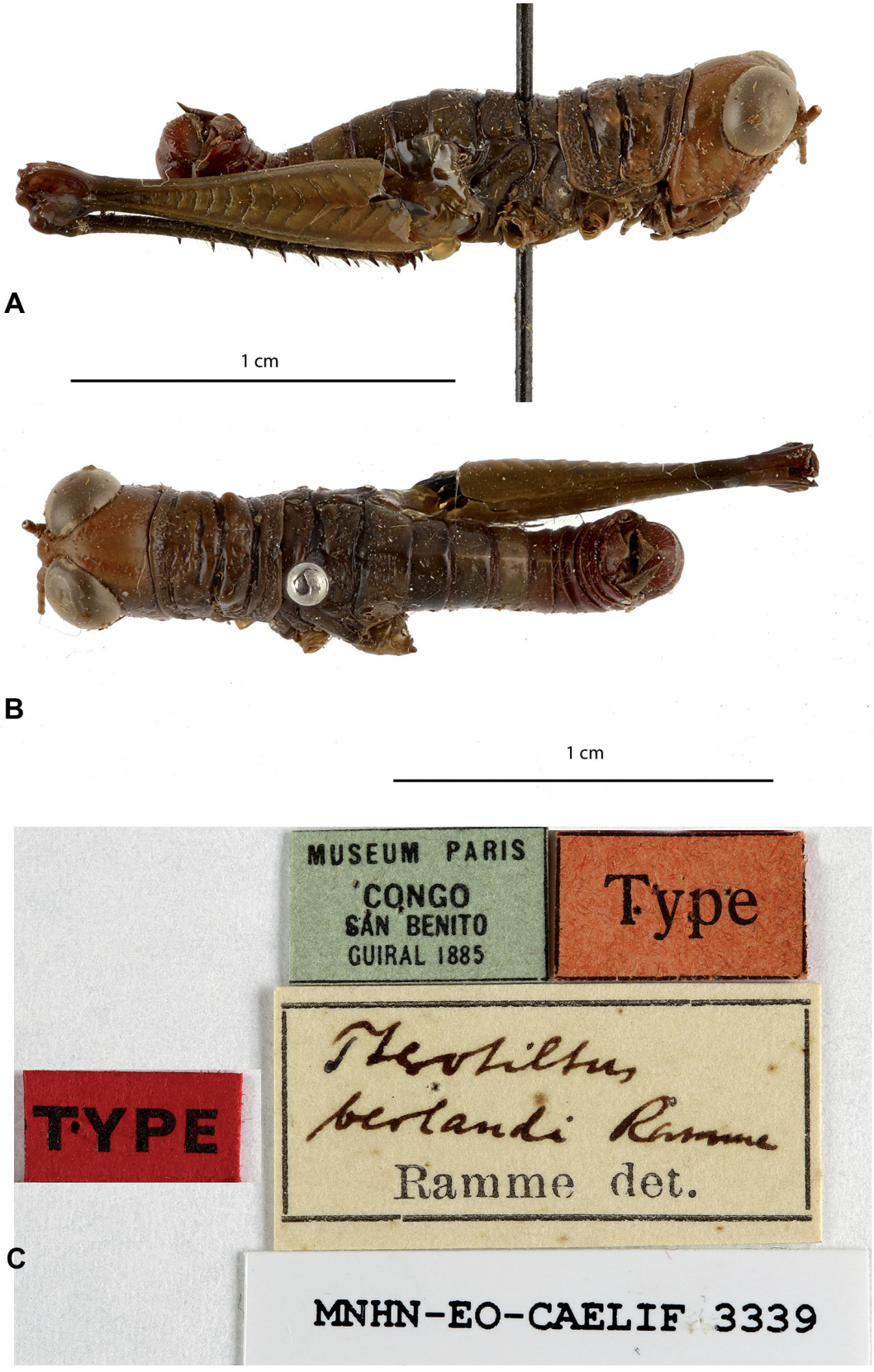


Fig. 32. *Pterotiltus berlandi* Ramme, 1929, holotype, ♂ (MNHN-EO-CAELIF 3339). **A**. Lateral view. **B**. Dorsal view. **C**. Labels (photos Simon Poulain, MNHN).

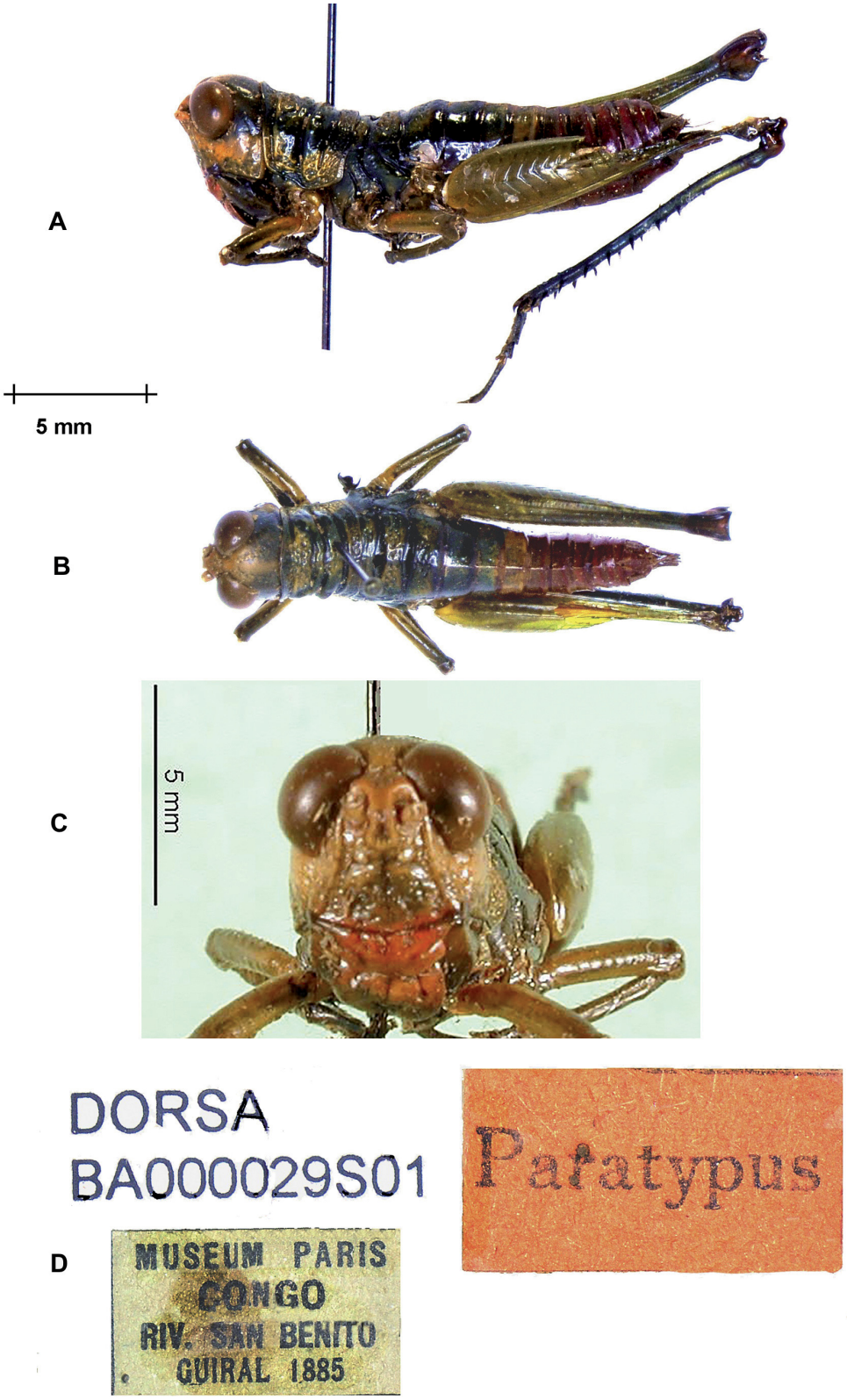


Fig. 33. *Pterotiltus berlandi* Ramme, 1929, paratype, ♀ (MfN, DORSA BA 000029S01). **A**. Lateral view. **B**. Dorsal view. **C**. Face, showing red colouration of clypeus and labrum (photo S. Ingrisch, from the OSF). **D**. Labels.

Table 10. Measurements of *P. berlandi* Ramme, 1929. Only the holotype and paratype are available. The female paratype was measured. The values given for the male holotype are derived from the photo (Fig. 34), using the scale provided on the photo, and are hence only approximate. Abbreviations as in Material and methods.

MALE	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
	3.5	16.98	?	0.52	4.24	11.46	2.4	?	?	?	?
N	1	1	0	1	1	1	1	0	0	0	0
				Foot formula				?			
FEMALE	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
	3.96	21.58	?	0.71	4.44	13.56	2.83	1.29	0.67	2.65	4.61
N	1	1	0	1	1	1	1	1	1	1	1
				Foot formula			0.28	0.15	0.57		
M/F means	0.88	0.79	?	0.73	0.95	0.85	0.85	?	?	?	
Normalised	1.00	0.89	?	0.83	1.09	0.96	0.96	?	?	?	

13. ***Pterotiltus hollisi*** Rowell, 2005
Figs 35–38; Table 11

Pterotiltus hollisi Rowell, 2005: 34.

Pterotiltus hollisi – Rowell & Hemp 2017: 86.

Type material

Holotype

UGANDA • ♂; Buganda, Mpigi District, Mpanga Forest Reserve; 13 Mar. 1998; C.H.F. Rowell leg.; NHMUK 98034.

Paratypes

UGANDA • 1 ♀; same data as for holotype; NHMUK 98032 • 1 ♀; same data as for holotype; RC 98033 • 1 ♀; Buganda, Mpigi District: Mpanga Forest Reserve; 5 Jul. 1992; C.H.F. Rowell leg.; RC 92013 • 1 ♂; Buganda, Mpigi District: Mpanga Forest Reserve; 4 Jul. 1992; C.H.F. Rowell leg.; RC 92008 • 1 ♀;

Fig. 34. *Pterotiltus* sp. indet. (RMCA). This specimen was identified by Dirsh as *P. berlandi*; the present authors think this erroneous. It may be *P. hollisi;* see text for discussion.

Tooro, Kabarole District, Kibale Forest, Kanyawara; 29 Mar. 2003; C.H.F. Rowell leg.; RC 2003073 • 1 ♂; same data as for preceding; 2 Apr. 2003; C.H.F. Rowell leg.; RC 2003079 • 1 ♂; same data as for preceding; 3 Mar. 2003; C.H.F. Rowell leg.; RC 2003074 • 1 ♂; Buganda, Mukono District, Mabira Forest, 5 km E of Najjembe; 8 Mar. 1998; C.H.F. Rowell leg.; RC 98006.

Other material examined

RWANDA • 1 ♀; contref. Est Muhavura; 2100 m a.s.l.; 28 Jan. 1952; P. Basilewsky leg.; RMCA. This specimen (Fig. 34) was determined erroneously as *berlandi* by Dirsh (1955). It is probably in fact *P. hollisi* – see Taxonomic remarks below – and not *berlandi.*

UGANDA • 1 ♂;Tooro: Kabarole District, Kibale Forest National Park, Kanyawara; 19 Mar. 2003; C.H.F. Rowell leg.; RC 2003056 • 1 ♀; Tooro: Bundibugyo District, Semliki National Park, Bumaga-Ntandi trail; 22 Aug. 2006; C.H.F. Rowell leg.; RC 2006278.

Approximately 50 other specimens, all from S or W Uganda, detailed in Rowell 2005 (MUMZ).

Description (condensed from Rowell 2005)

Small/medium size, average body length males 16.05 mm, females 19.86 mm. Antennal flagellum of 22 segments. Integument generally smooth and shiny; but frons, genae, pronotum, terga of meso- and metathorax and of first abdominal segment coarsely pitted. Mesosternal interspace longer than broad.

Male (Figs 35, 37–38)

Fastigium slightly concave, with an irregular surface and somewhat thickened margins. In most but not all individiduals there is a weak medial longitudinal groove at the anterior end of the fastigium. Furcula small and simple, with broadly triangular points. Cerci straight, simple, laterally compressed, narrowing before tip, pointed.

Phallic complex. Epiphallus (Fig. 37B–C) wide, divided, with a large outer pair and smaller inner pair of lophi, ancorae absent; oval sclerites present, teardrop shaped. Ectophallus: large ventrolateral sclerite present, encircling the lower half of the phallus. Apodemes of cingulum short and broad, anterior ends widely separated; rami extending ventrally, bulging convexly towards the rear, and meeting ventrally under the endophallus. Phallic membrane posterior to zygoma of cingulum produced into a sheath which covers the aedeagus. Endophallus as in generic diagnosis; note this supercedes the description previously given in Rowell (2005), which was written before a complete understanding of the oxyine phallus had been obtained. The valvular plate (Fig. 38A–D) is highly developed and unusually complex. The paired medial lobes form closely spaced vertical lamellae ventrally, but dorsally, where they fuse with the lateral lobes, each expands into a horizontal leaflike form, reflexed cephalad at their upper extremity, the tips almost touching the cingulum. The more ventral parts of the lateral lobes form a cup-shaped container around the medial lobes.

Female (Fig. 36)

Ovipositor as in generic diagnosis. Posterior margin of subgenital plate smoothly triangular, with a long, straight, pointed egg guide, laterally compressed at the tip and rather oblong in profile, and 1 pair of large, sclerotized columellae. Bursa copulatrix large, the walls ornamented with short projections, somewhat asymmetrical distally, but not as pronouncedly so as in *P. impenni***s** (Fig. 2). Spermathecal duct fairly short; spermatheca simple with a hooked terminal ampulla (Rowell 2005: fig. 5c), lacking the small lateral diverticulum seen in *P. impennis* (Fig. 2).

Colouration (in life) (Figs 35–36)

Antennae black, tipped greenish white. Eyes black. Vertex, fastigium, upper genae, black. Frons white, densely speckled grey-green. Palps and proximal parts of mandibles pale green. Lower genae white tinged with gold, increasingly speckled with green towards their anterior margins. The white band of the genae is continued backwards across the pronotal lobes and epimera and episterna of the meso- and metathorax. Dorsal half of thorax and the first 3 abdominal segments black, ventral half green. Rest of abdomen olive green, including genitalia. Paired spots on dorsa of pronotum, metathorax and 1st abdominal segment, gold or yellow. Middle and forelegs green, tarsal segments blue-green, underside and aroleum reddish. Hind femur leaf green, upper part of knee black, ventral lobes blue; hind tibia blue, with a leaf green post genicular band. Hind tarsi pinkish white, aroleum pink.

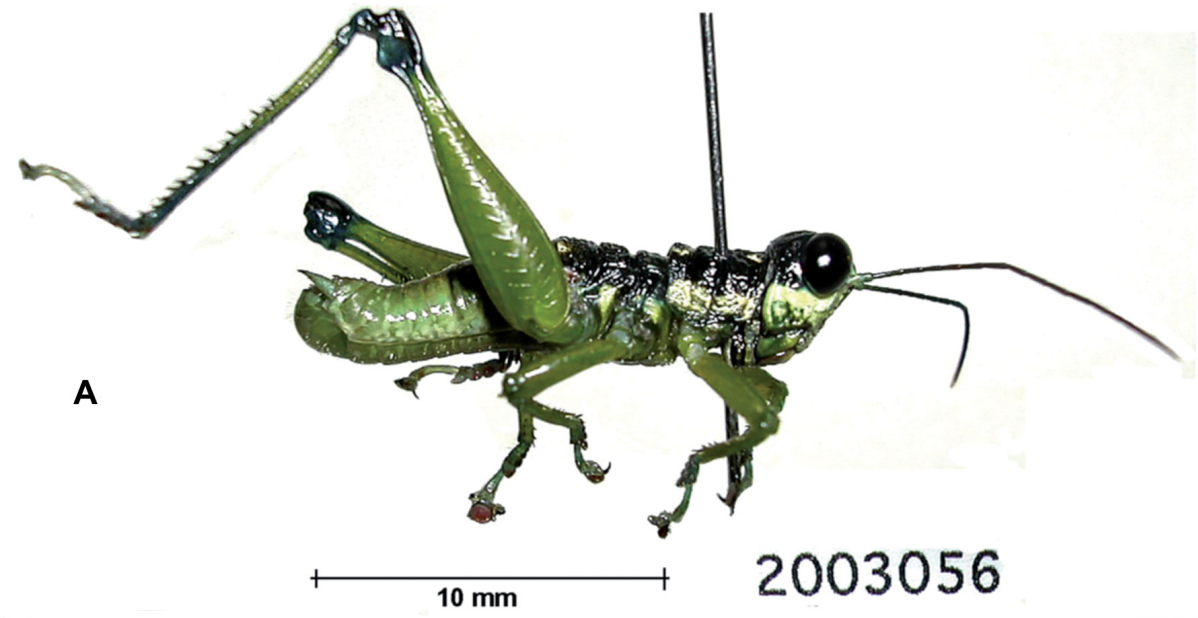


Fig. 35. *Pterotiltus hollisi* Rowell, 2005, males. **A**. Freshly killed Ugandan specimen, still with its natural colours (RC 2003056). **B**. Living male, Uganda, Bunyoro, Budongo Forest**.**

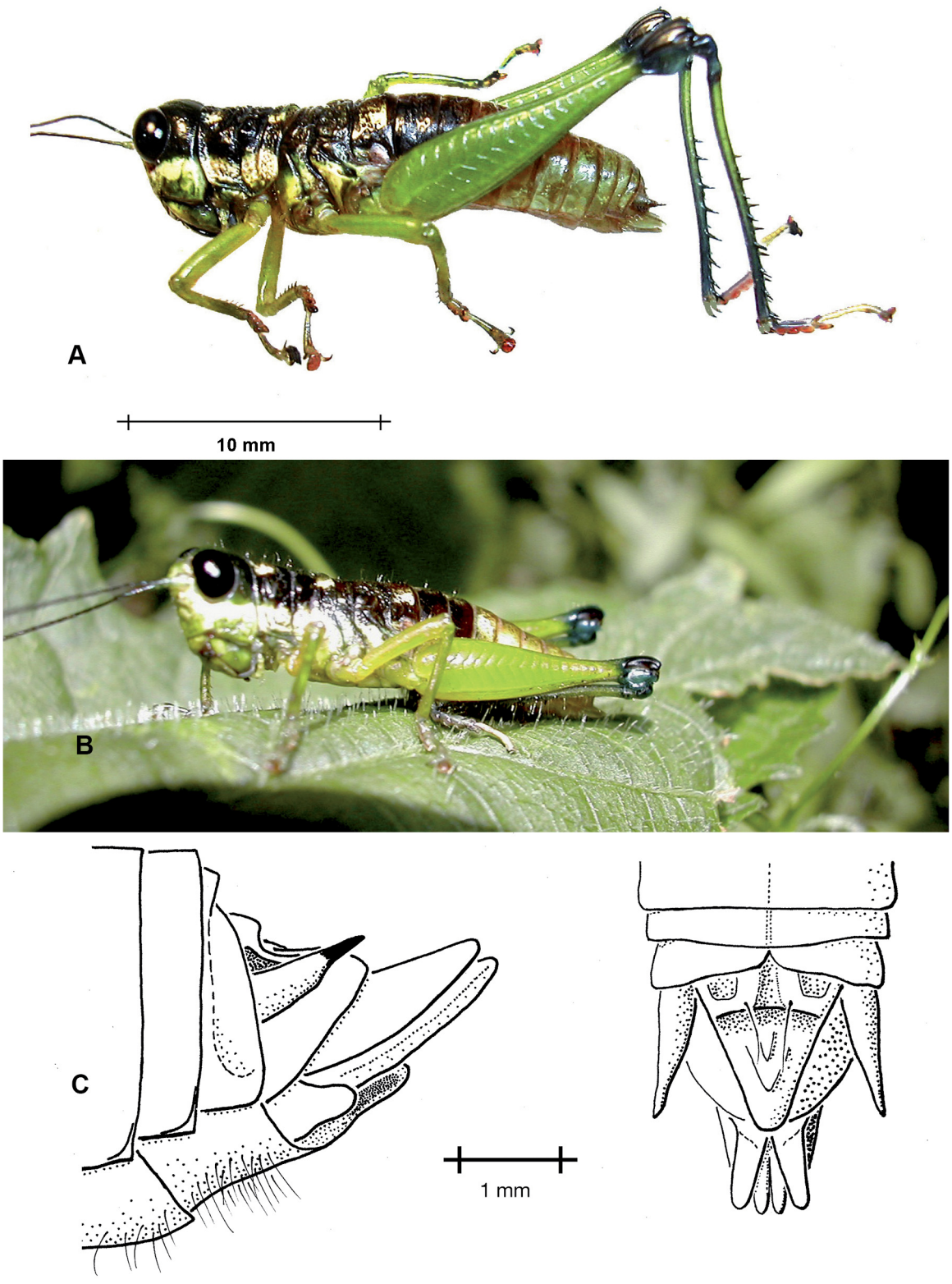


Fig. 36. *Pterotiltus hollisi* Rowell, 2005, females. **A**. Freshly killed Ugandan specimen, still with its natural colours. **B**. Living female, Uganda, Tooro, Kibale Forest. **C**. Female terminalia, lateral and dorsal views (from Rowell 2005). N.B. In A and B the antennae are cropped short in the photos.

In the female the white areas of the pronotum are often tinged with yellow or pink, the abdomen can be tinged with olive brown, and the areas of the legs that are blue in males are greyer in colour.

In dried museum material the blue colour tends to be lost and replaced by green, and in badly discoloured specimens the green itself is replaced by yellow. The eyes turn brown when dried. Alive in the wild, this is a black and green insect with prominent white or yellow spots on the dorsum. Note: *hollisi* has black, not red, hind knees. To date, all other known species of *Pterotiltus* from the Congo Basin have red knees, except for the Atlantic coastal *P. campoensis*, some individuals of *P. inuncatus*, and the various *Parapterotiltus* spp.

Measurements

See Table 11.

Ecology

Rowell (2005) gives some natural history information, including this species' epiphyllic oviposition on the food-plants (Marantaceae, Commelinaceae).

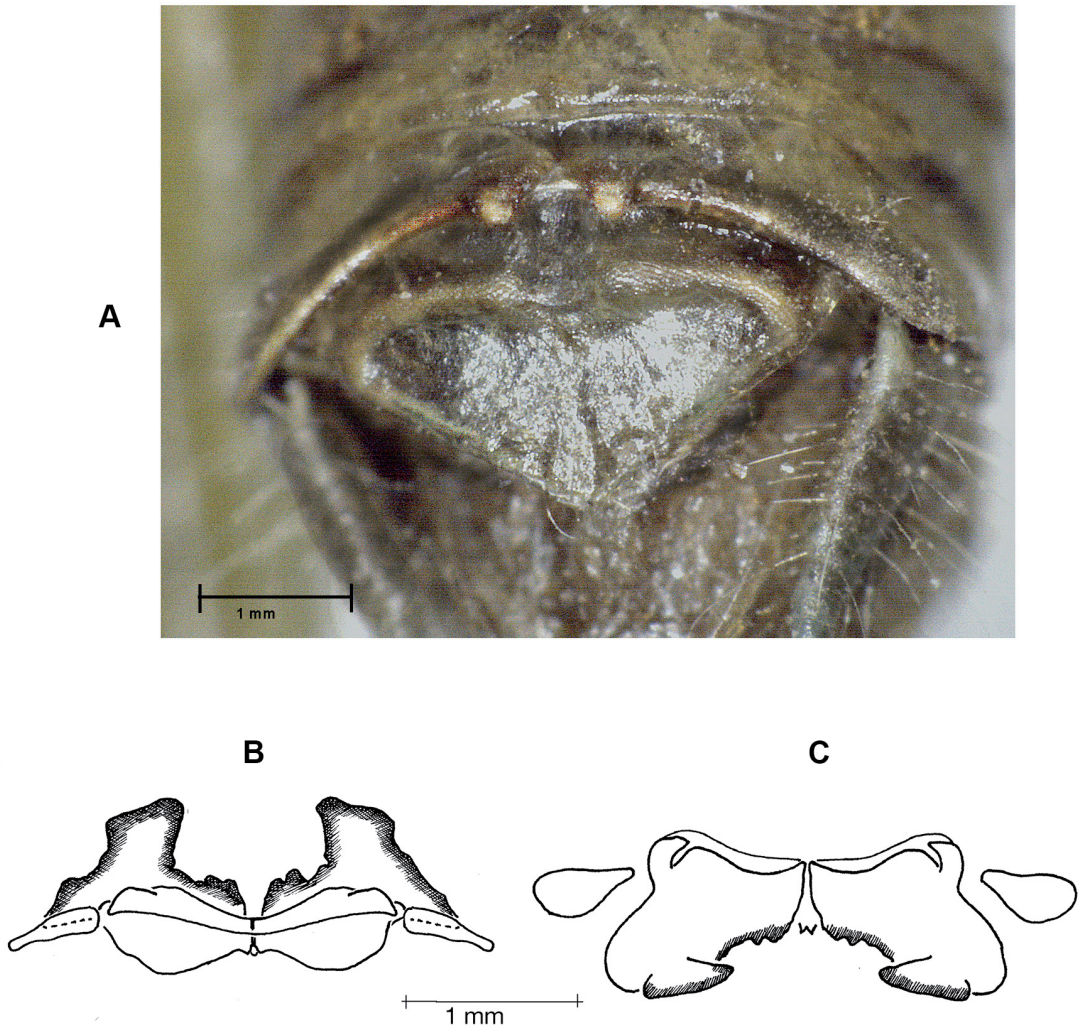


Fig. 37. *Pterotiltus hollisi* Rowell, 2005, males. **A**. Margin of tenth abdominal tergite, to show the furcula (digitally highlighted). **B–C**. Epiphallus, axial and dorsal views.

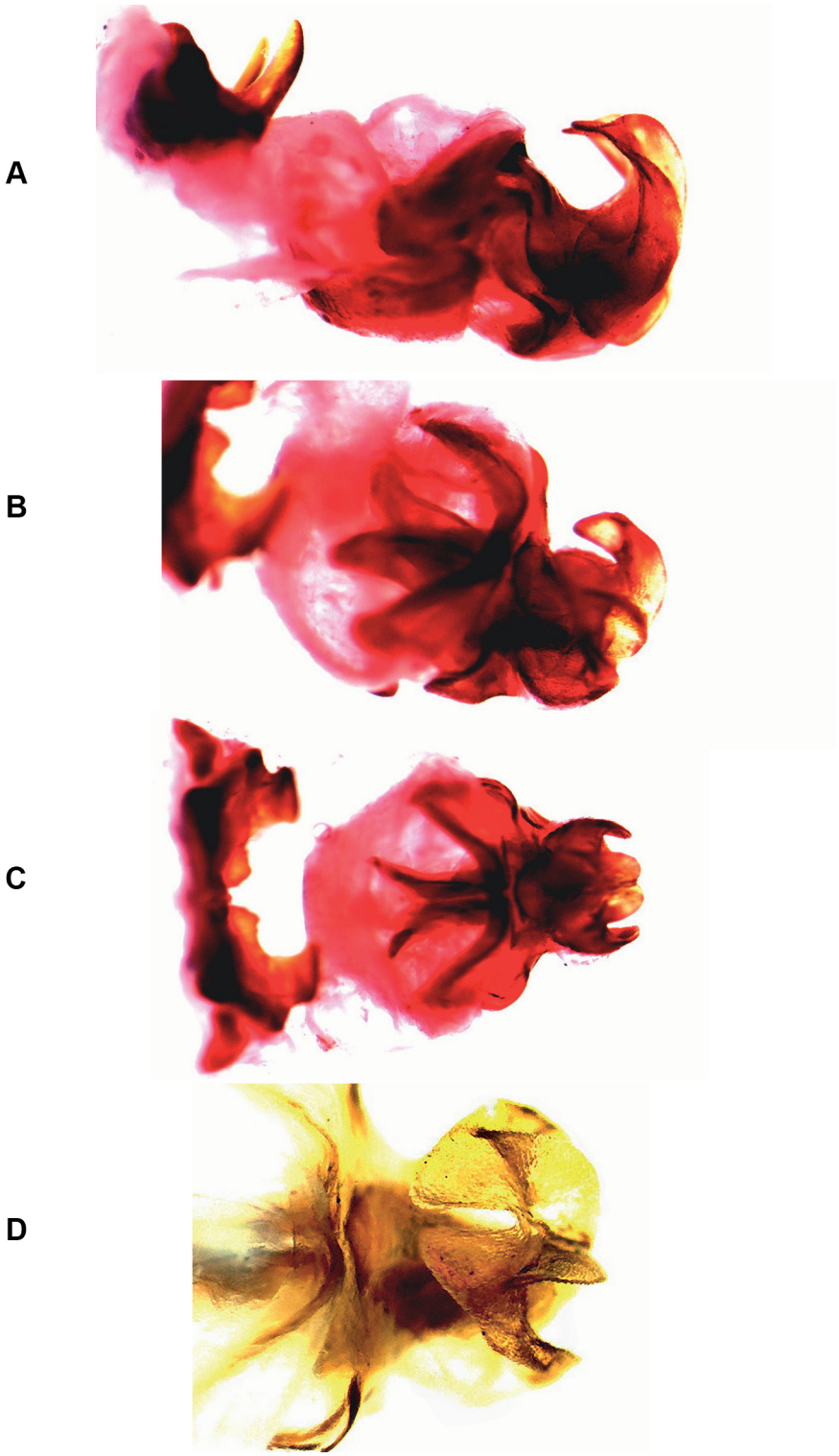


Fig. 38. *Pterotiltus hollisi* Rowell, 2005, phallus. **A–C**. Stained with acid fuchsin. **D**. Unstained. These figures try to illustrate the complexity of the valvular plate. **A**. Extended phallus, lateral view. **B**. As A, but oblique dorsolateral view. **C**. As A–B, but dorsal view. **D**. As in C, but more highly magnified, to show the leaflike terminations of the medial lobes of the valvular plate.

Table 11. Measurements of *P. hollisi* Rowell, 2005. 6 males and 6 females were measured; three of each group came from the Mpanga forest reserve, Buganda, Uganda (the type locality), and the other three from the Kibale Forest National Park, Tooro, Uganda. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	2.73	15.28	8.58	0.31	3.38	9.68	2.17	1.12	0.46	1.72	3.33
Maximum	3.36	17.74	11.66	0.45	3.80	11.32	2.40	1.37	0.52	1.90	3.76
Mean	3.00	16.54	10.54	0.36	3.59	10.62	2.30	1.23	0.49	1.81	3.56
N	6	6	5	6	6	6	6	6	6	6	6
				Foot formula			35%	14%	51%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	3.36	20.77	9.00	0.63	4.18	12.53	2.65	1.46	0.54	2.21	4.21
Maximum	3.75	22.16	9.29	0.71	4.39	13.55	2.90	1.48	0.60	2.34	4.42
Mean	3.56	21.47	9.15	0.67	4.29	13.04	2.78	1.47	0.57	2.28	4.32
N	6	6	6	6	6	6	6	6	6	6	6
				Foot formula			34%	13%	53%		
M/F means	0.84	0.77	1.15	0.54	0.84	0.81	0.83	0.84	0.86	0.79	0.82
Normalised	1.00	0.92	1.37	0.65	1.00	0.97	0.99	1.00	1.03	0.95	0.98

Distribution

Common in forests of southern and western Uganda, but not occcuring east of the Victoria Nile. Probably extends from W Uganda into NW Tanzania and extreme E DR Congo. Probably also occurs in N Rwanda; the Muhavura specimen cited by Dirsh (1955, 1970) as *P. berlandi* (RMCA Tervuren, examined; Fig. 34) is a female, and discoloured; it may have been pinned from an original alcohol preparation. Compared to the paratype female of *berlandi*, it seems to differ slightly in structure, as well as in aspects of colouration. The profile of the frons is straight, whereas that of the *berlandi* paratype is slightly concave; the anterior margin of the pronotum has a narrower midline projection overhanging the occiput than does the paratype. The hind knees are distinctly darker than the rest of the body, which is not the case in the paratype. It shows no trace of red colouration, either on the abdomen or the clypeus and labrum.

Although we cannot be completely certain that Dirsh's identification of this specimen as *P. berlandi* is incorrect, the present authors consider it very probable. An identification as *P. hollisi* (which had not been described at the date of Dirsh's determination, and which has black hind knees) is at least equally likely. The faint remaining traces of colouration suggest this, and it is biogeographically much more plausible, as *hollisi* occurs on the Ugandan (northern) slopes of Muhavura mountain, whereas the specimens of *berlandi* come from the very distant Atlantic coast. Only fresh material from the Rwandan (southern) side of Muhavura is likely to resolve this uncertainty.

Status of taxonomic material

Good: adequate material of both sexes present in collections, modern localities known.

14. ***Pterotiltus ngoylaensis*** Oumarou-Ngoute & Rowell, 2024
Figs 39–41; Table 12

Pterotiltus ngoylaensis Oumarou-Ngoute & Rowell, 2024: 129.

Type material

Holotype

CAMEROON • ♂; High-Nyong Division, Ngoyla, Nki National Park; alt. 510 m a.s.j.; 10 May 2021; C. Oumarou-Ngoute leg.; MfN 2021007 (Fig. 39A).

Paratypes

CAMEROON • 1 ♀; same data as for holotype; MfN 2021006 • 1 ♂; same data as for holotype; 16 May 2021; RC 2021005 • 1 ♀; same data as for preceding; RC 2021017.

Description

Condensed from Oumarou-Ngoute & Rowell (2024), who provided more detail. As this species and *P. campoensis* have been newly described only recently, we have reduced our treatment here to avoid unnecessary duplication.

Male

Body of medium size (average L = 20.3 mm).

Head. Antennae filiform, longer than head and pronotum together.

Thorax. Pronotum cylindrical, lateral and medial carinae absent; metazona short, about one-fourth of the length of prozona, and only 19% of the total pronotal length; posterior margin of metazona slightly notched in the midline, otherwise straight; anterior margin of pronotum slightly convex, minutely notched in midline; prosternal process conical, pointed; mesosternal space as wide as long; metasternal space open, about half the length of mesosternal space. Tegmina extremely reduced: elytra minute, slender and straight, not reaching the posterior margin of mesothoracic segment. Hind tibia slightly expanded apically. External apical spine of tibia present, 6 additional external tibial spines, 9 internal spines.

Abdomen. Tympanum wide, oval; last abdominal tergite divided, with a small. Furcula (Fig. 43A); cercus slightly incurved, strongly compressed laterally, with acute apex, shorter than subgenital plate but exceeding supra-anal plate. Supra-anal plate as in generic diagnosis.

Phallic complex (Fig. 41B–H). It is of large size for the genus, epiphallus with large forwardly curved blade-like outer lophi (Fig. 41G–H); inner lophi absent; anterior processes of epiphallus only slightly developed. The oval sclerites have two small tubercles on their ventral surfaces. The valvular plate is large and well developed (Fig. 41E–F), its basic structure similar to that of *P. hollisi* (Fig. 40).

Female

Female of medium size (L = 24.4 mm). In general, similar to the male.

Colouration

Male and female of similar colouration (Figs 39–40). Body multi-coloured, predominantly green and black in life, but dried specimens discolour rapidly to a rather uniform olive-brown. Scape and pedicel of antenna green-brown, flagellum green-brown, sometimes brown apically; fastigium green; vertex blue-black with black longitudinal bands either side of the midline, which extend dorsally onto the pronotum; eyes conspicuously violet in life, fading to brown when dried; upper half of male frons blue-black, lower half white-yellow, extending posteriorly across the lower genae as a white-yellow subocular stripe, and forming two pale patches on the ventral margin of the pronotal lobes, sometimes on the mesothoracic and metathoracic pleura as well. Pronotal disc multi-coloured, predominantly black, in life with two longitudinal whitish-yellow bands; these bands are prolonged dorsally onto the mesothoracic and the metathoracic tergites but are indistinct in dried specimens; thoracic sterna green; hind femur green with

Fig. 39. *Pterotiltus ngoylaensis* Oumarou-Ngoute & Rowell, 2024, males. **A**. Holotype (MfN 2021007), lateral view. **B–C**. Living males.

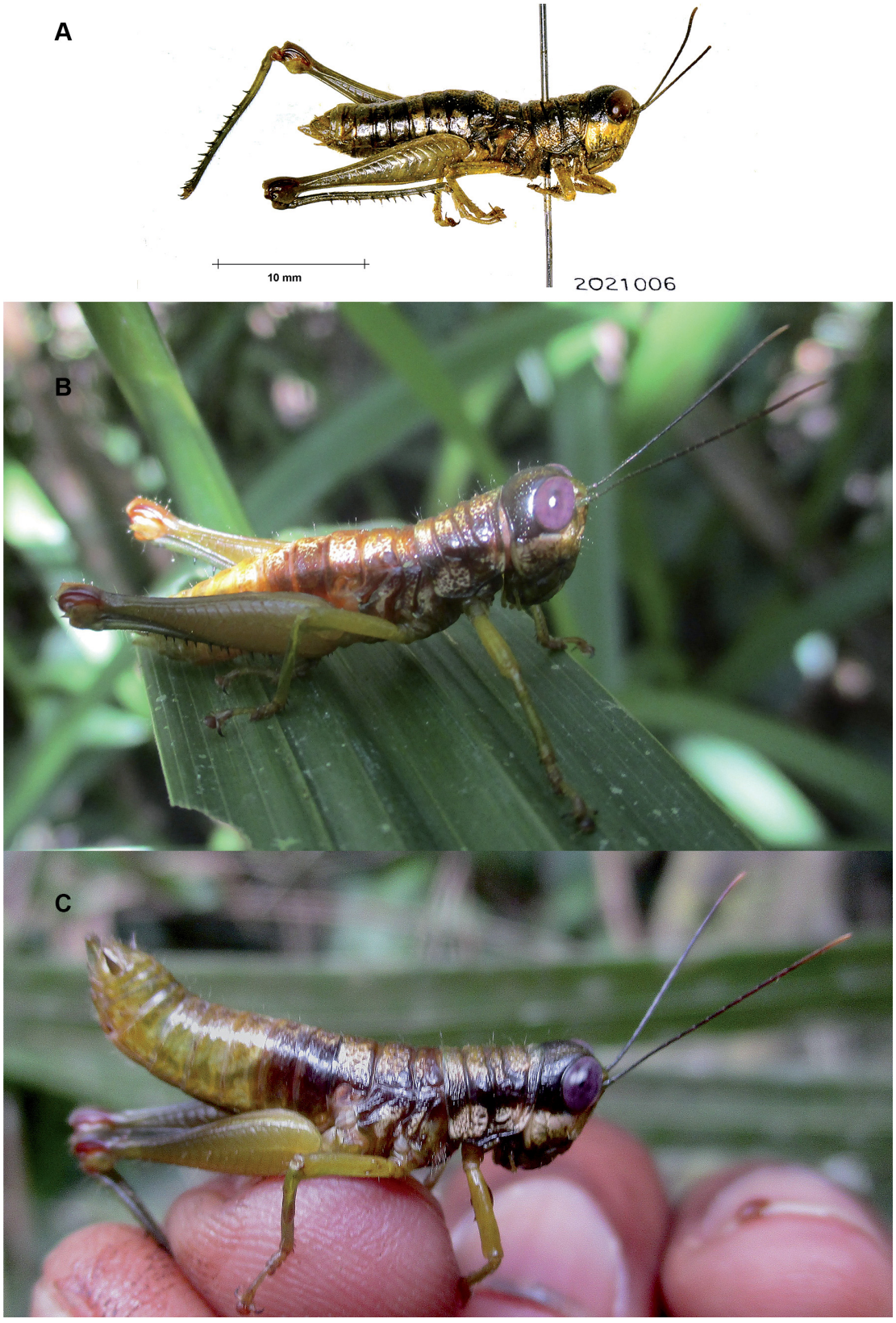


Fig. 40. *Pterotiltus ngoylaensis* Oumarou-Ngoute & Rowell, 2024, females. **A**. Paratype (MfN 2021006), lateral view. **B–C**. Living females.

Table 12. Measurements (mm) of *Pterotiltus ngoylaensis* Oumarou-Ngoute & Rowell, 2024. Fifteeen specimens were measured, all from the type locality. Unfortunately, only 2 were female. Abbreviations as in Material and methods.

MALES	L	P	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum:	18.30	3.96	9.45	0.47	4.13	12.42	2.49	0.95	0.59	2.12	3.87
Maximum:	22.14	4.46	13.94	0.76	5.54	13.49	3.10	1.29	0.85	2.87	4.78
Mean:	20.30	4.14	11.65	0.64	4.53	13.01	2.85	1.17	0.71	2.49	4.37
N:	13	13	13	13	13	13	13	10	10	10	8
				Foot formula			27%	16%	57%		
FEMALES	**L**	**P**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum:	24.36	4.61	11.26	0.84	4.93	14.16	3.14	1.44	0.445	2.62	4.505
Maximum:	24.44	4.86	11.32	0.90	4.96	14.53	3.43	1.58	0.76	2.86	5.20
Average:	24.40	4.74	11.29	0.87	4.95	14.35	3.29	1.51	0.60	2.74	4.85
N:	2	2	1	2	2	2	2	2	2	2	2
				Foot formula			31%	12%	56%		
M/F means	0.83	0.87	1.03	0.73	0.92	0.91	0.87	0.77	1.18	0.91	0.90
Normalised	0.96	1.00	1.19	0.84	1.05	1.04	1.00	0.89	1.35	1.04	1.03

the upper genicular lobe reddish brown; all tibiae and tarsi green. The first abdominal segment black, with two white-yellow longitudinal bands; the 2nd and 3rd segment black, sometime slightly white dorsally; the 4th segment green, sometimes whitish in dorsal view; all the remaining abdominal segments are green.

Measurements

See Table 12.

Remarks

Pterotiltus ngoylaensis has eyes conspicuously violet in life (Figs 39B, 40B–C), which is, to date, a unique character in the genus. The large forwardly curved blade-like outer lophi are typical of the genus, and close to the structure seen in *P. coeruleocephalus*; however, in *ngoylaensis* the oval sclerites have two small tubercles on their ventral surfaces, absent in other species. Externally, the two species are completely different: the male of *P. coeruleocephalus* is predominantly blue in life, whereas *P. ngoylaensis* is green. At first glance *ngoylaensis* resembles *P. hollisi*, but is somewhat larger and lacks the well-defined pale spots on the thoracic terga; further, its hind knees are reddish brown, not black as in *hollisi*.

Distribution

Eastern Cameroon: Ngoyla: Nki National Park; 2°24′0″ N, 13°51′0″ E, altitude 498 m. Also, Haut Nyong Division, Lobeke National Park. These localities are in National Parks, which should guarantee conserving the natural habitat against deforestation. However, the species could probably be found in other localities in southern Cameroon. Its habitat is typical of the genus: rainforest, 400 to 600 m a.s.l., with abundant Marantaceae R.Br. and Commelinaceae Mirb. in the understorey. These conditions are found in many parts of the south Cameroon plateau and in the neighbouring countries (Congo, Gabon, Central African Republic).

Status of taxonomic material

Adequate, both sexes present in collections, modern localities known.

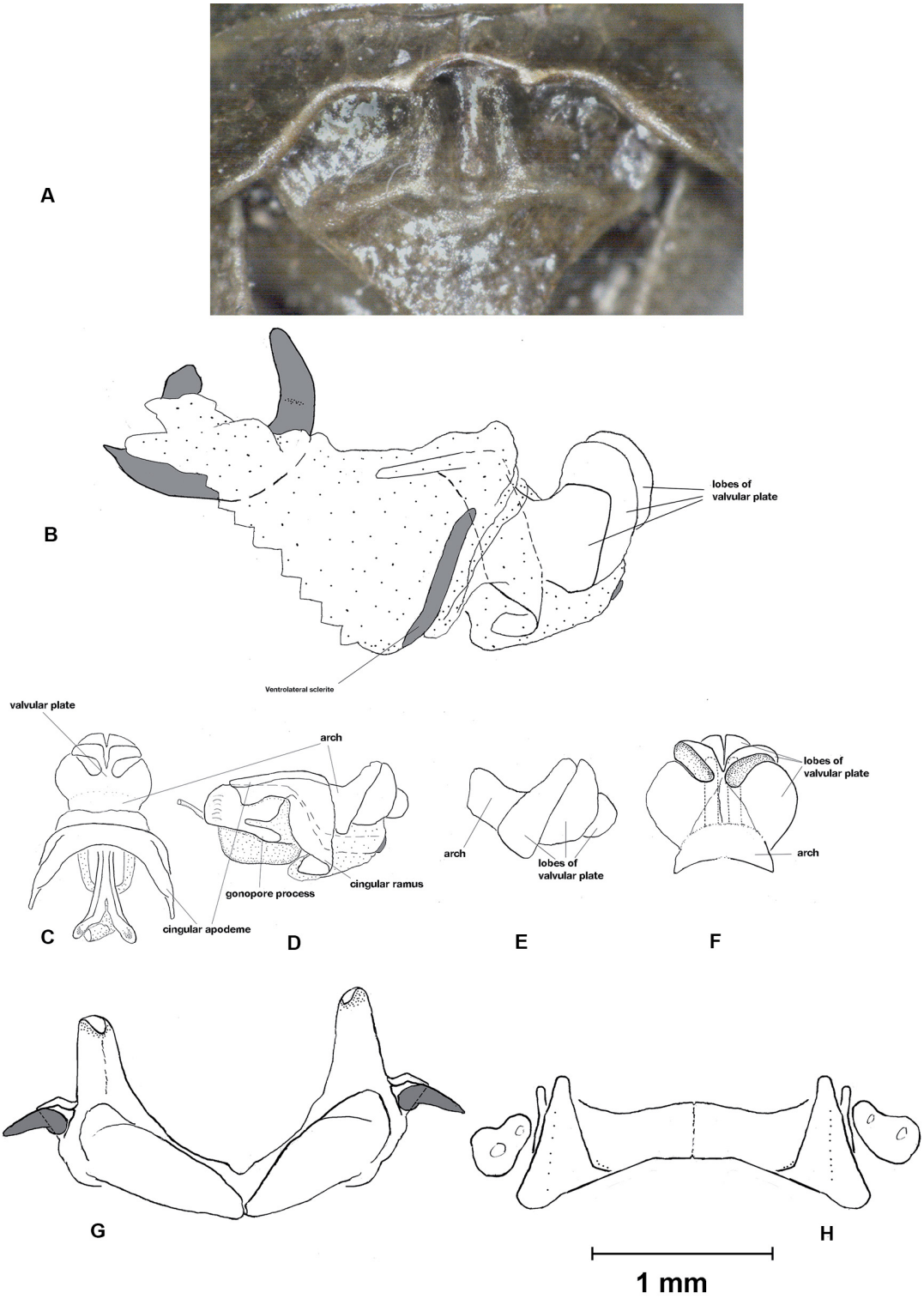


Fig. 41. *Pterotiltus ngoylaensis* Oumarou-Ngoute & Rowell, 2024, males. **A**. Dorsal view of terminalia, to show the furcula (here digitally lightened for visibility). **B–H**. Phallic structures. **B**. Extended phallus, lateral view. **C–D**. Cingular and aedeagal sclerites in dorsal and lateral views. **E–F**. Isolated valvular plate in lateral and dorsal views. **G–H**. Epiphallus in axial and dorsal views. The scale in the lower figure applies to G–H only.

15. ***Pterotiltus campoensis*** Oumarou-Ngoute & Rowell, 2024
Figs 42–44; Table 13

Pterotiltus campoensis Oumarou-Ngoute & Rowell, 2024: 133.

Type material

Holotype
CAMEROON • ♂; Ocean Division, Campo town; 6 m a.s.l.; 13 Nov. 2017; C. Oumarou-Ngoute leg.; MfN 2017242.

Paratypes
CAMEROON • 1 ♀; same data as for holotype; MfN 2017243 • 1 ♂; same data as for holotype; 5 Jun. 2016; RC 2016039.

Description

As in the case of *P. ngoylaensis*, this species has been newly described only recently, and we have therefore reduced our treatment of these species here to avoid unnecessary duplication.

Male
Body of medium size, integument shiny, rugose in the pronotum and in the three first segments of abdomen.

Head. Antenna filiform, longer than head and pronotum together; fastigium of vertex short, pentagonal in dorsal view, somewhat concave, with a slight medial sulcus; frons slightly oblique, frontal ridge shallowly sulcate, well developed above medial ocellus and obsolete below; eyes large, oval, convex; inter-ocular space equal to or slightly wider than antennal scape.

Thorax. Pronotum cylindrical, medial carina very weak, crossed by three deep transverse sulci, the space between the sulci 2 and 3 wider and more convex than elsewhere; lateral carinae absent; metazona very short, about one-fifth of the length of prozona; posterior margin of metazona slightly notched in the midline, otherwise straight; anterior margin of pronotum slightly convex; prosternal process conical, sharply pointed; mesosternal space as wide as long; metasternal space very small, almost completely closed. Hind tibia only slightly expanded, hind femur slender, with weakly impressed chevron markings; lower genicular lobe acutely pointed; external apical spine of tibia present.

Abdomen. Tympanum wide, oval or circular; last abdominal tergite divided, the hind margin in male with very small lobiform processes forming a minute furcula, almost indiscernible (Fig. 46A); cercus long, straight, strongly compressed laterally, with acute apex extending beyond the tip of the subgenital plate. Supra-anal plate very short, triangular in dorsal view, apex rounded in female, slightly more acute in male. Proximally, there is a short medial longitudinal groove, bounded posteriorly by an oblique transverse ridge that extends across the width of the plate.

Phallic complex. Epiphallus (Fig. 43A) with wide, roughly oblong, outer lophi and poorly developed and somewhat assymetrical inner lophi. 'Oval' sclerites of irregular shape. Anterior processes bluntly pointed and directed inwards. Valvular plate well developed, with a distinctive set of medial and lateral lamellae apically.

Female

Similar to male in structure and colouration, but larger. Subgenital plate smooth.

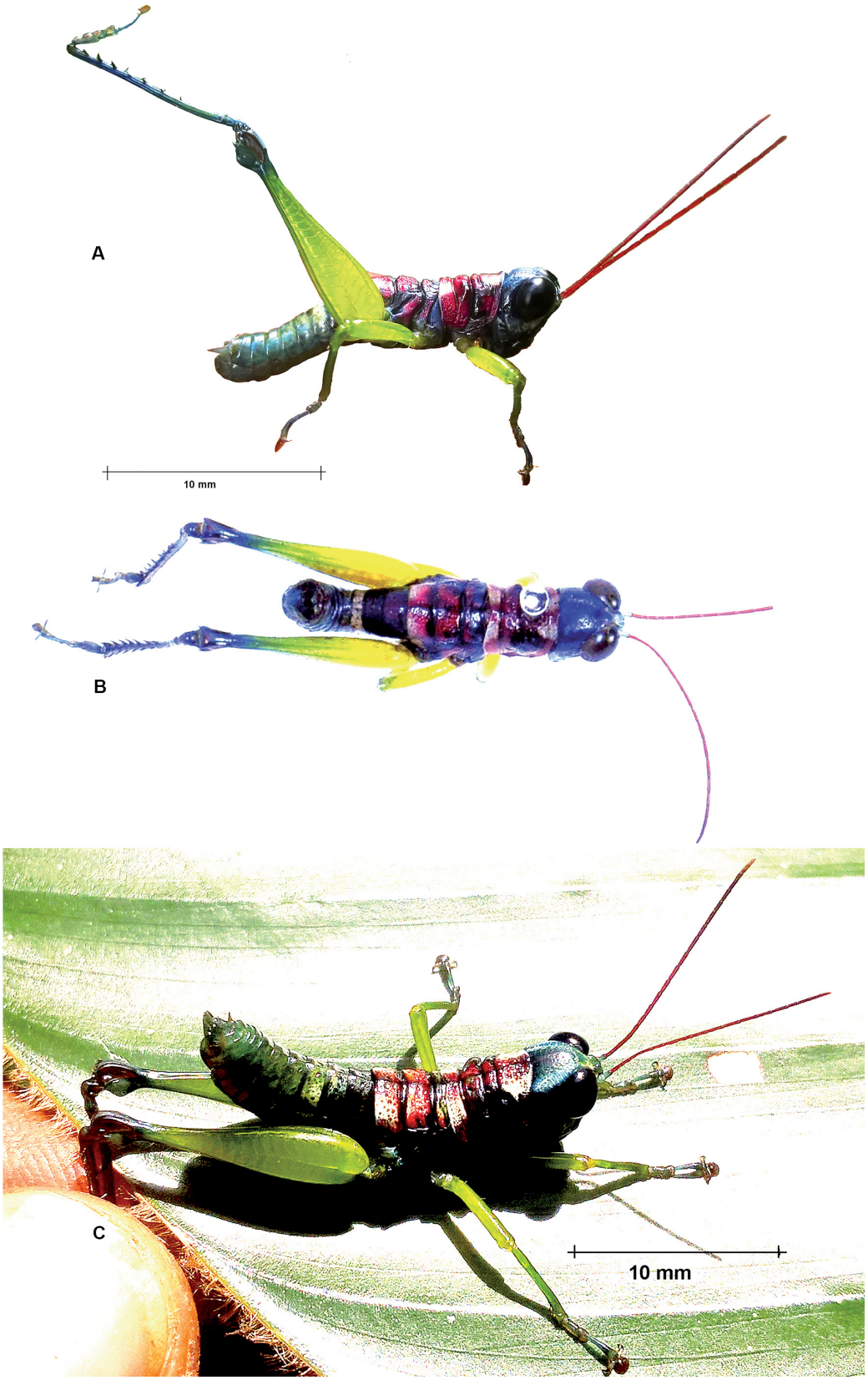


Fig. 42. *Pterotiltus campoensis* Oumarou-Ngoute & Rowell, 2024. **A**. Male, recently killed, lateral view. **B**. Male, dorsal view. **C**. Female, alive.

Colouration (Fig. 42)

Very distinctive. In life colouration predominantly black, blue and red, with green legs.

Scape and pedicel of antenna green, flagellum entirely red, sometimes brown apically; fastigium blue; vertex blue with two faint lighter (yellow or red) lateral longitudinal bands; eyes red in life, fading

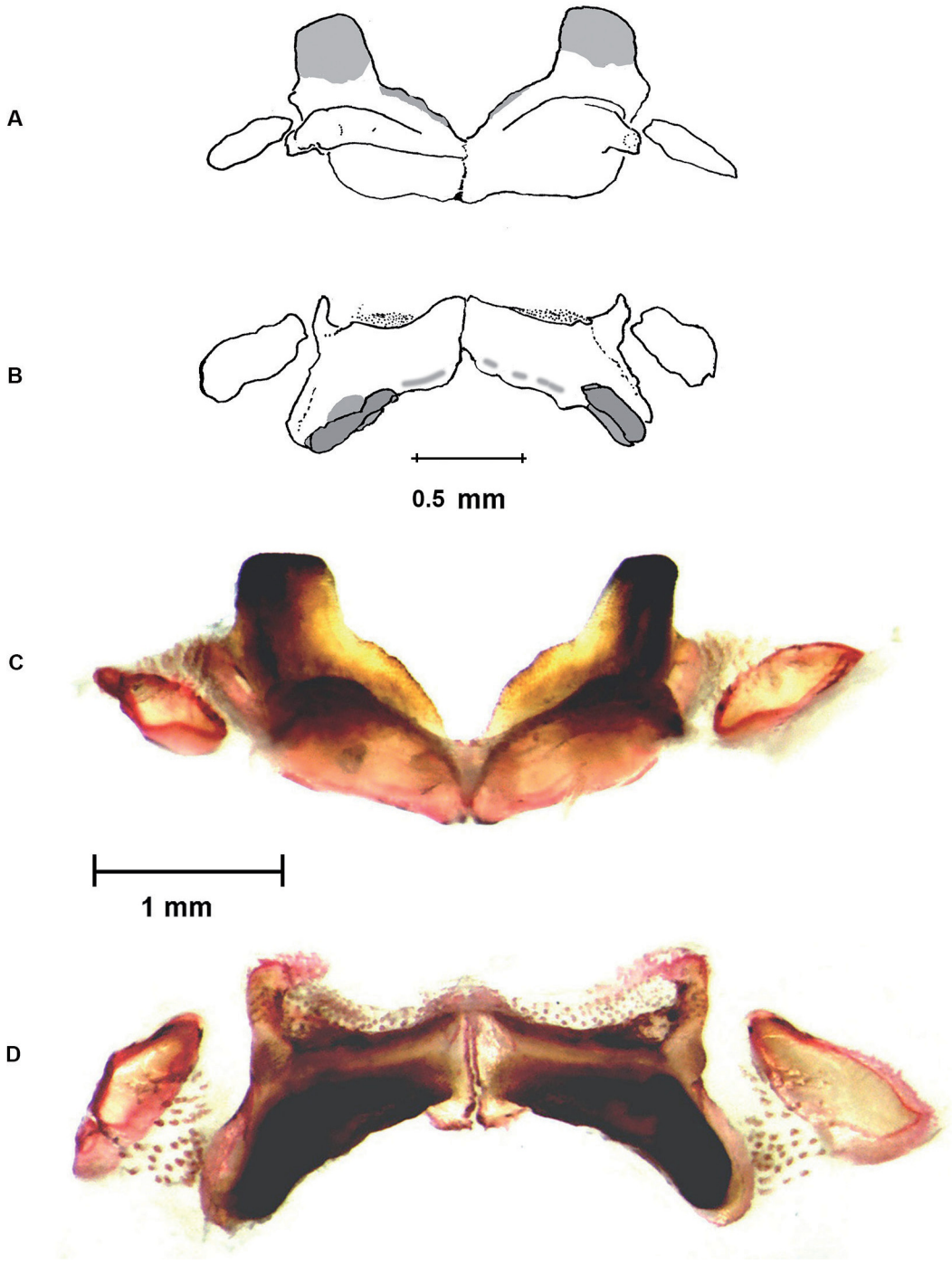


Fig. 43. *Pterotiltus campoensis* Oumarou-Ngoute & Rowell, 2024, epiphallus, **A, C**. Axial view. **B, D**. Dorsal view.

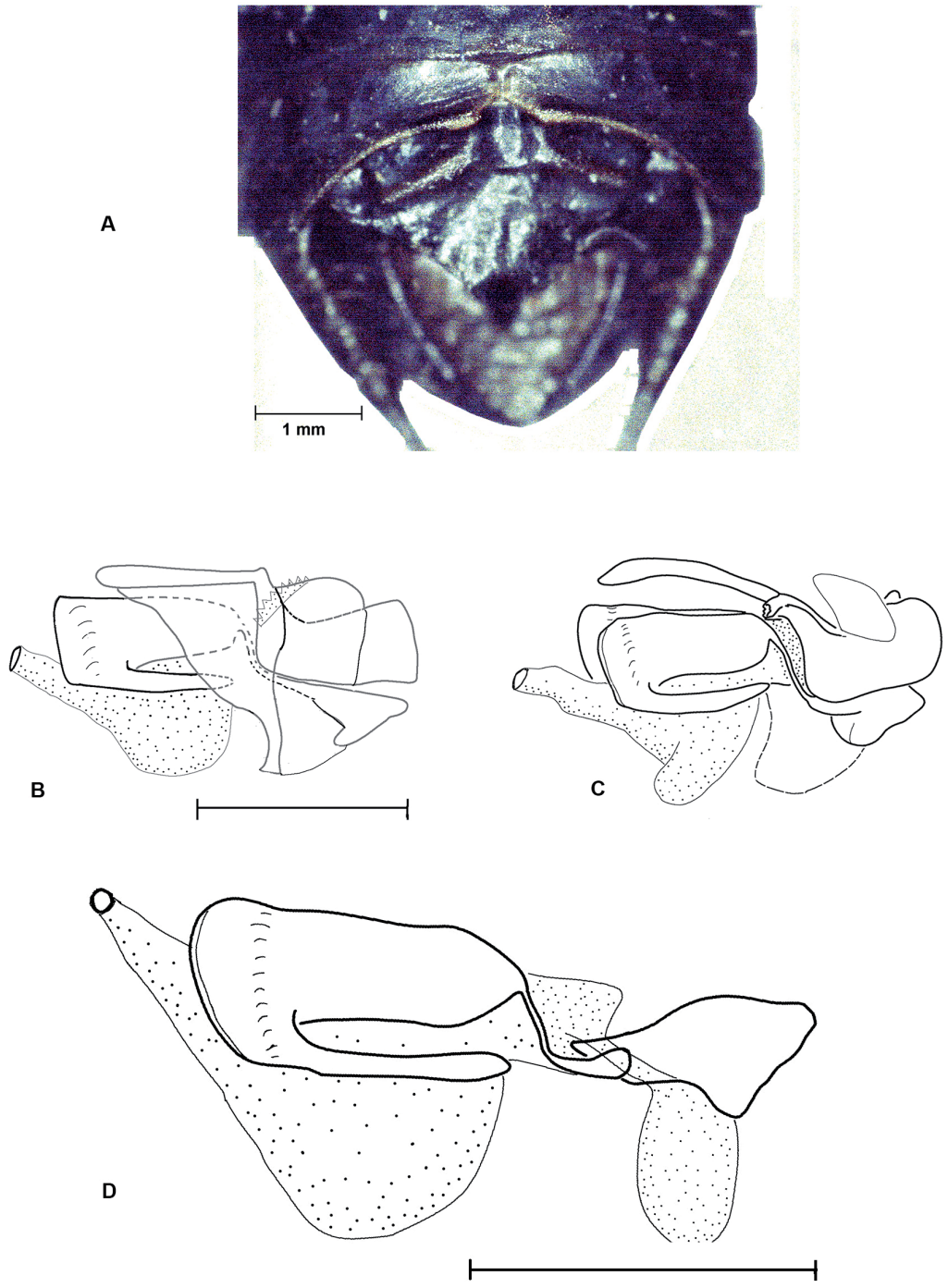


Fig. 44. *Pterotiltus campoensis* Oumarou-Ngoute & Rowell, 2024. **A**. Margin of male tenth abdominal tergite, to show the very weakly developed furcula (here digitally lightened for visibility) and the long cerci, exceeding the subgenital plate. **B–C**. Phallus in lateral view. **B**. The epiphallus, epiphallic membrane and ventrolateral sclerite have been removed; ejaculatory and spermatophore sacs stippled. **C**. As in B, but the nearside cingular ramus has been removed to expose the endophallic plate, flexure and ventral aedeagal sclerite. **D**. All ectophallic components removed, leaving only endophallic plate, flexure, endophallic process, ventral aedeagal sclerite and parts of the sacs of the genital tract. Scale bars = 1 mm.

Table 13. Measurements (mm) of *P. campoensis* Oumarou-Ngoute & Rowell, 2024. 5 males, but only 2 females, all from the type locality, were measured. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum:	3.31	16.62	9.40	0.30	4.07	10.31	2.40	0.97	0.28	2.06	3.78
Maximum:	3.86	18.91	12.42	0.66	4.56	11.59	2.66	1.66	0.63	2.40	4.32
Mean:	3.51	17.92	11.10	0.48	4.24	11.23	2.57	1.30	0.50	2.23	4.02
N:	5	5	3	5	5	4	4	4	4	4	4
				Foot formula			32%	12%	55%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	4.07	19.60	?	0.65	4.86	13.99	3.02	1.20	0.58	3.00	4.91
Maximum	4.19	20.54	?	0.69	4.90	14.03	3.16	1.46	0.71	3.16	5.20
Mean	4.13	20.07	?	0.67	4.88	14.01	3.09	1.33	0.65	3.08	5.06
N	2	2	0	2	2	2	2	2	2	2	2
				Foot formula			26%	13%	61%		
Means M/F	0.85	0.89	?	0.72	0.87	0.80	0.83	0.97	0.77	0.72	0.80
Normalised	1.00	1.05	?	0.85	1.02	0.94	0.98	1.15	0.91	0.85	0.94

to brown-yellowish or yellow when dried. Frons blue black. Genae blue/black, with a weak white or yellow subocular stripe. Postocular stripe black, extending on to the pronotum.

Pronotal disc multi-coloured, predominantly black with two yellowish patches in the anterior part of prozona and two more in the posterior part of metazona, and red pigment in the midline between the yellow patches. Mesothoracic tergite black, with small red areas either side of midline. Metathoracic tergite mainly red. Abdominal tergite 1 is red medially with yellow pigment laterally, tergites 2 & 3 are black, tergite 4 yellowish. Remainder of abdomen blue.

Prosternal, mesosternal and metasternal spaces blue; prosternal spine slightly brown, probably green in life. Hind femur yellowish green proximally and green distally; knee blue black with upper lobe brownish; tibia and tarsi blue.

Measurements

See Table 13.

Distribution

Cameroon, Ocean Division, Campo town. This species is found in coastal swamp forest. Note: Campo town is on the border with Equatorial Guinea. *Pterotiltus campoensis* probably occcurs in that country too.

Status of taxonomic material

OK: both sexes present in collections, modern localities known.

Three new species of Pterotiltus

Pterotiltus erythrocerus sp. nov. and *P. sobrius* sp. nov. are described below from recent collections in South-Central Cameroon, initially made to investigate *P. rubroantennatus*, as explained below under Taxonomic remarks.

Pterotiltus biafrensis sp. nov. is known from the male holotype only, and no female is known. We would not normally describe a new species on this basis; as, however, this specimen is already present in the literature, and under an erroneous name, we make an exception, noting that further collections, including a female, are now urgent.

16. ***Pterotiltus erythrocerus*** sp. nov.
urn:lsid:zoobank.org:act:6E6BC5F8-037B-4FA8-838E-A16192E8F464
Figs 45–48; Table 14

Etymology

Latinised from Greek '*erythros*' ['red'] and '*keras*' ['horn, antenna']. Specific name selected to emphasize the most striking external feature (the red antennae) and to link the species linguistically with its taxonomic history of being originally but erroneously described as the female of *apicalis rubroanntenatus*.

Material examined

Holotype

CAMEROON • ♂; Nyong-et-So Division, Zamakoe Village; 668 m a.s.l.; 4 May 2018; C. Oumarou-Ngoute leg.; MfN 2017250.

Paratypes

CAMEROON • 1 ♀; same data as for holotype; MfN 2017249 • 1 ♂; same data as for holotype; MfN 2017251 • 1 ♀; Yaoundé; [3°52′0″ N, 11°31′0″ E]; 1897; von Carnup leg.; [paratype of *P. apicalis rubroanntenatus* Ramme, 1929]; MfN, DORSA BA000507S02 • 1 ♀; Lolodorf; [3°14′ N, 10°44′ E]; L. Conradt leg.; [paratype of *P. apicalis rubroanntenatus* Ramme, 1929]; MfN, DORSA BA000507S03 • 1 ♀; Bipindi; [3°04′ N, 10°25′ E]; G. Zenker leg.; [paratype of *P. apicalis rubroanntenatus* Ramme, 1929]; MfN, DORSA BA000507S04.

Description

Size, medium; males average ca 19 mm in body length, females ca 22 mm – see Table 14 . Integument rugose and pitted on head, thoracic, and proximal abdominal tergites, but otherwise smooth and shiny.

Male

Head. Antennae filiform, longer than head and pronotum together. Fastigium of vertex (Fig. 46A) roughly triangular, short, wider than long, sloping forwards, slightly concave, sometimes with a weak medial carinula; the obtuse-angular apex runs smoothly into the frontal ridge. Frons oblique and straight in profile; frontal ridge clearly defined in its upper half with shallow medial sulcus but obliterated in lower half. Lateral facial carinae well defined dorsally, but obsolete below level of medial ocellus. Eyes small, almost round, strongly convex; interocular space in males equal to, in females slightly wider than, the antennal scape.

Thorax. Pronotum cylindrical, without medial or lateral carinae; three deep, wide sulci crossing dorsum, with large transverse convexities between them that project laterally between sulci 3 & 4. Metazona less than one-fifth length of prozona, its posterior margin straight, slightly concave in the midline, the anterior pronotal margin slightly produced in the midline, overhanging the occiput. Furrows between meso- and metanota and metanotum and first abdominal tergite wide and deep. Prosternal process simple, conical, acute at apex. Mesosternal interspace open, slightly longer than wide, mesosternal lobes rounded. Metasternal interspace nearly closed. Elytra and wings almost completely absent, elytron reduced to a minute immoveable cuticular scale on the mesothoracic tergite. Hind femur slender, 4.5 times as long

as wide. Hind tibia only moderately expanded distally, but densely haired; external apical spine present. External tibial spurs smaller than the internal spurs. Arolium large.

Abdomen. Tympanum small, circular, open. Last abdominal tergite of male with a minute furcula, the paired projections separated at their tips by 0.42 mm (Fig. 46B). Male supra-anal plate widely triangular, very short. Male cercus wide at base, laterally compressed, triangular in lateral view, narrowing to spine-like apex, slightly incurved. Male subgenital plate very short, rounded.

Fig. 45. *Pterotiltus erythrocerus* sp. nov. **A**. Living female, Cameroon, Bipindi. **B**. Living male, Cameroon, Zamakoe.

Phallic complex. The 'horseshoe' formed by the cingulum and the cingular apodemes in dorsal view is slender. The anterior tips of the apodemes are widened and rounded, rather than pointed. Epiphallus (Fig. 47A–D) with divided bridge, ancorae absent, and large lophi; in this species the roughly triangular outer lophi are set obliquely and the pointed tips are sharply inclined cephalad, so that in axial view the lophi appear almost rectangular. There is also a pair of small inner lophi more medially on the lophal ridge (Fig. 49A, D). The 'oval' sclerites are roughly teardrop-shaped. The epiphallic membrane contains a ventrolateral sclerite, encircling the ventral half of the phallus. The ventrolateral sclerite is unusually

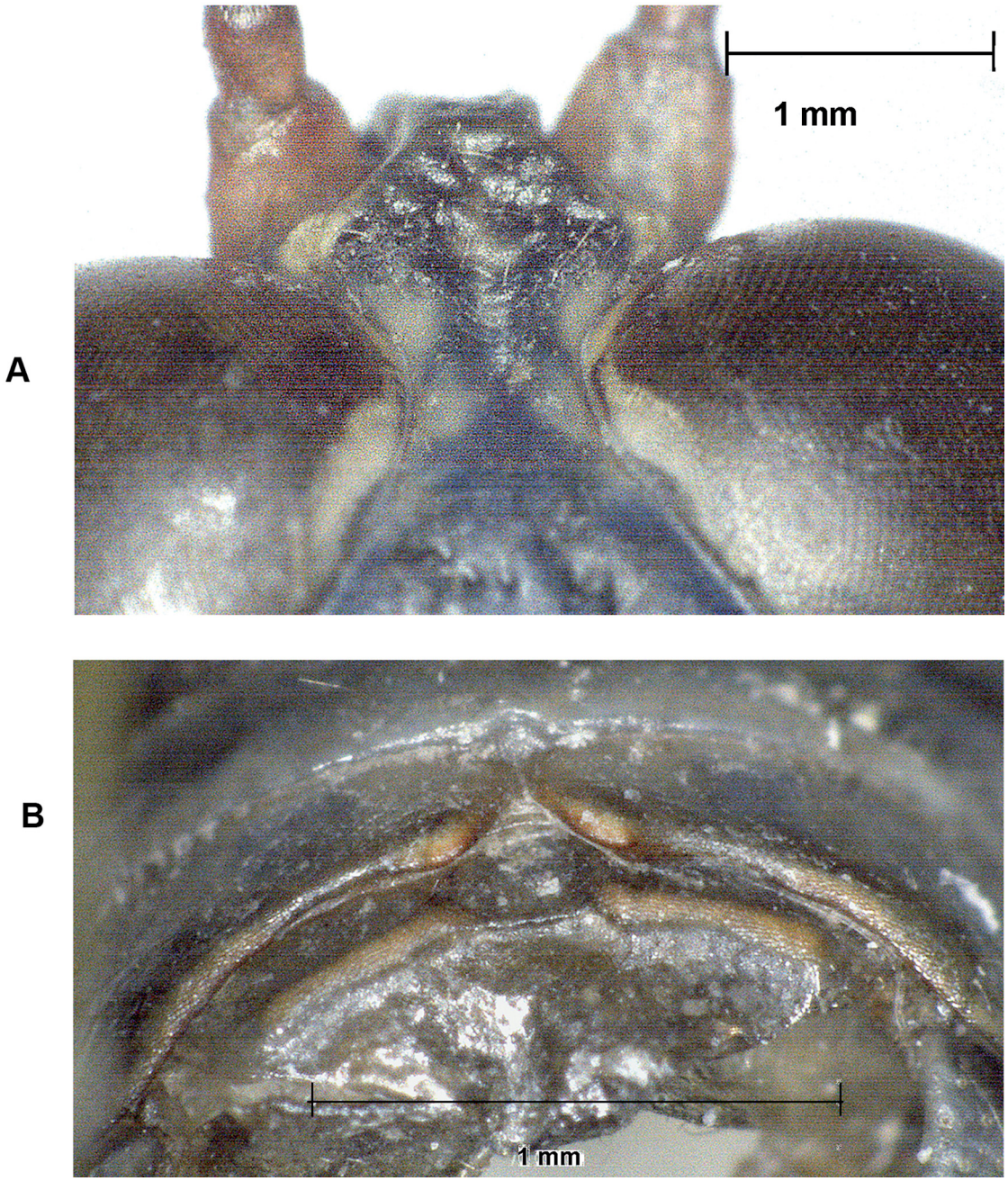


Fig. 46. *Pterotiltus erythrocerus* sp. nov.. paratype, ♂ (MfN 2017251). **A**. Male fastigium, dorsal view. **B**. Posterior margin of male 10th abdominal tergite, to show the furcula (here digitally lightened to increase its visibility).

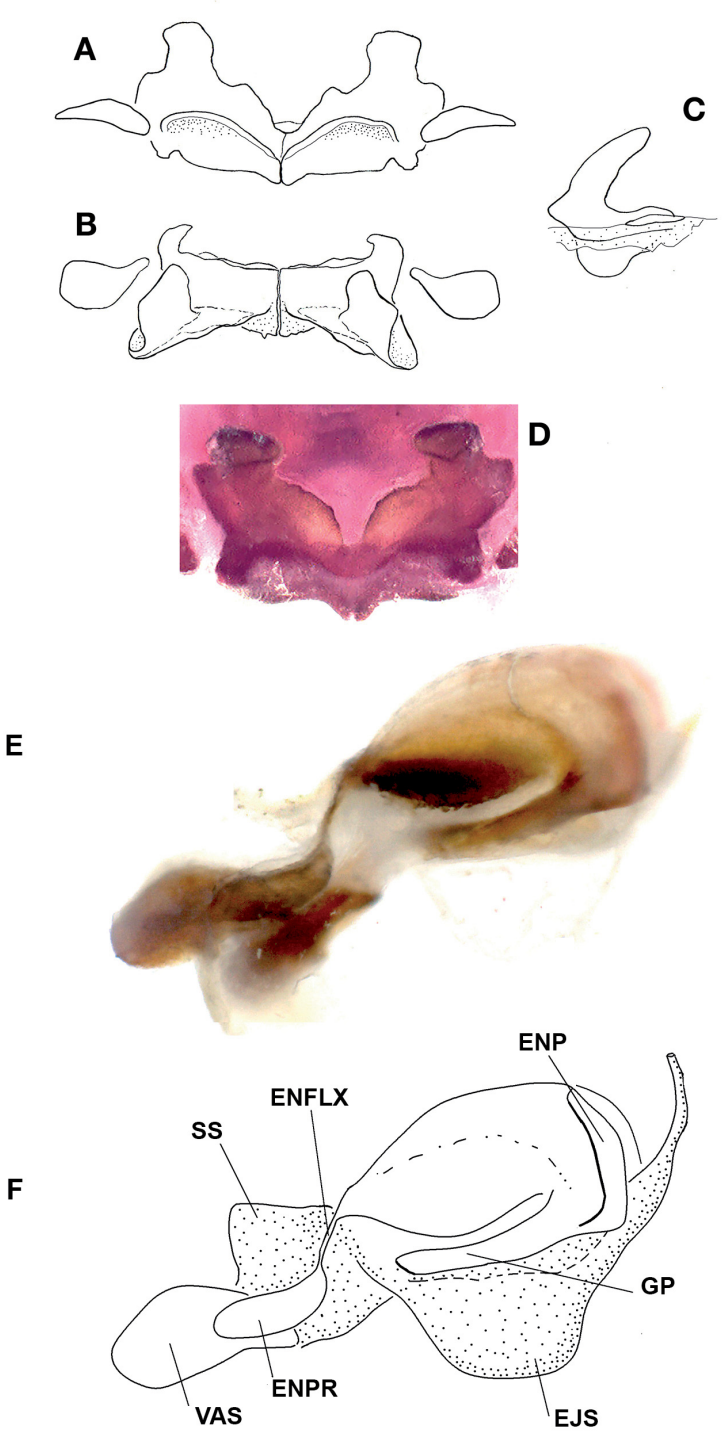


Fig. 47. *Pterotiltus erythrocerus* sp. nov. **A–D**. Epiphallus. **A**. Axial view. **B**. Dorsal view. **C**. Lateral view. **D**. Photograph of a different (stained) preparation, showing epiphallus in axial view. **E**. Photomacrograph of endophallus. **F**. Explanatory diagram of E. In this preparation the ectophallic cingulum, rami, and valvular plate have been removed to expose the flexure and the junction of the right-hand side endophallic process with its ventral aedeagal sclerite. (The out of focus left-hand side sclerite is also visible in E, but is omitted in the diagram). Note that the spermatophore sac has been damaged by the removal of the overlying valvular plate in dissection – only its remnants are visible here. Abbreviations: see Material and methods.

variable in this species. In most individuals it forms the usual half hoop surrounding the ventral half of the ectophallus, its tips running obliquely upwards and rearwards in the ectophallic membrane to a point just anterior to the cingular rami. In some individuals, however, the sclerite takes the form of 2 oblique bands which touch or overlap in the ventral midline but are not joined together. The overlapping ends are widened – perhaps the origin of the ventral flange? This observation suggests that the ventrolateral sclerite of *Pterotiltus* was originally a paired structure, now fused in most species. Endophallus (Fig. 47E–F) with a slender flexure, which ends as a short spatulate endophallic process, applied closely to the ventral aedeagal sclerite. Cingular valves fused and elaborated together with the arch sclerite into a valvular plate (Hollis 1971, 1975) covering the aedeagus dorsally and laterally. The anterior part of the plate is saddle-shaped and fits over the dorsal surface of the edeagus. The terminal lateral lobes of this plate are concave, cupped around the medial lobes, which form two vertical rounded lamellae (Fig. 48A–E).

Female

Dorsal valves of ovipositor laterally compressed, with obtuse apices; ventral valves smooth, slender, straight, rod-like, sometimes dorsally flattened or slightly grooved. Egg guide prolonged horizontally rearwards between the ventral valves, up to half the length of the latter, rod-shaped, straight or weakly curved, sharply pointed. Female subgenital plate simple, its ventral surface smoothly rounded; hind margin curves inwards to base of egg guide (Fig. 48F). Bursa copulatrix large, sac-like, spermatheca with small apical diverticulum and a large curved subapical diverticulum (Fig. 48G).

Colouration

Male and female are identically coloured (Fig. 45).

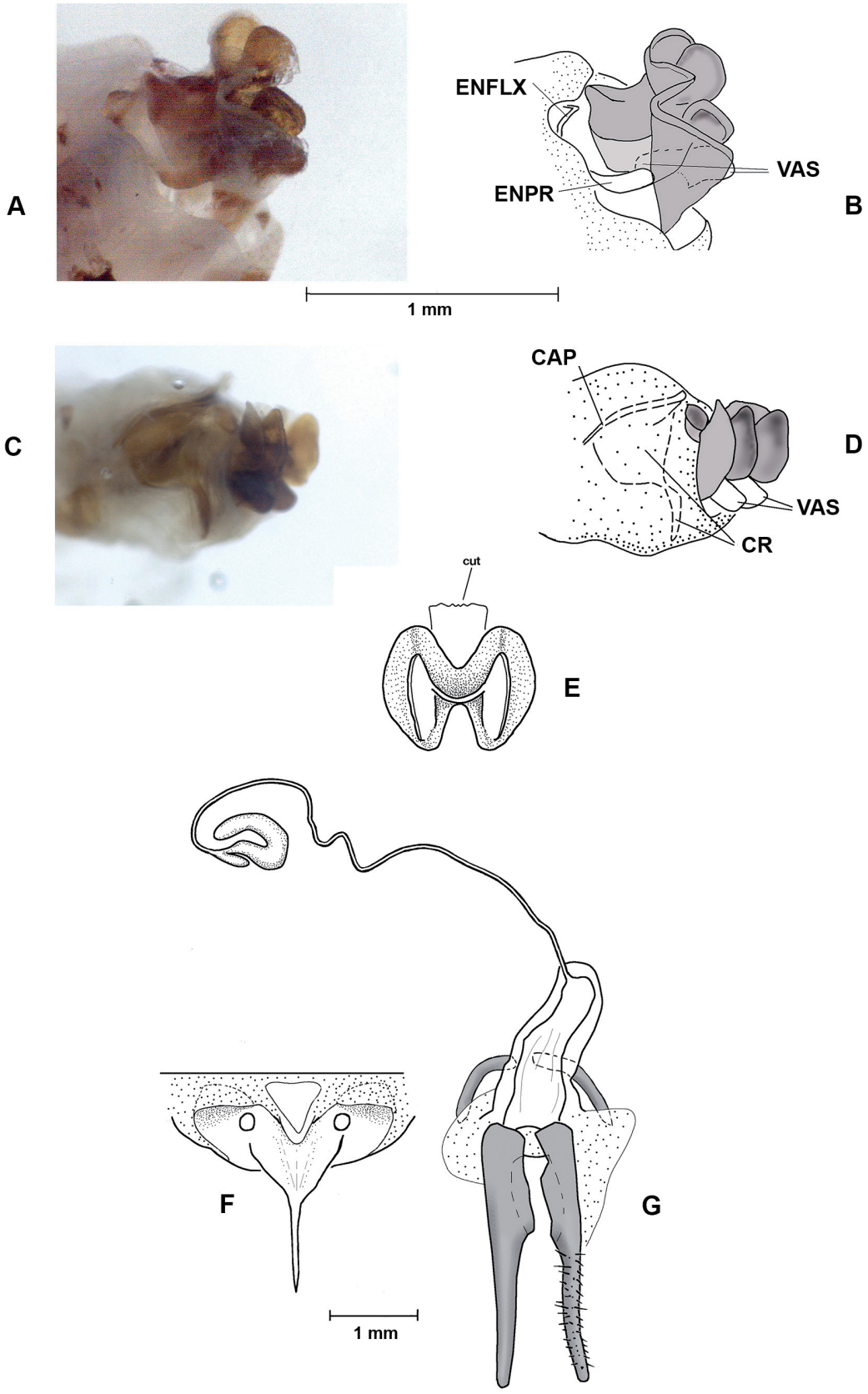
Head. Antennae uniformly red, without white tips. Eyes black, drying to yellow grey. Vertex and fastigium sometimes tinted red (see Fig. 45B). Margins of antennal sockets and the edges of the fastigium anterior to the lateral ocelli, often red. Genae behind eye blue-black, below eye white. Frons white with green or brown mottle. Clypeus and labrum white, heavily mottled with blue-green and black. Sides of mandibles dark blue-green.

Thorax. Pronotum shiny black, with paired white patches near both posterior and anterior margins of the disc. The white of the subocular genae continues along the lower margins of the lateral pronotal lobes, but is interrupted by black between sulci 1 and 2. Pleura and terga of meso- and metathorax black, with blurred white patches on both episterna. In some individuals the pronotal disc and the thoracic terga are blotched with red. All legs green, drying to yellow. Hind knee and condyle of hind tibia red, tibial shaft and tarsi dark blue green.

Abdomen. Abdominal tergites 1 to 3 black, with paired white patches on Abd. 1. In some individuals, the Abd. 1 tergite is red. Abdominal tergite 4 dirty white, remainder of abdomen green, drying to yellow. The tip of the abdomen is never red in this species.

Sexual dimorphism

Table 14 (below) shows that the length of the male pronotum (P) is 0.89 times that of the female. The ratio of their body lengths (L), however, is 0.88 – this discrepancy is due to a measurement error in the male body length caused by the upwardly inflected male genital segments. When the various measurements are normalised by dividing their averages by P, their male:female ratios mostly approach unity, showing that the body proportions are identical in the two sexes. The exceptions (which are typical of the genus as whole) are a) the male antennae are proportionately much longer (M/F = 1.39), and b) the male interocular space is proportionately smaller (M/F = 0.80).


A
ENFLX
VAS
ENPR
B
1 mm
C
CAP
D
VAS
CR
cut
E
F
G
1 mm

Measurements

See Table 14.

Taxonomic history

Ramme (1929) erected the taxon *P. apicalis rubroantennatus* to cover a variety of specimens of *Pterotiltus* present in European museums, which had as their common feature their entirely red antennae. The holotype male (now *P. rubroantennatus* stat. nov.) from Cross River has been treated above (p. 30). The remainder of his type series comprised (a) a male paratype from the very distant Faradje (DR Congo); this specimen appears to be of a distinct species,which we discuss below (p. 97) under "Additional species requiring further collections before description" and (b) the female paratypes now transferred to *P. erythrocerus* sp. nov., from a different part of Cameroon.

The three female paratypes of Ramme's *P. apicalis rubroantennatus*, MfN DORSA BA000507S02 to DORSA BA000507S04 (see p. 77), are included in this new species, and are here considered to be additional paratypes of it. Ramme's female paratypes (all examined) are specimens from three localities on the South Cameroon Plateau. All have red antennae, and some of these individuals have additional red colouration on the fastigium, pronotum or head, but they all lack the red abdomen of Ramme's holotype. Conradt's specimen was collected probably in the 1890s, but certainly before 1905, as it was cited in Bolívar's article of that year (other Conradt specimens of grasshoppers from Cameroon are labelled 1896–1899).

To investigate Ramme's paratypes, and especially to examine the previously unknown males of this taxon, we collected and examined recent samples of *Pterotiltus* spp. from four different localities on the South Cameroon Plateau, close to the localities of Ramme's specimens. It comprised 22 adults: 10 individuals from Ongot, nr Yaoundé; 9 individuals from Zamakoe; 2 individuals from Ngoutedjap; 1 individual from Bipindi.

They fall into two groups in their colouration, and in their epiphallic structure. Most specimens have red antennae and some of these also have minor red colouration on the fastigium, and/or the pronotum. The females of this group are indistinguishable from Ramme's *rubroantennatus* females. The males' epiphalli have heavy, wide, rather oblong outer lophi, and also a pair of smaller 'inner lophi' on the lophal ridge (see Fig. 47).

Fig. 48 (preceding page). *Pterotiltus erythrocerus* sp. nov. **A–E**. Valvular plate. **F–G**. Female internal genitalia. **A**. Tip of extended phallus, oblique dorsolateral view, showing aedeagus protruding from the phalllic membrane. The major visible structure is the valvular plate. The near side endophallic flexure, endophallic process and ventral aedeagal sclerite are also visible just anterior to the plate. **B**. Explanatory diagram of the structures shown in the photograph. The valvular plate is shaded, membrane stippled. The scale refers only to A and B. **C**. Photograph as in A, but of a different preparation, more lateral and slightly less magnified. The near-side cingular ramus and cingular apodeme are visible through the membrane, and both of the ventral aedeagal sclerites protrude below the lobes of the valvular plate. **D**. Explanatory diagram of the photograph, conventions as in B. **E**. Posterior axial view of the lobes of the valvular plate after this has been dissected from the phallus. **F–G**. Female internal genitalia (compare with Fig. 2). **F**. Internal surface of posterior margin of subgenital plate, showing the greatly elongated egg guide, the two post-vaginal sclerites and the floor pouches. Broken lines indicate outlines of the floor pouches, visible through the membrane. **G**. Ventral ovipositor valves, spermathecal vestibule, basi-valvular sclerites, spermathecal duct and spermatheca. Coarse stipple indicates membrane, fine stipple indicates relief of surfaces. Sclerotized tissue shaded in G. Abbreviations: see Material and methods.

Table 14. Measurements (mm) of *P. erythrocerus* sp. nov. 5 males and 11 females were measured. The measured females include 3 paratypes of *P. apicalis rubroantennatus* Ramme, 1929. All the remaining specimens were recent captures from Ongot, Zamakoe, or Bipindi (Cameroon, southern plateau). Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.62	17.51	11.99	0.47	4.19	11.87	2.47	1.08	0.38	1.90	3.44
Maximum	4.01	20.20	14.39	0.62	4.43	12.76	2.86	1.39	0.67	2.12	4.18
Mean	3.79	18.98	13.22	0.54	4.33	12.32	2.73	1.22	0.51	2.01	3.73
N	5	5	4	5	5	4	4	4	4	4	4
				Foot formula			31%	15%	54%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	3.87	19.10	10.33	0.61	4.56	13.14	2.86	1.28	0.59	2.08	4.26
Maximum	5.10	22.39	10.89	0.86	5.08	14.42	3.19	1.62	0.74	2.57	4.85
Mean	4.24	21.58	10.60	0.77	4.77	13.81	2.99	1.47	0.69	2.43	4.58
N	11	8	4	11	11	11	11	10	10	10	10
				Foot formula			32%	15%	53%		
M/F means	0.89	0.88	1.25	0.71	0.91	0.89	0.91	0.83	0.74	0.83	0.81
Normalised	1.00	0.99	1.40	0.80	1.02	1.00	1.03	0.93	0.83	0.93	0.91

A minority, however (all from Ongot), have blackish brown antennae (but not shiny black as in *P. nigroantennatus*), and no red on head or thorax, and the hind knees are less vibrantly red in colour. These males have slim, tapering, crescent-shaped outer lophi, and lack inner lophi completely.We describe this form below (p. 85) as *P. sobrius* sp. nov.

What is the relation of this modern population to Ramme's type of *P. apicalis rubroantennata*? The male of *erythrocerus* lacks the red abdomen of Ramme' male holotype. We compared the phallus of his holotype (Fig 16) with that of *erythrocerus*. The holotype of *rubroantennata* has a different shape of epiphallus. The lophi are crescentic, but broader than in *erythrocerus*, and there is no inner lophus on the lophal ridge. We conclude that there are three different taxa within Ramme's "*apicalis rubroantennata*":

a) *P. rubroanntenatus* Ramme, 1929 stat. nov. (i.e., Ramme's holotype male from Ossidinge)
b) the "Faradje male" paratype (see below, p. 97, an undescribed species)
c) Ramme's paratype females from South Central Cameroon (= *P. erythrocerus* sp. nov.).

All three species have red antennae.

Distribution

South Cameroon Plateau, from Ongot and Yaoundé in the north, west to Bipindi and Boumnyebel, and South to Ngoutadjap. In Ongot it is sympatric with *P. sobrius* sp. nov. Bipindi is on the road from Kribi to Lolodorf, at Km 75; Lolodorf is at Km 110.

Boumnyebel is on route N3 from Doula to Yaoundé, just a little east of the border between Littoral and Central Divisions; coordinates 3.883694° N, 10.848956° E, Dept Nyong-et-Kéllé.

Status of taxonomic material

Good. Both sexes known, adequate numbers of specimens available, and modern localities known.

17. ***Pterotiltus sobrius*** sp. nov.
urn:lsid:zoobank.org:act:AC29CB9D-95E6-419A-B544-0924D784FB68
Figs 49–53; Table 15

Etymology

Latin '*sobrius*' ['sober, serious'], referring to the absence of bright colours, unusual in this genus.

Type material

Holotype

CAMEROON • ♂; Mefou-et-Akona Division, Ongot Village; 720 m a.s.l.; 10 Feb. 2018. C. Oumarou-Ngoute leg.; MfN 2017253.

Paratypes

CAMEROON • 1 ♀; same data as for holotype; MfN 2017252 • 1 ♂; same data as for holotype; RC 2017254 • 1 ♂; same data as for holotype, but Apr. 2022; MfN 2022814 • 1 ♂; same data as for preceding; RC 2022815 • 1 ♀; same data as for preceding; RC 2022816.

Description

Size, medium (males ca 18 mm in length, females ca 23 mm – see Table 15). Integument rugose and pitted on head, thoracic, and proximal abdominal tergites, but otherwise smooth and shiny (Fig. 49 A–B).

Head. Antennae filiform, longer than head and pronotum together. Fastigium of vertex roughly triangular, short, wider than long, sloping forwards, slightly concave, its surface pitted, sometimes with a weak medial carinula; the obtuse-angular or squared-off apex runs smoothly into the frontal ridge. Frons oblique and straight in profile; frontal ridge clearly defined in its upper half with shallow medial sulcus but obliterated in lower half. Lateral facial carinae well defined dorsally, but obsolete below level of medial ocellus. Eyes small, almost round, strongly convex; interocular space in males equal to, in females slightly wider than, the antennal scape.

Thorax. Pronotum cylindrical, without carinae; three deep, wide sulci crossing dorsum, with large transverse convexities between them that project laterally between sulci 2 & 3. Metazona less than one-fifth length of prozona, its posterior margin almost straight, but slightly concave in the midline, the anterior pronotal margin slightly produced in the midline, overhanging the occiput. Furrows between meso- and metanota and metanotum and first abdominal tergite wide and deep. Prosternal process simple, conical, acute at apex. Mesosternal interspace open, slightly longer than wide, mesosternal lobes rounded. Metasternal interspace nearly closed. Elytra and wings reduced to a minute immoveable cuticular ridge on the mesothoracic pleuron. Hind femur slender. Hind tibia only moderately expanded distally, but densely haired distally; external apical spine present. Arolium large.

Abdomen. Tympanum small, circular, open. Last abdominal tergite of male incompletely divided, with a minute furcula (Fig. 50A), the paired projections separated at their tips by 0.55 mm. Male supra-anal plate widely triangular, short, but with a somewhat elongated, more slender, tip, extending halfway across the pallium but not reaching the rim of the subgenital plate. Male cercus wide at base, laterally compressed, triangular in lateral view, narrowing to spine-like apex, slightly incurved. Male subgenital plate very short, rounded, with the dorsal rim slightly thickened.

Phallic complex. Typical of the genus (see generic description and Fig. 1) but has some distinguishing features. Epiphallus with a rather narrow divided bridge, ancorae absent, and a single pair of large lophi, slender, pointed and smoothly curved cephalad throughout their length, not just near their tips (Fig 50B–C); inner lophi absent, but all of the lophal ridge is sclerified, similar to the situation in

Fig. 49. *Pterotiltus sobrius* sp. nov., living animals, Cameroon, Ongot. **A**. Male. **B**. Female.

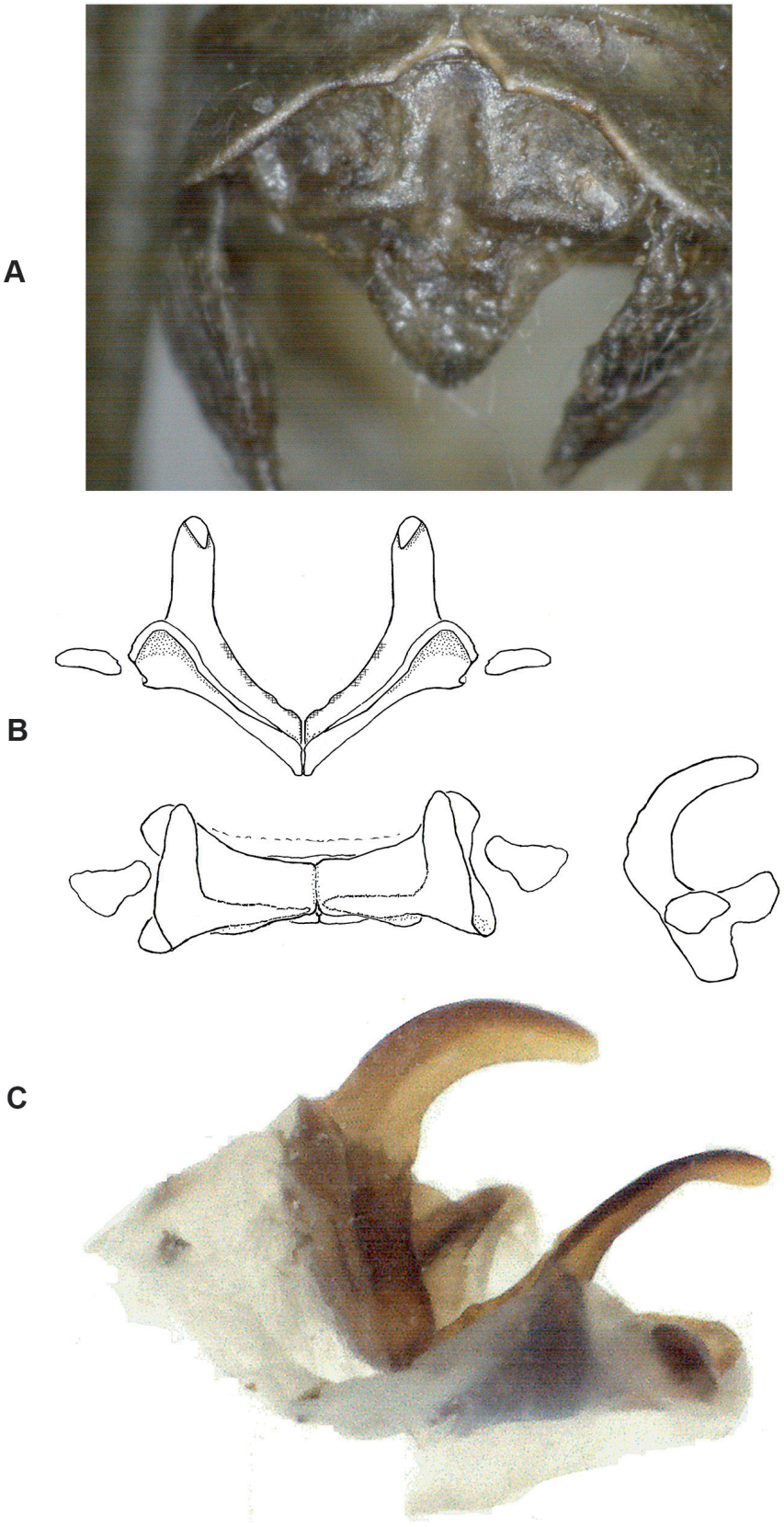


Fig. 50. *Pterotiltus sobrius* sp. nov. **A**. Male furcula and supra anal plate. **B**. Epiphallus, in axial, dorsal and lateral views. **C**. Epiphallus in oblique dorsolateral perspective view.

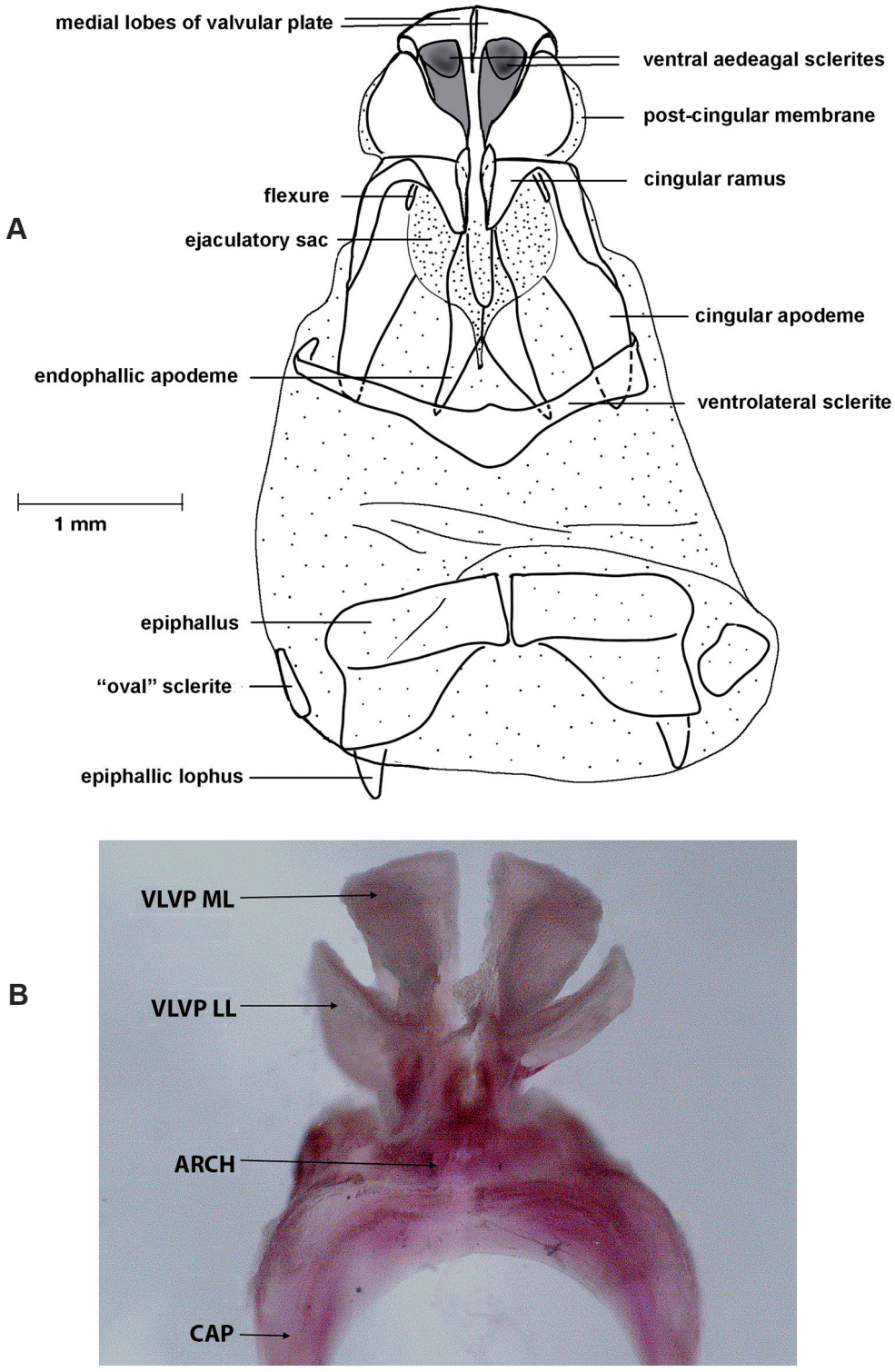


Fig. 51. *Pterotiltus sobrius* sp. nov.. **A**. Phallic complex, extended, ventral view. The ventral aedeagal sclerites are shaded. In this species they are tubular and obliquely truncated at their tips. Ectophallic membrane sparsely stippled, and rendered as if transparent. **B**. Posterior region of cingulum, to show the valvular plate in dorsal view. The two medial lobes have separated in dissection; in life they join each other at midline. Abbreviations: see Material and methods.

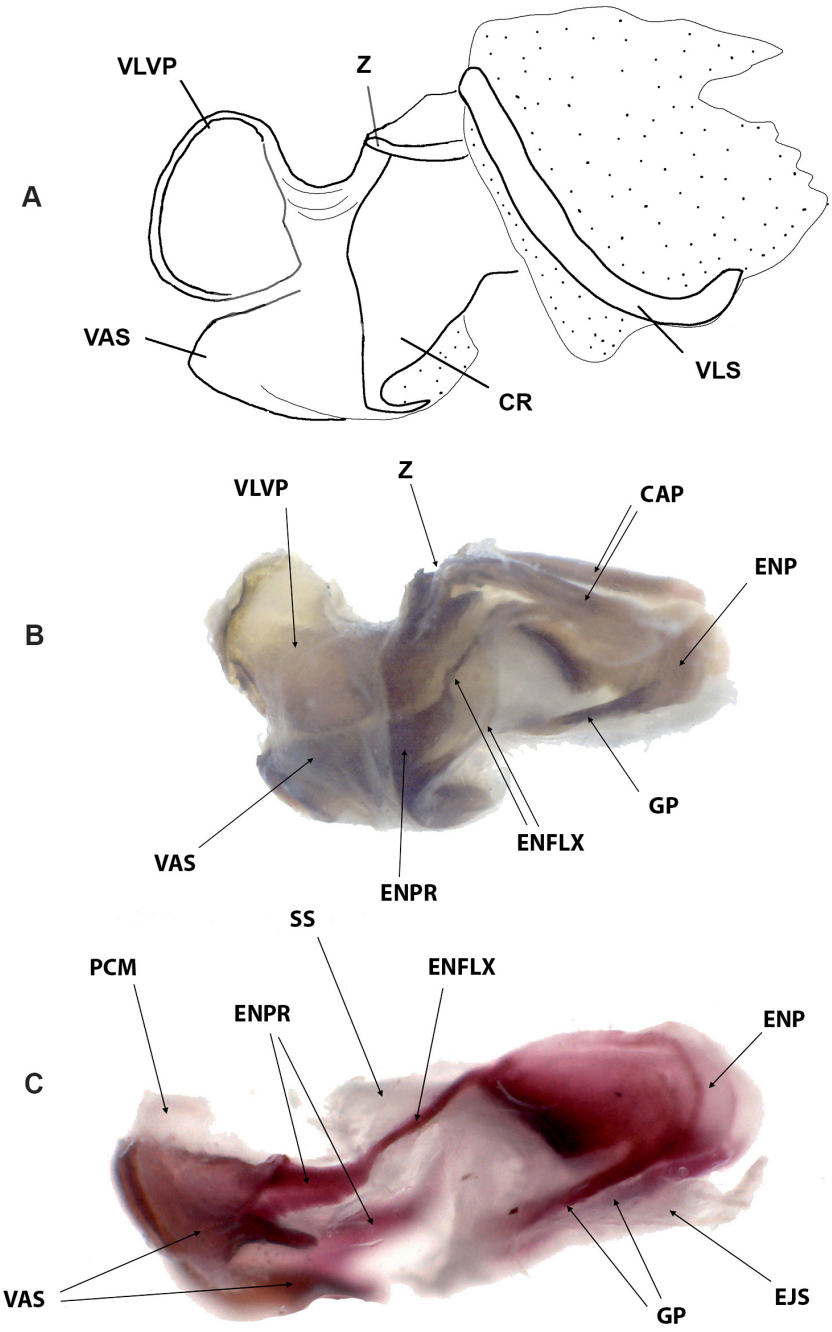


Fig. 52. *Pterotiltus sobrius* sp. nov.. **A**. Phallic complex in lateral view, epiphallus removed. **B**. Phallic complex in lateral view. Remaining epiphallic membrane and ventrolateral sclerite removed, and proximal cingular ramus cut away, exposing the endophallic plate, the flexure and its endophallic process abutting the ventral aedeagal sclerite. In this photograph the post-cingular membranes, sheathing the aedeagus, are well seen. **C**. Endophallus in oblique ventro-lateral view, after removal of all ectophallic components, and staining with acid fuchsin. The endophallic plates bear their apodemes and the gonopore processes at their anterior ends, and posteriorly give rise to the flexure (which terminates abruptly in the spatulate endophallic process appresssed to the ventral aedeagal sclerite). Tattered remnants of the ejaculatory sac spermatophore sac and the post-cingular membrane can be seen. Only the proximal sclerites (of the insect's right hand side) are in focus; the left hand sclerites are only vaguely visible. Abbreviations: see Material and methods.

P. coeruleocephalus. The outer edge of the base of the lophus is produced into a narrow flange, forming a very slight posterior process, something absent in most species of the genus. The 'oval' sclerites are roughly triangular in shape (Fig. 50B). Zygoma of the cingulum and arch sclerite fused and produced posteriorly as a valvular plate (Hollis 1971, 1975) covering the aedeagus dorsally and laterally. Both the medial and the lateral lobes of the plate are complexly formed, with a terminal leaf-shaped medial lobe and flanking concave lateral lobes (Fig. 51A–B). Endophallus with a slender flexure, ending in a short endophallic processes, appressed to ventral aedeagal sclerites of complex shape which form the external ventral valves (Fig. 52C). Epiphallic membrane contains a slender ventrolateral sclerite, encircling the ventral half of the ectophallus (Figs 51A, 52A). This is only slightly widened anteriorly in the ventral

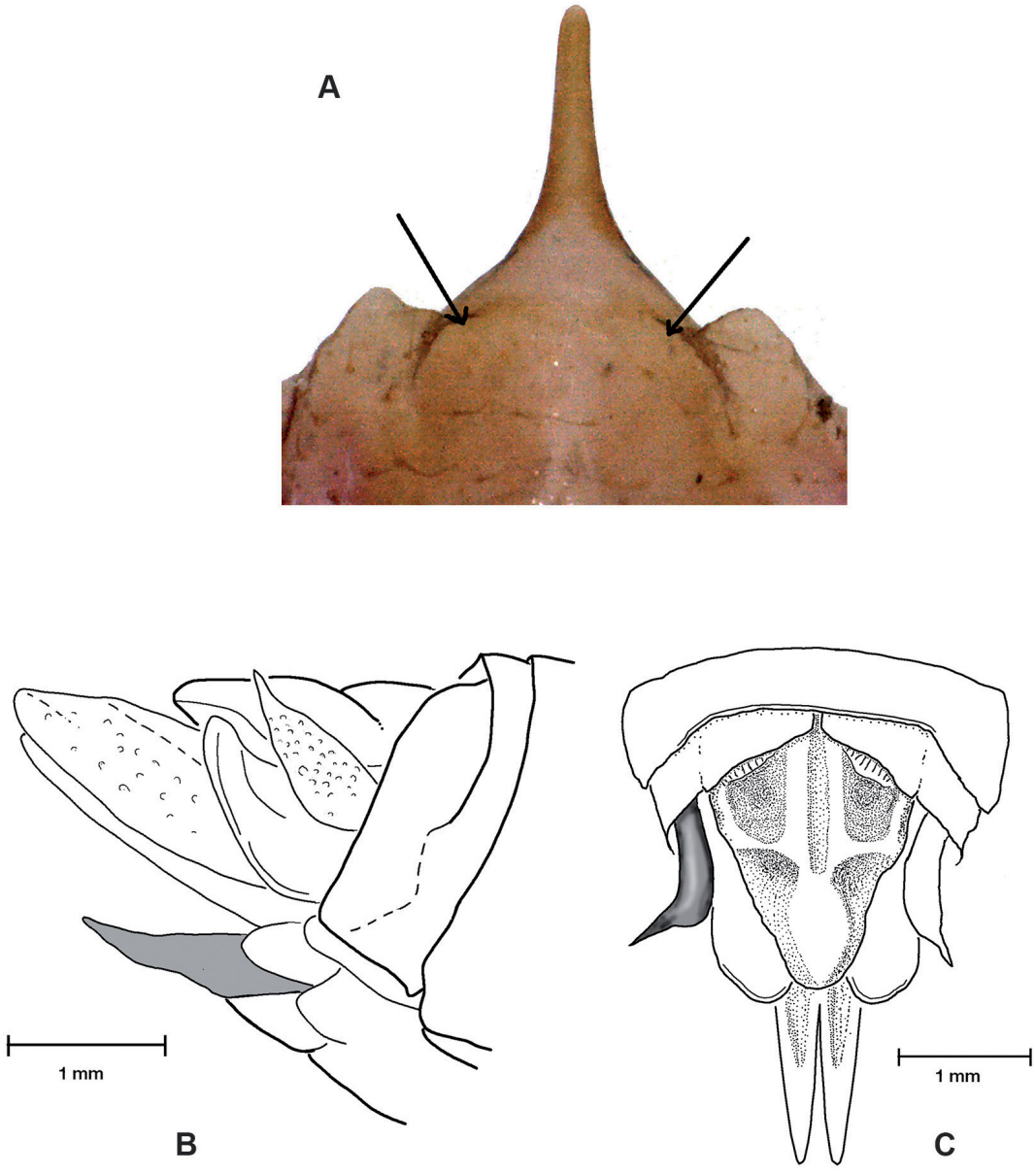


Fig. 53. *Pterotiltus sobrius* sp. nov., paratype, ♂ (MfN 2017252). **A**. Hind margin of female subgenital plate. The structures mentioned in the text (p. 91) are arrowed. **B**. Lateral view of terminalia. The egg guide is shaded. **C**. Dorsal view of terminalia. The cerci (one is shaded) are atypically curved outwards in this specimen, probably due to a faulty ecdysis.

midline, resulting in a very short triangular ventral flange, which is clearly composed of two confluent processes, one from each half of the sclerite.

Female

Supraanal plate more lingulate and less pointed than in male (Fig. 53C). Female cercus robust, laterally flattened, wide basally, tapering to a narrow pointed tip. Paraprocts large and readily visible, extending rearwards as far as the tip of the SAP, with a thickened ventral edge (Fig. 53B). Bursa copulatorix very large, saclike, thinwalled. Spermatheca apparently with only a single ampulla, no lateral diverticulum. Dorsal valves of ovipositor laterally compressed, with obtuse apices; ventral valves smooth, slender, straight, rod-like, sometimes dorsally flattened or slightly grooved. Egg guide prolonged horizontally rearwards between the ventral valves, rather short in comparison with other species of the genus, straight or weakly curved, sharply pointed (Fig. 53B). Ventral surface of female subgenital plate flattish or slightly concave in the midline. The subgenital plate, when dissected free, has an unusual rear margin, with two small incipient projections flanking the egg guide (Fig. 53A). This feature is apparently confined to this species, and may indicate first steps towards the condition seen in *Parapterotiltus*, where comparable projections are much larger.

Colouration

Male and female are identically coloured (Fig. 49A–B).

Head. Antennae dark greenish brown, slightly paler at their tips. Eyes shiny black, drying to brown. Fastigium greenish; occiput and and vertex black. Genae behind eye black, below eye white. Frons white with green mottle. Clypeus and labrum white, but heavily suffused with blue-green and black. External sides of mandibles dark blue green.

Thorax. Pronotum shiny black, with indistinct whitish patches either side of the midline of the disc. The white of the subocular genae continues briefly onto the ventral margins of the lateral pronotal lobes, but is interrupted by extensive black pigmentation between sulci 1 and 3. The posterior ventral angle of the pronotal lobe, behind sulcus 3, is white. Pleura and terga of meso- and metathorax greenish black, with blurred white markings. All legs green, drying to yellow. Hind knee reddish brown dorsally, tibial shaft green proximally, black distally. Hind tarsi greenish black.

Abdomen. Abdominal tergites 1 to 3 black, with blurred white patches dorsally. Abdominal 4 dirty white, remainder of abdomen green. The ventral surfaces of thorax and abdomen are blackish green.

Sexual dimorphism

Table 15 gives the ratios of the male to female mean measures. The midline length of the male pronotum (P) is on average 89% that of the female. The overall length of the male body (from fastigium to abdominal tip) is only 82% of the female value. This discrepancy is due to the error in measurement of the male length caused by its upturned genital region. After compensating for the difference in body sizes, the male antennae are significantly longer than those of the female (ratio M/F 1.30) and the male interocular space is significantly smaller (M/F = 0.83).

Measurements

See Table 15.

Remarks

Pterotiltus sobrius sp. nov. and *P. erythrocerus* sp. nov. are externally similar in size and colouration, and occasionally are sympatric. They differ externally in the colour of the antennae, and in the brighter red hind knees of *erythrocerus*. Their phallic characters (epiphalli and valvular plates) are distinctly different.

Table 15. Measurements (mm) of *P. sobrius* sp. nov. All 10 measured specimens are recent, from Cameroon: Ongot or Mamfe. As usual for this genus, males have relatively longer antennae and narrower inter-ocular spaces. Abbreviations as in Material and methods.

MALES	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
Minimum	3.35	17.00	8.65	0.45	3.64	10.99	2.44	1.13	0.46	1.82	3.55
Maximum	3.96	20.55	12.13	0.54	4.29	13.31	2.90	1.46	0.64	1.97	3.94
Mean	3.68	18.84	10.63	0.50	4.08	12.53	2.72	1.30	0.55	1.92	3.77
N	**5**	5	5	5	5	5	5	5	5	5	5
				Foot formula			34%	15%	51%		
FEMALES	**P**	**L**	**Ant**	**IOS**	**E-E**	**F**	**FD**	**Ta1**	**Ta2**	**Ta3**	**Ta1+2+3**
Minimum	3.82	20.35	9.82	0.71	4.50	13.65	2.97	1.51	0.54	2.22	4.54
Maximum	4.41	24.83	10.95	0.85	4.74	15.00	3.23	1.67	0.78	2.45	4.71
Mean	4.16	23.02	9.89	0.74	4.55	13.88	2.99	1.58	0.70	2.33	4.60
N	5	5	4	5	5	5	5	5	5	5	5
				Foot formula			34%	15%	51%		
Means M/F	0,89	0.82	1.07	0.68	0.90	0.90	0.91	0.82	0.79	0.83	0.82
Normalised	1.0	1.0	1.30	0.83	1.10	1.10	1.11	1.00	0.96	1.01	1.00

Distribution

South Cameroon Plateau, from Ongot and Yaoundé. Also recorded from Mamfe, in the Cross River valley North and West of the plateau.

Status of taxonomic material

Adequate. Both sexes known, and modern localities, but the geographical range of the species needs investigation.

18. ***Pterotiltus biafrensis*** sp. nov.
urn:lsid:zoobank.org:act:A5DFC3AE-4F92-4E91-99A0-636A64B39921
Figs 54–55; Table 16

non *Pterotiltus miniatulus* Karsch, 1893 – Bolívar 1905: 226 (misidentification).

Etymology

The term "Biafra" was used historically by Europeans (including I. Bolívar) for the eastern region of the Gulf of Guinea from E Nigeria (Niger/Cross River delta) to Gabon, including Cabo San Juan).

Type material

Holotype

EQUATORIAL GUINEA • ♂; [Rio Muni], Cabo S. Juan; [1°10′31″ N, 9°20′29″ E]; Aug. 1901; Martínez de la Escalera leg.; MNCN, MNCN_Ent 324769.

Description

Male (Figs 54–55)

Differs only slightly from the generic description, as detailed below.

Small to medium size. Integument rugose and pitted on head, thoracic, and proximal abdominal tergites, but otherwise smooth and shiny.

Head. Antennae filiform, longer than head and pronotum together, tapered at their tips. Fastigium of vertex roughly triangular, short, wider than long, sloping forwards, slightly concave, with a weak medial longitudinal depression, containing a pair of minute tubercles just behind the apex; the apex is parabolic and runs smoothly into the frontal ridge. Frons oblique, straight; frontal ridge clearly defined in its upper half with shallow medial sulcus but obliterated in lower half below the medial ocellus. Lateral facial carinae complete but diminish ventrally. Eyes small, almost round, strongly convex; interocular space narrower than antennal scape.

Thorax. Pronotum cylindrical, without carinae; four transverse sulci, the first of which does not extend to the disc. Three deep, wide sulci (i.e., nos 2–4) crossing dorsum, with a large transverse convexity between sulci 3 and 4. Metazona only about one-fifth length of prozona, its posterior margin straight with a slight midline notch, the anterior pronotal margin somewhat produced in the midline, overhanging the occiput. Transverse furrows between meso- and metanota and between metanotum and first abdominal tergite wide and deep. Prosternal process simple, bluntly conical. Mesosternal interspace open, about as wide as long, mesosternal lobes rounded. Metasternal interspace nearly closed. Elytra and wings absent. Hind femur slender, its tip exceeding the end of the abdomen. Lower lobes of the hind knee acutely pointed.

Tibia. Hind tibia only moderately expanded distally, but its margins are fringed with long hairs; 8 internal and 8 external tibial spines, including apical spines. Arolium large.

Abdomen. Tympanum small, almost completely circular. Last abdominal tergite of male with a minute furcula, the paired projections separated by 0.32 mm. Male supra-anal plate widely triangular, very short, not covering completely the paraprocts. Cercus wide at base, laterally compressed, straight in dorsal view, triangular in lateral view, narrowing to a spine-like apex. Male subgenital plate very short, rounded.

Phallic complex. Epiphallus with divided bridge, ancorae absent, lophi short and strong, almost triangular in axial view; small inner lophi present (Fig. 55A); oval sclerites are roughly oval, and not 'elbowed' as in *miniatulus*. Epiphallic membrane contains a ventrolateral sclerite, encircling the ventral half of the ectophallus (Fig. 55B). Phallic dissection was limited, to preserve the unique specimen, and not all details could be completely resolved. Especially, the valvular plate was not dissected off and could not be examined in detail; it is, however, different from that of all other species so far examined, consisting of a circular 'ruff' of membrane around the valves (derived from the lateral lobes of the plate) and two flat bars (the medial lobes). Endophallus with a slender flexure, terminating in short spatulate endophallic processes that are appressed to the ventral aedeagal sclerites. The ventral aedeagal sclerites were also left undissected, but their rounded posterior tips project from the edges of the ventral cleft (Fig. 55B).

Female

Unknown.

Colouration

The overall impression is of a yellow and black insect with a green abdomen and green hind legs with red hind knees; front and middle legs dull red. All the black pigmented areas are shiny – unusual in this genus, where black is more often matte. As usual with old museum specimens, it is possible that the currently yellow areas were originally green or even white.

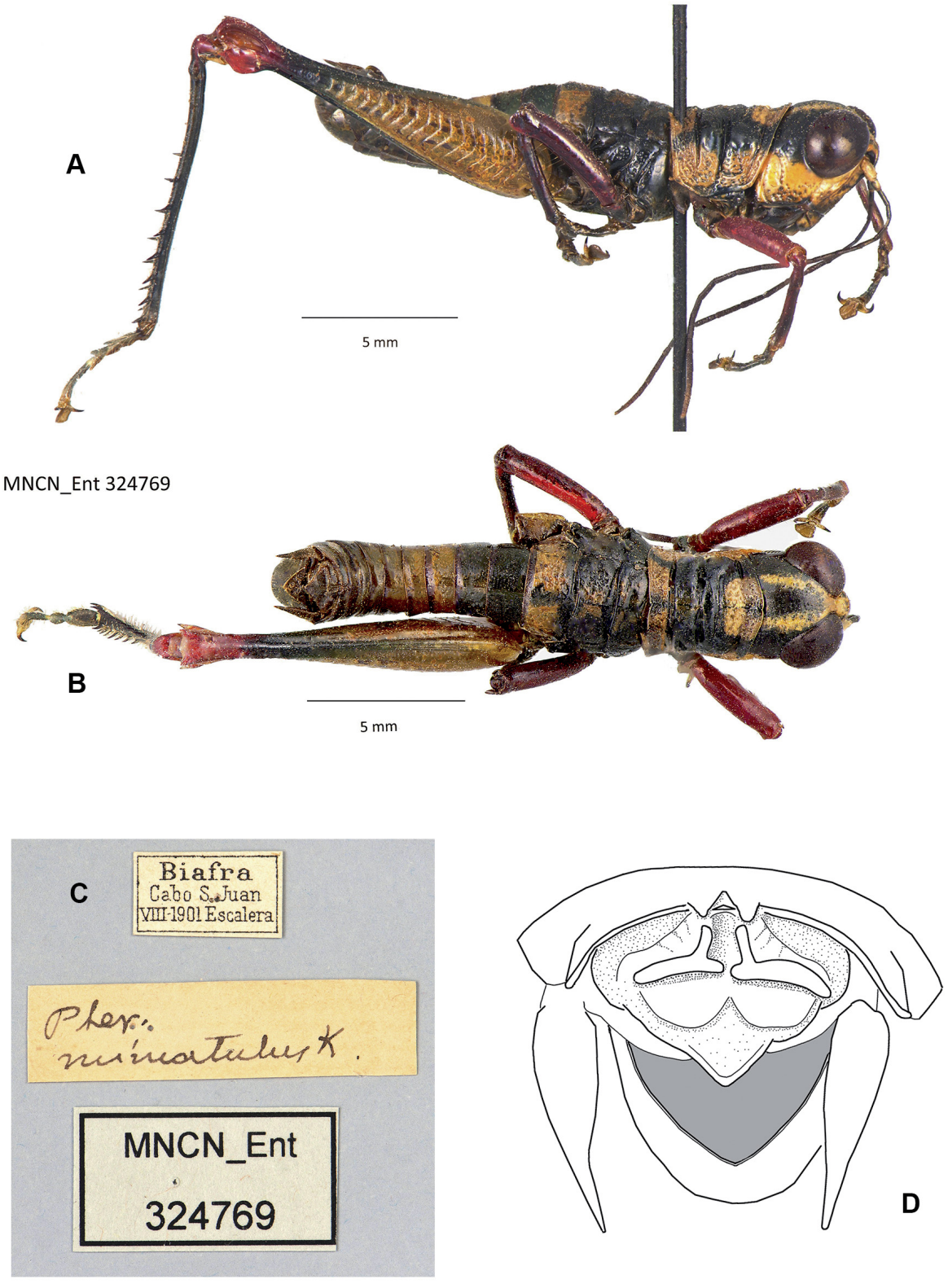


Fig. 54. *Pterotiltus biafrensis* sp. nov., holotype, ♂ (MNCN_Ent 324769). **A**. Lateral view. **B**. Dorsal view. **C**, Labels. **D**. Terminalia, dorsal view. Photos courtesy M. París, MNCN.

Head. Antennal scape and pedicel yellow, flagellum black, with no pale tip. Head predominantly yellow, with black eyestripe. There is a black medial stripe on the occiput, narrowing forwards; mandibles black, clypeus and labrum yellow clouded with black. Palps were probably green in life.

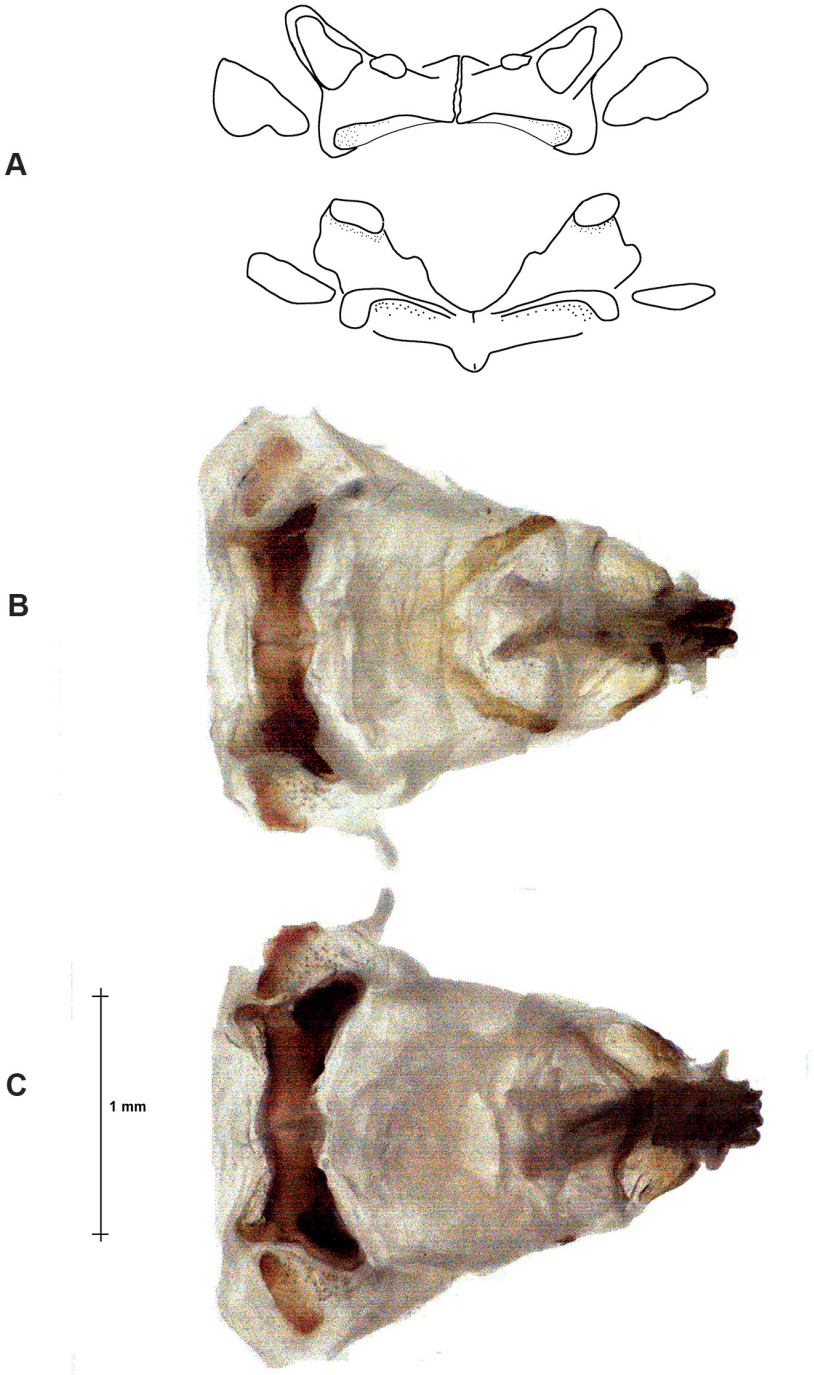


Fig. 55. *Pterotiltus biafrensis* sp. nov., holotype, ♂ (MNCN_Ent 324769). **A**. Epiphallus in dorsal and axial views. **B**. Extended phallus in ventral view. **C**. Extended phallus in dorsal view.

Table 16. Measurements (mm) of holotype male of *P. biafrensis* sp. nov. Abbreviations as in Material and methods.

MALE	P	L	Ant	IOS	E-E	F	FD	Ta1	Ta2	Ta3	Ta1+2+3
	3.60	18.12	12.03	0.43	3.90	11.51	2.70	1.19	0.50	1.96	3.65
N	1	1	1	1	1	1	1	1	1	1	1
				Foot formula			33%	14%	54%		

Thorax. Pronotal disc black, except for a yellow patch in the midline extending from the anterior margin to the second sulcus. Lateral pronotal lobes mostly yellow; lower margins of lobes and the pronotal episternum black. Meso- and metathoracic tergites black, weakly blotched dorsally with yellow.

Legs. Pro- and mesothoracic legs dull red, tarsi blackish red. Hind femur and coxa, yellow (probably green in life), with a wide and diffuse black pregenicular ring, unique in this genus. Hind knee red. Condyle of hind tibia red, shaft of tibia black. Tibial spines reddish black. Tibial spurs, tarsi and claws olive brown, probably green in life.

Abdomen. Tergite of first abdominal segment yellow with partial black suffusion. Tergites of abdominal segments 2 & 3 black; abdominal segment 4 to tip of abdomen yellow (probably green in life).

Measurements

See Table 16.

Remarks

This species is known from a single specimen that was erroneously determined by Bolívar (1905) as *P. miniatulus* (see pp. 92 & 22 above). This specimen, with Bolívar's original label, is preserved in the Madrid museum (Fig. 54), and we were allowed to examine it and to dissect out its phallus. It is a previously undescribed species of the genus, and not *miniatulus*. As it is already present in the literature, under an erroneous name, we consider it appropriate to describe it here and give it a specific name, even though it is a unique specimen, and the female is unknown.

Pterotiltus biafrensis sp. nov. differs from the West African *P. miniatulus* (Bolívar's determination) in a number of details, especially in colouration, having dark red pro- and meso-thoracic legs and black antennae, and it lacks both the pale blue hind tibiae and the red abdomen seen in the Ghanian and Togoan material of *miniatulus*. It shows some similarities to *P. georgii* from Yambata, DR Congo, in having the pro- and meso-thoracic femora red, but the colouration of the hind knee lobes is different, and this Biafran species has black hind tibiae, not pale blue-green ones like *georgii*. (The two unique specimens (*biafrensis* & *georgii*) are of different sexes, which makes comparison more difficult.)

Distribution

So far known only from the coast of Rio Muni (the mainland area of Equatorial Guinea). Cabo San Juan is the SW extremity of the Rio Muni coastline, near the Gabon border. On a modern map it is labelled "Yoni point", probably an anglophone corruption of the Spanish name.

Status of taxonomic material

Poor. Female unknown, unique holotype, no modern localities. Colouration in life somewhat uncertain, as the unique specimen has been in a museum for over a century.

Additional species requiring further collections before description

We note here additional material which suggest the existence of more undescribed species, but are not yet adequate for a formal description.

Two of these species are known to us only from photographs taken in Cameroon, showing specimens with a colouration quite unlike that of any of the known species. One of these was found on Mt Koupé, the other in the Baganté area. A third new species from Western Nigeria (Ibadan) and Togo (Mt Kloto, 700 m a.s.l.) is known to us from male specimens (in NHMUK and IITAB) but we are still lacking a female.

Additionally, there is the "Faradje male" (the paratype male of Ramme's *P. apicalis rubroantennata*), that indicates the existence of a further undescribed species in the NE of the DR Congo, necessitating further collection before description. Notes on this specimen (Fig. 56) are given below.

Material examined

DEMOCRATIC REPUBLIC OF THE CONGO • 1 ♂; Haut-Ituri, Faradje; Blommaert leg.; RMCA.

(Faradje is on the SE border of the Garamba National Park, more than 2000 km E of the type locality of *rubroantennatus* (Ossidinge, Cameroon), and only 133 km WNW of Koboko, Uganda).

Superficially, this insect looks like a reasonably good match for Ramme's *rubroanntenatus* females, except that its lighter areas are a pronounced bright yellow, rather than whitish, and its darker areas are dark green, rather than black. The antennae are red, but it lacks the red abdomen of the Ossidinge holotype.

We dissected the phallic complex – the epiphallus (Fig. 57) differs from that of the Ossidinge male, but is rather similar to that of the Cameroonian *P. erythrocerus* sp. nov. (p. 80, Fig. 47), with oblong outer lophi and small inner lophi. We presume it is a different, undescribed species.

Measurements (from Ramme 1929, mm)

L = 20; P = 3.8; Ant = 15; F = 12.8.

Status of taxonomic material

Poor. New collections from the Faradje area, including local females, and a redescription would be necessary to characterize this taxon properly. In this text we refer to this specimen as "the Faradje male", as it cannot yet be given a scientific name.

This additional material, together with the large number of species recorded in Cameroon, the best-known territory in the generic range, and the general paucity of museum specimens of the known species, indicate that our current knowledge of the genus is still very incomplete. There are probably a large number of local species yet to be identified in the huge geographical range of the genus. Sadly, many will likely be lost before description, due to ongoing rapid loss of habitat through forest destruction.

Discussion

In this review we have distinguished 18 known taxa within the genus *Pterotiltus*, most of which are probably true species; to date, only *P. inuncatus* and *P. coeruleocephalus* seem to have geographically distinct colour forms. They extend over almost 4000 km of tropical Africa, from Ghana to Uganda (Fig. 58). All of them are very similar in their morphology, and appear to have identical lifestyles, in so far as this is known. Two questions arise: are they all distinct species, or could they represent local

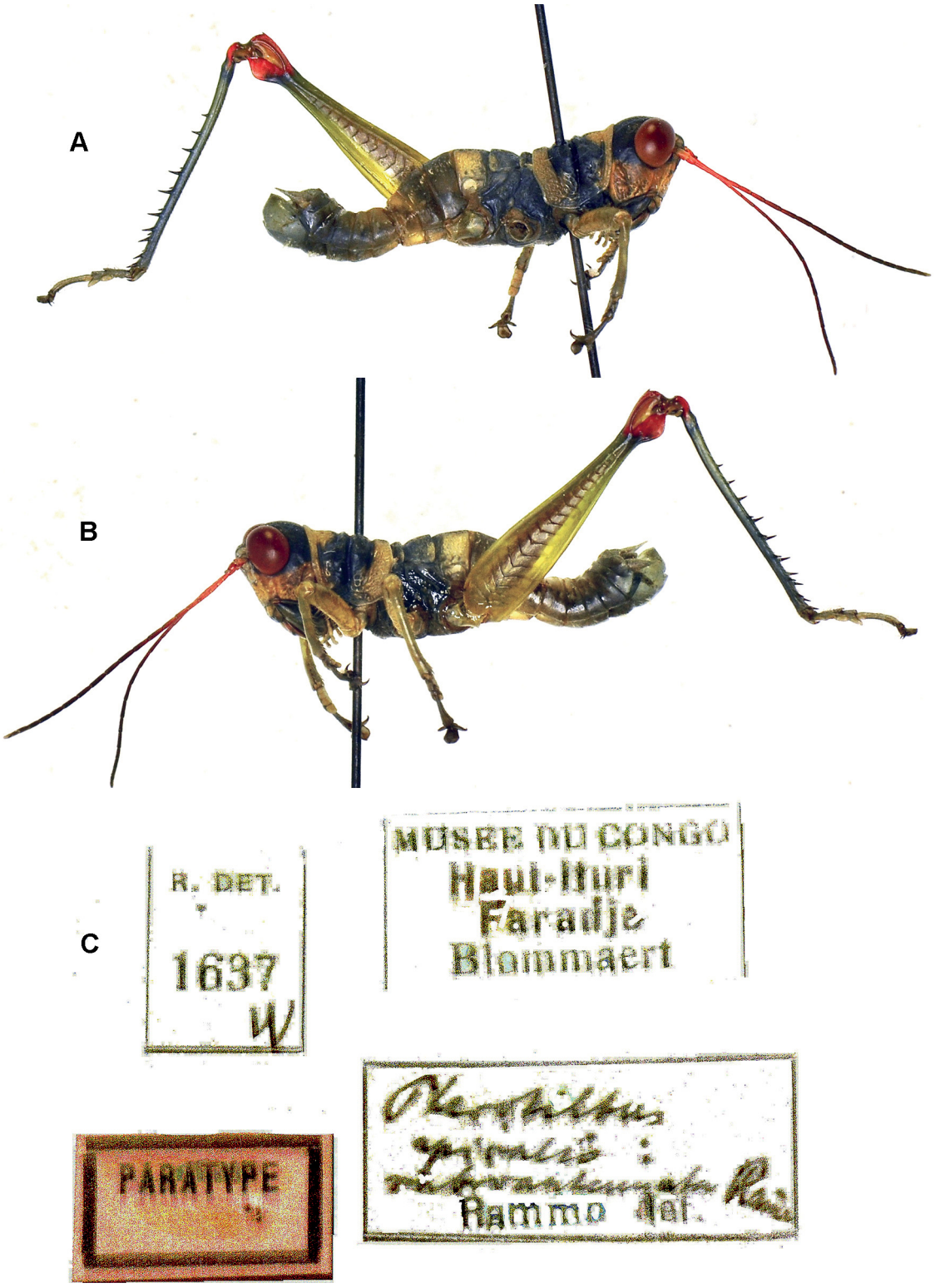


Fig. 56. *Pterotiltus* sp., the "Faradje male", the male paratype of *P. apicalis rubroanntenatus* Ramme 1929 (RMCA). It is unidentified, presumably an undescribed species. No female is known.

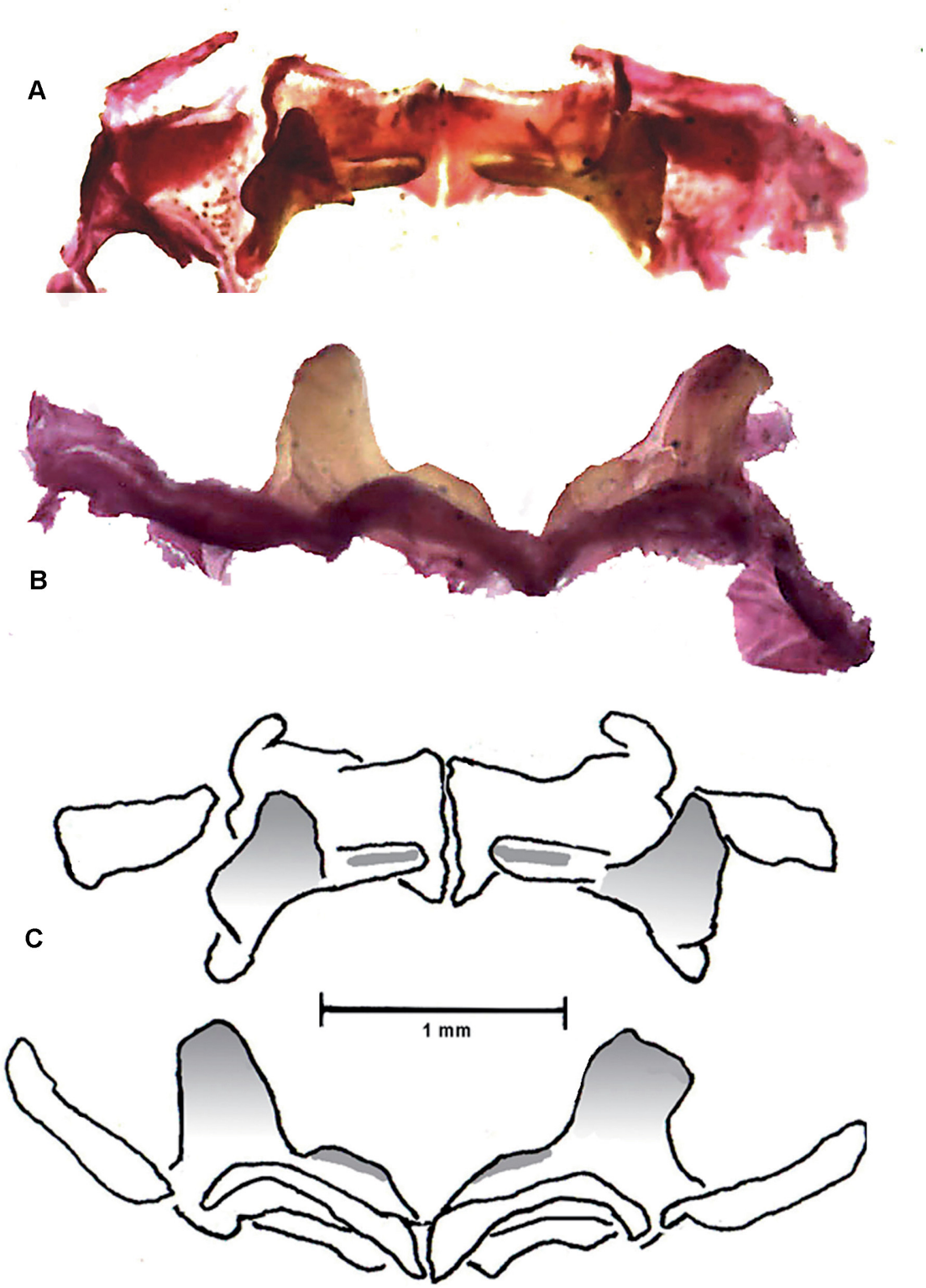


Fig. 57. *Pterotiltus* sp., the "Faradje male" (RMCA), as in Fig. 17. Epiphallus, stained in acid fuchsin. **A**. Photomicrograph in dorsal view. **B**. Photomicrograph in axial view. **C**. Interpretative drawing from A–B.

variations of a smaller number of genotypes? And why might this genus be so speciose and widely distributed, when very similar and closely related genera are not?

Hemp (2023), discussing the taxonomy of the widely distributed genus *Acrida*, wrote: "In widespread species, variation in external morphology, colouration and body size is common, and if the species are only known from a few widely separated localities, this could well lead to the description of separate taxa. When more specimens are collected from intermediate localities, taxa described from widely separated localities often turn out to be identical". The first of these sentences describes the situation of *Pterotiltus* very well, and for most *Pterotiltus* spp. we have no collections at all from "intermediate localities". Why then do we consider our taxa to be valid species? We offer 4 reasons.

1. The individual species do not in fact seem to be prone to much variation in morphology or colouration within the sampled populations. Only in the form of the male furcula have we found any significant local variation, apart from distinct geographical races in a few species.
2. The most widely distributed species, *P. occipitalis*, is morphologically and chromatically identical in Cameroon, DR Congo, and Uganda, showing no local adaptations.
3. Detailed examination of the phallic sclerites (especially of the valvular plate and ventral aedeagal sclerites) shows that our taxa differ significantly from each other in internal morphology. However,

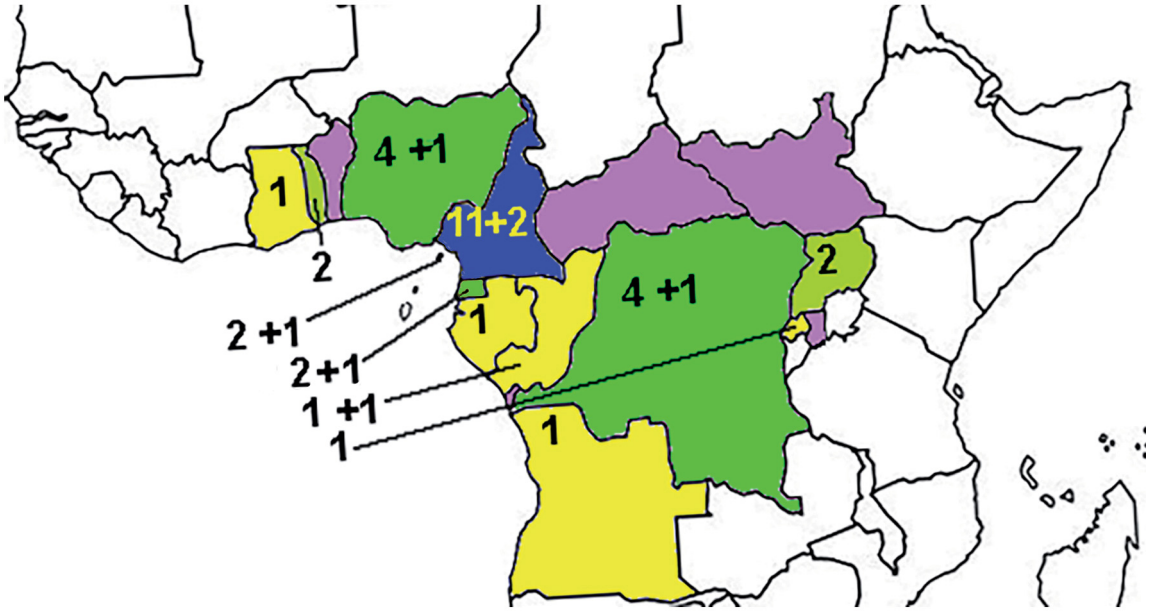


Fig. 58. Sketch map of Central Africa showing the countries in which *Pterotiltus* Karsch, 1893 has been found. Equatorial Guinea is here represented by two separate areas, Bioko island and Rio Muni on the mainland, each with its own species. For each country, the number of certain and possible extra species (the latter after a plus sign) is given, and the fill colour, from yellow through shades of green to blue, is adjusted accordingly. Yellow (Ghana, Rwanda, Angola, Gabon, Congo Republic) means only a single species is recorded to date, while blue (Cameroon) means that many species are recorded. Countries coloured green (Togo, Bioko Island, Rio Muni, Nigeria, DR Congo, Uganda) have intermediate numbers of species. Purple fill indicates countries or regions (Benin, Central African Republic, S Sudan, Cabinda province of Angola, Kagera province of Tanzania) which are expected to harbour species of *Pterotiltus*, but in which they have not yet been recorded. Note: the genus is confined to humid forest, and this occurs in only limited areas of each country. The map does not imply that *Pterotiltus* is found everywhere in the indicated countries; many of these are partly savannah, an unsuitable environment for the genus.

in three taxa (*P. georgii*, *apicalis*, *berlandi*) the male is still unknown, so further investigations are certainly necessary.

4. Where different taxa are sympatric, as in Central Cameroon (*P. sobrius* sp. nov. & *erythrocerus* sp. nov.) and Western Uganda (*P. hollisi* & *occipitalis*), we have observed no interaction beween the two putative species, and certainly no hybridization or attempted copulation.

However, Hemp's point is well taken, and it is essential that collections be made in the intermediate localities, from whence we have no faunal information. More than half of the presently known taxa are found in Cameroon, probably reflecting its unusual diversity of climate and forest habitats, but also the more thorough collecting that has taken place there. Outside of Cameroon, most of the other species seem to have limited distributions, though this may well be just an artifact of inadequate collection, especially in the DR Congo, Gabon and the Congo Republic.

Pterotiltus is closely related to several other West African forest oxyine genera of similar life style and morphology – *Badistica*, *Cylindrotiltus*, *Digentia*, *Caryanda* – but these are much less speciose and are not widely distributed. It is not easy to explain this difference, but it is not unusual globally: *Caryanda* has only 3 local species in W Africa but is very speciose in tropical Asia, where other oxyine genera are less diverse. Similarly, in the American humid tropics the subfamily Proctolabinae contains many small local genera but also two (*Drymophilacris* Descamps, 1976 and *Poecilocloeus* Bruner, 1910) that are speciose and wide-ranging. Without a much better knowledge of the biology of these taxa, especially of their foodplants and feeding preferences, it is difficult to discuss these differences meaningfully.

Writing this review has made clear to us the difficulties of organizing the sparse knowledge we have of many African genera, which suffer greatly from inadequate collection and an almost complete absence of biological data. Many other African genera are still awaiting their first revisions, due primarily to a virtual absence of adequate museum material.

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