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Monograph

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Semi-aquatic Epilamprinae cockroaches (Blattodea: Blaberidae) in Cameroon: towards a revision of continental African species of *Rhabdoblatta* Kirby, 1903 and *Africalolampra* Roth, 1995

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Abstract. Although semi-aquatic cockroaches have been known for a long time, these insects remain little studied and their diversity underestimated. While a few species are known from Asia or South America, only a single one is known to be associated with water in Africa. Here, we report two species of semi-aquatic cockroaches of the subfamily Epilamprinae from Cameroon. One of these species is new: *Rhabdoblatta fotoi* Nyame Mbia, Legendre & Biram à Ngon sp. nov. *Africalolampra camerunensis* (Borg, 1902) comb. nov. was also found associated to these streams and we provide an extended description of this species, as well as for *Africalolampra stipata* comb. nov., also known from streams in West Africa. Another species was found in Cameroonian streams and is described here, although only identified at the family level (Blattellidae). The descriptions are based on morpho-anatomic characters, including male genitalia. Because nymphs were found primarily associated with water – more than adults – we provide a description of nymphs whenever possible. We provide molecular data (12S rRNA marker) for two of these water-associated species that we compared with published and unpublished sequences of Epilamprinae in a Maximum Likelihood approach. We also illustrate all but one species from continental Africa in the genera *Africalolampra* and *Rhabdoblatta*, including *R. punctipennis* (Saussure, 1895) which we reinstate. We provide a map and list of localities for *Africalolampra* and

Rhabdoblatta spp. from continental Africa and Madagascar, as well as an identification key for species of *Africalolampra*. We finally discuss putative adaptations of semi-aquatic cockroaches.

Keywords. Blattaria, river, amphibious, habitats, systematics, tergal glands.

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Introduction

While semi-aquatic cockroaches have been known for a long time (e.g., Annandale 1900, 1906; Shelford 1901, 1907), much of their diversity and biology remain undeciphered (Cover & Bogan 2015). Semi-aquatic or amphibious cockroaches are known from two kinds of habitats: phytotelmata, and streams and rivers (Bell *et al.* 2007). In both cases, these cockroaches dive to feed or to escape from predators (Roth & Willis 1960; Bell *et al.* 2007). They have apparently no morphological specializations; the few characteristics that were mentioned – like their terminal abdominal spiracles opening into tubes that extend rearward – have also been observed in terrestrial cockroaches (Shelford 1907; Chopard 1938). Nonetheless, several aquatic species have been observed to use air stores (Bell *et al.* 2007; Legendre & Grandcolas 2020: pl. 4), as do Dytiscidae Leach, 1815, for instance (Jones *et al.* 2019).

Most if not all semi-aquatic cockroaches belong to the Epilamprinae Brunner von Wattenwyl, 1865, a blaberid subfamily with a circumtropical distribution, found from Japan in the northern hemisphere to Australia in the southern hemisphere. Yet, semi-aquatic cockroaches are almost exclusively known from South East Asia and South America (e.g., Annandale 1900, 1906; Shelford 1901, 1907, 1909a; Scott 1912; Caudell 1914; Bristowe & Scott 1925; Crowell 1946; Princis & Kevan 1955; Seifert & Seifert 1976; Bragg 1997a, 1997b; Neesemann *et al.* 2010). So far, only a single semi-aquatic cockroach is known to occur in Africa, namely *Rhabdoblatta stipata* (Walker, 1868), although undescribed species have been reported (Biram à Ngon 2019). *Rhabdoblatta stipata* was collected and observed associated with streams in Liberia (Weidner 1969), although this species is also known from Sierra Leone, Guinea and Ghana (Princis 1967; Kumar 1975). Weidner (1969) described these cockroaches as extraordinarily nimble and tireless in their efforts to return to the water.

The genus *Rhabdoblatta* Kirby, 1903 belongs to the Morphnini McKittrick, 1964, a tribe composed of several genera that are all found exclusively in Asia, except for *Rhabdoblatta*, which is also found in Africa. This genus is notoriously polyphyletic (Legendre *et al.* 2017; Yang *et al.* 2019; Wang *et al.* 2023) so that important taxonomic changes are expected. A few attempts at clarifying its taxonomy have been undertaken but they only concern Asian species (Anisyutkin 2003; Yang *et al.* 2019; Wang *et al.* 2023). African *Rhabdoblatta* spp. remain virtually ignored. Among the rare exceptions are the works of Kumar (1975) and Roth (1995). Kumar (1975) reviewed cockroaches from West Africa and the Congo Basin, and he provided identification keys, including for seven species of *Rhabdoblatta*, while Roth (1995) described a new genus, *Africalolampra* Roth, 1995. Although Roth provided a diagnosis for *Africalolampra*, he did not compare this new genus with *Rhabdoblatta*. Yet, Anisyutkin (2016) placed two species of *Rhabdoblatta* in this genus – *Africalolampra erubescens* (Gerstaecker, 1883) and *A. punctipennis* (Saussure, 1895) – further underlining the proximity between these two genera.

Our study does not pretend to revise the taxonomy of *Rhabdoblatta*, a genus comprising more than 150 species (Beccaloni 2014), but our focus on semi-aquatic Epilamprinae from Cameroon is an opportunity to contribute to this revision of African species. We describe two species, including one new species and

an unidentified species of Blattellidae Handlirsch, 1925, all associated with streams. We illustrate all but one species from continental Africa in the genera *Africalolampra* and *Rhabdoblatta*, including male genitalia whenever possible. We also provide a distribution map and a comprehensive list of localities for all known African and Malagasy species in these genera.

Material and methods

Description of study site

This study was conducted from December 2018 to November 2019, in the Centre-South forest region of Cameroon, located between 3°30'–3°58' of latitude north and 11°20'–11°40' of longitude east. The average elevation is 750 m, with a globally uneven relief, in an urban area made up of many hills of 25 m to 50 m below the plateau (Santoir & Bopda 1995). This ecological region is dominated by an equatorial climate, locally known as “the Yaounde Climate”, characterized by moderate precipitation (1576 mm/year) (Kodjo 1998) and four unequal seasons that vary from one year to another: a long dry season (mid-November to mid-March), a short rainy season (mid-March to the end of June), a short dry season (July to mid-August) and a long rainy season (mid-August to mid-November) (Suchel 1987). The vegetation is of the secondary dense forest type and the hydrographic connection is dense. The average atmospheric temperature is $23.5 \pm 2^\circ\text{C}$. The soil is made up of more or less tiny quartzo-feldspathic materials (Bachelier 1959), with acidic pH varying between 4.5 and 5.5 in the superficial layers. To carry out this work, 32 stations from three watersheds were selected for sampling. We selected three streams, called Abouda, Keheng and Ebozoa, in the Mefou watershed (Centre Region), each with three stations, giving a total of nine stations. The Mvilla watershed (South Region) included four watercourses called Metyi, Bengo'o, Sounou, and Lo'o, each with three stations except for the Metyi stream, which has only two stations, for a total of 11 stations. In the Haut-Nyong catchment area (Eastern Region) we selected four streams (Djenassou, Andzié, Sena and the CDC) with three stations each, for a total of 12 stations. The 32 stations were chosen according to their accessibility, the thickness of the water column, the presence of riffles, common dishes and exposure to human activity. A Garmin MAP e 40x GPS receiver was used to record the corresponding geographic coordinates.

Sampling of semi-aquatic cockroaches

The sampling of cockroaches was carried out seasonally, from December 2018 to November 2019 according to the monohabitat approach (Stark *et al.* 2001). Samples were collected using a kick-net of 30 cm square side and 400 μm mesh size. Thus, during each campaign and at each station, 20 drags of kick-net were done in various microhabitats, corresponding to a surface of 3 m². Sampling was carried out in different weirs or streams characterized by their substrate and flow velocity (Stark *et al.* 2001). Each time, specimens retained by the mesh of the kick-net were collected and transferred into polyethylene tubes containing 10% formalin.

Tracking of individual specimens was, unfortunately, compromised due to the long time period following the fieldtrips and the lack of adequate facilities on site. Thus, to be conservative, specimens are labeled with slightly less precise localities than the usual standard. Some specimens were lost but they are nonetheless listed in the material examined because 1) they were examined at the beginning of this study and 2) they give an idea of the abundance of the different species at the time of collection. Despite these issues, it was possible to accurately record the different localities where each species was collected (Table 1).

Dissections and morphological study

To observe male genitalia, specimens were softened before dissections. The dissected genitalia were placed in 10% KOH before being rinsed and observed in water. For pictures, they were placed in a few drops of ‘hand-sanitizer’ (Su 2016). Genitalia were preserved in microvials with glycerine placed under

Table 1. Localities where *Africalolampra camerunensis* (Borg, 1902) comb. nov., *Rhabdoblatta fotoi* Nyame, Legendre & Biram sp. nov. and an unidentified Blattellidae Handlirsch, 1925 were collected for this work.

Watershed	River	Station code	Latitude (N)	Longitude (E)	Elevation (m)	<i>Africalolampra camerunensis</i> comb. nov.	<i>Rhabdoblatta fotoi</i> sp. nov.	Unidentified Blattellidae
Bassin V. Mefou	Abouda	ABO1	3°49'58"	11°24'54"	775	X	X	
Bassin V. Mefou	Abouda	ABO2	3°50'33"	11°25'10"	730	X	X	
Bassin V. Mefou	Abouda	ABO3	3°51'35"	11°25'00"	728	X	X	
Bassin V. Mefou	Ebozoa	EBO1	3°51'26"	11°20'55"	746	X	X	
Bassin V. Mefou	Ebozoa	EBO2	3°51'04"	11°20'31"	775	X	X	
Bassin V. Haut-Nyong	Andzié	AND1	3°58'14"	13°08'46"	670	X	X	
Bassin V. Haut-Nyong	Andzié	AND2	3°58'19"	13°08'56"	667	X	X	
Bassin V. Mvilla	Bengo'o	BEN2	2°53'08"	11°09'24"	574	X	X	
Bassin V. Mvilla	Bengo'o	BEN3	2°53'03"	11°09'28"	569	X	X	
Bassin V. Mvilla	Sounou	SOU1	2°52'36"	11°06'53"	581	X	X	X
Bassin V. Mvilla	Sounou	SOU2	2°52'41"	11°06'45"	576	X	X	X
Bassin V. Mvilla	Sounou	SOU3	2°52'43"	11°06'41"	570	X	X	X
Bassin V. Mvilla	Lo'o	LOO1	2°53'48"	11°06'47"	594	X	X	X
Bassin V. Mvilla	Lo'o	LOO2	2°53'53"	11°06'53"	585	X	X	X
Bassin V. Mvilla	Lo'o	LOO3	2°53'59"	11°06'58"	579	X	X	X

the dissected dry specimen. The nomenclature of male genitalia follows that of Klass (1997), also used in Anisyutkin (2014), Lucanas (2017) and Yang *et al.* (2019) for Epilamprinae. Most abbreviations follow Anisyutkin & Yushkova (2017). For sclerites, the terms used by McKittrick (1964; from now on MK64) and Roth (1970; R70) on the one hand, and by Grandcolas (1996a; G96) on the other, are mentioned in brackets.

For measurements, the overall width corresponds to the largest width of the specimen in ventral view (ca at $\frac{1}{3}$ of abdomen length), while overall length is measured ventrally, from the vertex to the tip of the abdomen (i.e., without wings). The terminology used for descriptions follows Anisyutkin (2014, 2016).

Specimens were examined with a Leica M205 C binocular stereo microscope. Photographs were taken using a Canon EOS 5D mark II mounted on a Leica MZ APO stereo microscope, except pictures of genitalia, taken with a Nikon D800 digital camera mounted on a Nikon SMZ25 stereo microscope. All images are digitally stacked photomicrographic composites of several individual focal planes, obtained using HeliconFocus ver. 6.7 software. Figures were composed with Adobe Illustrator CC 2019 and Photoshop CC 2019 software.

Type specimens of the newly described species are deposited at MNHN.

Distribution of African *Rhabdoblatta* and *Africalolampra*

Taking into account the species newly described in this paper, 16 cockroach species of *Rhabdoblatta* and *Africalolampra* are known from continental Africa and Madagascar (Princis 1967; Kumar 1975; Roth 1995; Beccaloni 2014; Anisyutkin 2016). We have extensively reviewed the literature about all these species to list all the known localities for each species and provide a map with those localities (Fig. 1). For each species, more details are provided in their respective sections.

Molecular work

We extracted DNA from midlegs of three alcohol-preserved specimens (molecular samples BL943, BL945 and BL946). Total genomic DNA was extracted using a DNAeasy Blood and Tissue Kit following the manufacturer's instructions. DNA extractions and amplifications were carried out at the BoEM lab (Laboratoire commun de Biologie Moléculaire) and Service de Systématique Moléculaire of the MNHN, respectively. A portion of the *12S rRNA* gene was targeted (12S, \approx 350 bp) using the primers 12Sai/12Sbi (Simon *et al.* 1994) and the protocol reported in Legendre *et al.* (2008). This molecular marker can assist, like the barcode region of cytochrome c oxidase I (*cox1*), in cockroach species identification and is often more easily obtained than *cox1* (e.g., Colinet *et al.* 2016). Sequences were cleaned and checked for sequencing errors in Geneious Prime® 2022.0.1 (Biomatter Ltd., New Zealand), before being blasted on GenBank (<http://blast.ncbi.nlm.nih.gov/Blast.cgi>; blastn). They were then analyzed with sequences of Epilamprinae available from GenBank, as well as 22 Epilamprinae sequences generated with the aforementioned protocol for other projects (e.g., Colinet *et al.* 2016), but never published so far. The newly generated sequences have the following Genbank accession numbers: OR589771–OR589772, PP460881–PP460903. All sequences were aligned using Muscle (Edgar 2004) as implemented in AliView ver. 1.26 (Larsson 2014). The full dataset contained 78 sequences and 401 positions (Supp. file 1, Supp. file 2). We then conducted a ML analysis with IQ-TREE ver. 1.6.12 (Nguyen *et al.* 2015) with the -TESTNEW command line (i.e., standard model selection with free rated heterogeneity) and 1000 ultrafast bootstrap replicates (Hoang *et al.* 2018). The tree was rooted with *Aptera fusca* (Thunberg, 1784). The best fit model according to BIC was GTR+F+I+G4.

Abbreviations

- ap. scl. = “apical sclerite” of the sclerite L2D in the male genitalia
 f.s. = “folded structure” of the sclerite L3 in the male genitalia
 hge. = groove of sclerite L3 in male genitalia (sensu Klass 1997)
 m.o. = “membranous outgrowth” of the sclerite L3 in the male genitalia
 out. = outgrowth at caudal end of the sclerite L2D of the male genitalia
 pl.s. = plate-like sclerite of the male genitalia
 s.t. = “small tooth” of apical part of the sclerite L3 in the male genitalia

Repositories

- BMNH = British Museum of Natural History, London, UK
 LUHM = Lund University History Museum, Sweden
 MCZ = Museum of Comparative Zoology, Harvard University, USA
 MNHN = Museum national d’histoire naturelle, Paris, France
 NHRS = Swedish Museum of Natural History, Stockholm, Sweden
 NMW = Naturhistorisches Museum Wien, Austria
 RMCA = Royal Museum for Central Africa, Tervuren, Belgium
 ZIMG = Zoological Institute and Museum, University of Greifswald, Germany



Fig. 1. Distribution of African species of *Rhabdoblatta* Kirby, 1903 and *Africalolampra* Roth, 1995, including the new species described (indicated with a star). “?” is used when countries with no exact locality were provided in the literature. Details of localities are provided in the main text.

Results

Phylogenetic analysis

The phylogenetic tree obtained in ML is shown in Fig. 2. Since this tree has been reconstructed from the 12S marker only, we did not expect to retrieve detailed and supported relationships for the whole tree. However, this tree might bring insights as to the putative relatives of African species of Epilamprinae. *Rhabdoblatta fotoi* Nyame Mbiam, Legendre & Biram à Ngon sp. nov. and *Africalolampra camerunensis* (Borg, 1902) comb. nov. clustered together (bootstrap support = 95). *Africalolampra camerunensis* has a long terminal branch, like most of the African species sampled in this tree.

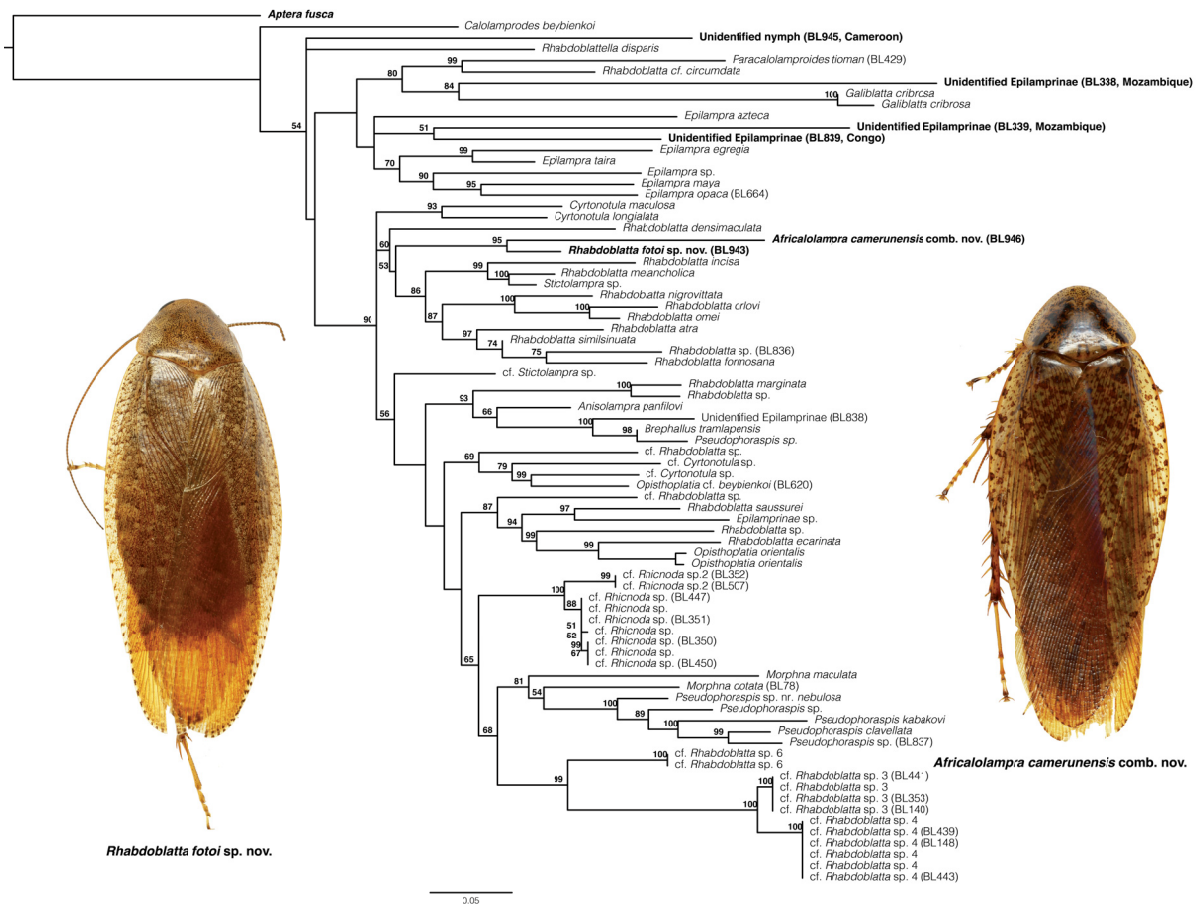


Fig. 2. Maximum Likelihood tree obtained from the analysis of the 12S marker of various species of Epilamprinae Brunner von Wattenwyl, 1865 with IQ-TREE. Bootstrap supports are reported at each node, except when the values were below 50. African species are in bold. Newly sequenced specimens have their voucher numbers in parentheses (i.e., BL***).

Systematic part

Class Insecta Linnaeus, 1758
Order Blattodea Brunner von Wattenwyl, 1882
Superfamily Blaberoidea Saussure, 1864
Family Blaberidae Saussure, 1864
Subfamily Epilamprinae Brunner von Wattenwyl, 1865
Genus *Africalolampra* Roth, 1995

Type species

Africalolampra ehrmanni Roth, 1995.

Diagnosis and history

The genus *Africalolampra* was erected to accommodate the new species *Africalolampra ehrmanni* Roth, 1995. Later, Anisyutkin (2016) transferred two species of *Rhabdoblatta* to this genus: *A. erubescens* and *A. punctipennis*. According to Roth (1995), the following combination of characters is diagnostic of the genus *Africalolampra*: weak sexual dimorphism (tegmina and wings completely developed in both sexes – although this is not true for *A. punctipennis*), metatarsus with 2 rows of spines along lower margin, tarsal claws distinctly serrated, first abdominal tergite of male with medial specialization (this is not true either for *A. punctipennis*), left stylus absent. This combination of characters is also found in two species from continental Africa belonging to the genus *Rhabdoblatta*, and we thus propose the following new combinations: *Africalolampra camerunensis* and *Africalolampra stipata*. We also reinstate *Rhabdoblatta punctipennis* because it does not share the apomorphies of *Africalolampra*. Note that *R. lyncea* (Gerstaecker, 1883) and *R. pallida* (Borg, 1902) also have a tergal specialization but on the 5th and at the junction of the 8–9th abdominal tergites, respectively. *Rhabdoblatta lyncea* may also have slightly serrated claws (Kumar 1975) but two styli, whereas *R. pallida* has a single stylus. Finally, Malagasy species are reported but males of some species have not been observed, so we do not dwell further on their generic affiliation, which would require further examination.

Below is the updated diagnosis of the genus *Africalolampra*, slightly modified from Roth (1995) and Anisyutkin (2016):

Weak sexual dimorphism, with tegmina and wings fully developed in both sexes. Anteroventral margin of front femur type B2; genicular spine absent from fore femur, present on mid and hind femora; spines present on antero- and posteroventral margins of all femora; pulvilli on four proximal tarsomeres; ventral margin of first tarsal segments with two rows of spines; tarsal claws symmetrical and serrated, arolia well-developed. Male with glandular specialization on first abdominal tergite; subgenital plate weakly asymmetrical, with only a single, small, right style (i.e., left style absent).

Africalolampra camerunensis (Borg, 1902) comb. nov.
Figs 3–7; Table 2

Epilampra camerunensis Borg, 1902: 8.

Epilampra camerunensis – Shelford 1909b: 479; 1910: 14. — Anonymous 1910: 579. — Sjöstedt 1933: 7. — Princis 1963a: 136.

Rhabdoblatta camerunensis – Kumar 1975: 81.

Material examined

Lectotype

CAMEROON • 1 ♀; “Camerun; Sjöstedt; lectotype”; NHRS, NRM-BLAT 0002100 [pictures only].

Additional specimens

CAMEROON – **Centre Region** • 2 ♀♀, 5 ♂♂, 9 juvs; Mefou watershed, Eloundem; elev. 569–775 m; Dec. 2019–Nov. 2020; University of Yaoundé1 BLA 0001 • 1 ♀; Nkolkoumou; “Adam 350”; MNHNEP7587. – **Eastern Region** • 1 ♀, 2 ♂♂, 6 juvs; Haut-Nyong watershed, Abong-doum; elev. 670 m; Dec. 2019–Nov. 2020; University of Yaoundé1 BLA 0002 • 2 ♂♂, 2 ♀♀ nymphs; same data as for preceding; molecular sample BL946; MNHN-EP7596 to MNHN-EP7599. – **South Region** • 1 ♀, 3 ♂♂, 11 juvs; Mvilla watershed, Nonenlam; elev. 579–581 m; Dec. 2019–Nov. 2020; University of Yaoundé1 BLA 0003 • 2 ♂♂; same data as for preceding; MNHN-EP7588, MNHN-EP7589. – **Unknown region** • 1 ♀; “Camerun; Sjöstedt”; NHRS, NRM-BLAT 0002101 [pictures only] • 1 ♀; “Camerun, Bonge; Sjöstedt”; NHRS, NRM-BLAT 0002102 [pictures only] • 1 ♀; “Deutsch Kamerun, Mundame, Rhode”; NMW 25.718 [pictures only].

REPUBLIC OF GUINEA • 1 ♂; “Nimba; 1946; Lamotte”; MNHN-EP7586 • 2 nymphs; “Nimba, brousse secondaire, Br2; 1946; Lamotte”; MNHN • 1 ♂; “Nimba; ??? Septembre, 1969 1493; Lamotte”; LUHM.

Differential diagnosis

Contrary to what was written in previous descriptions or keys (e.g., Kumar 1975), *A. camerunensis* has specialized claws, which contributes to justify its belonging to the genus *Africalolampra*. This species can be readily differentiated from its congenics by its pattern of coloration (pronotum, wing, face) and the shape of its tergal gland.

Redescription

Male

Princis (1963a) was the first to describe a male specimen of *A. camerunensis*. He underlined that it is smaller than the conspecific female and has a hypandrium quite similar to that of *A. erubescens*, with a single stylus, although its right side is more advanced posteriorly than in *A. erubescens*. He



Fig. 3. *Africalolampra camerunensis* (Borg, 1902) comb. nov., lectotype (NHRS, NRM-BLAT 0002100). Habitus in ventral and dorsal views, and labels. Photographed by Gunvi Lindberg (© 2023 Naturhistoriska riksmuseet). Original photos cropped, light levels and contrast adjusted. Made available by the Swedish Museum of Natural History under Creative Commons Attribution 4.0 International Public License, CC-BY 4.0. Scale bar = 5 mm.

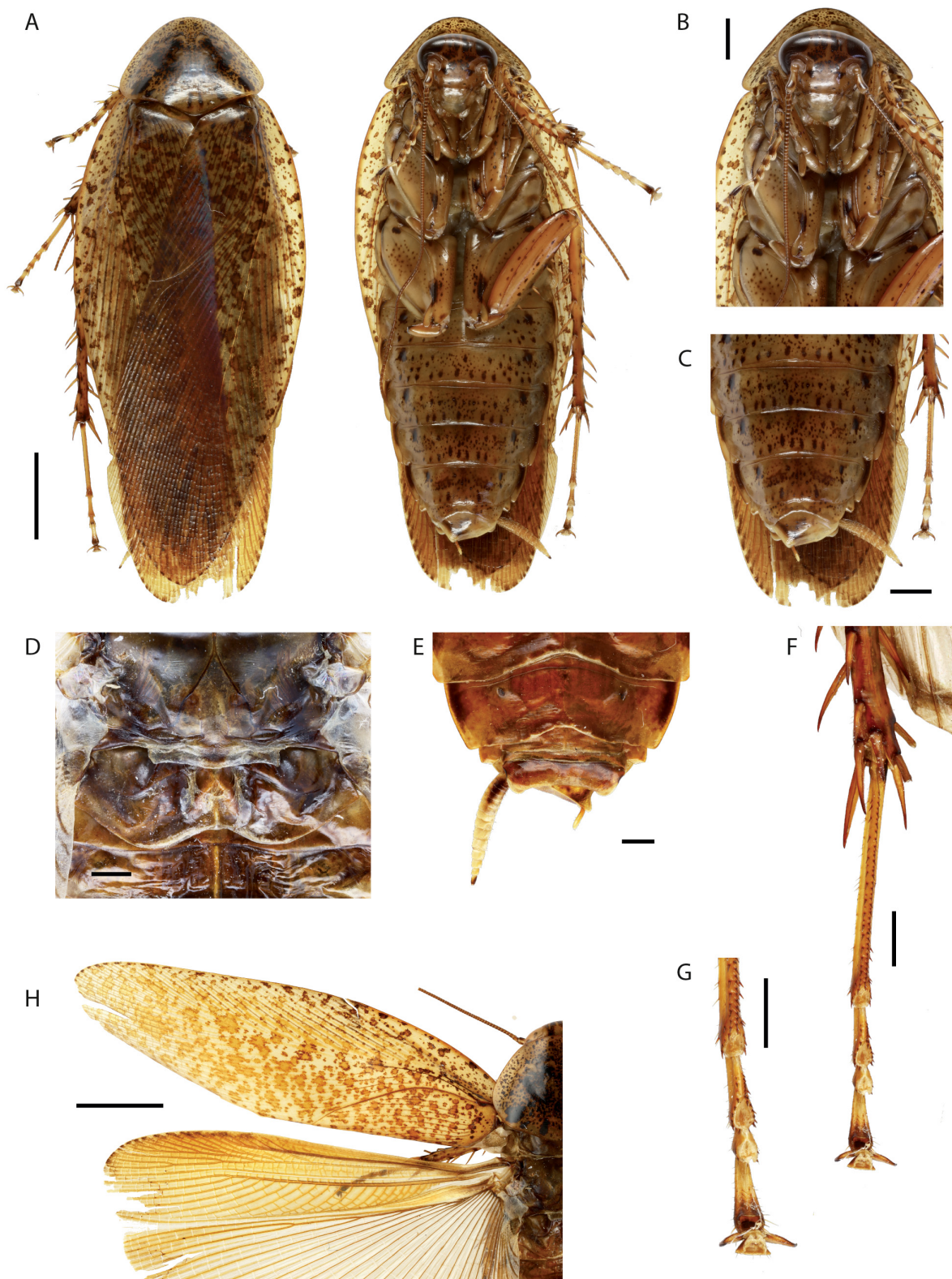


Fig. 4. *Africalolampra camerunensis* (Borg, 1902) comb. nov., male specimen (MNHN-EP7588) collected for this study. **A.** Habitus in dorsal and ventral views. **B.** Head and front legs. **C.** Terminalia and hind tibiae in ventral view. **D.** Tergal gland on first abdominal tergite. **E.** Supra-anal plate. **F–G.** Hindlegs. **H.** Forewing and anterior part of hindwing. Scale bars: A, H = 5 mm; B–C = 2 mm; D–G = 1 mm.

also described the tergal specialization of the first tergite: triangular and nearly transversely oriented, with tuft of hairs oriented anteriorly on both sides (whereas triangular and vertically oriented in *A. erubescens*). This description can be complemented as follows:

HEAD. About as long as wide, dark brown with several black maculae (Fig. 4B). Eyes dark brown, ocellar spots brown with one dark spot below each of them. Labrum and clypeus brown, but lighter than vertex. Scape and pedicel mostly light brown, while other antennal segments dark brown. Distance between eyes similar to distance between antennal sockets.

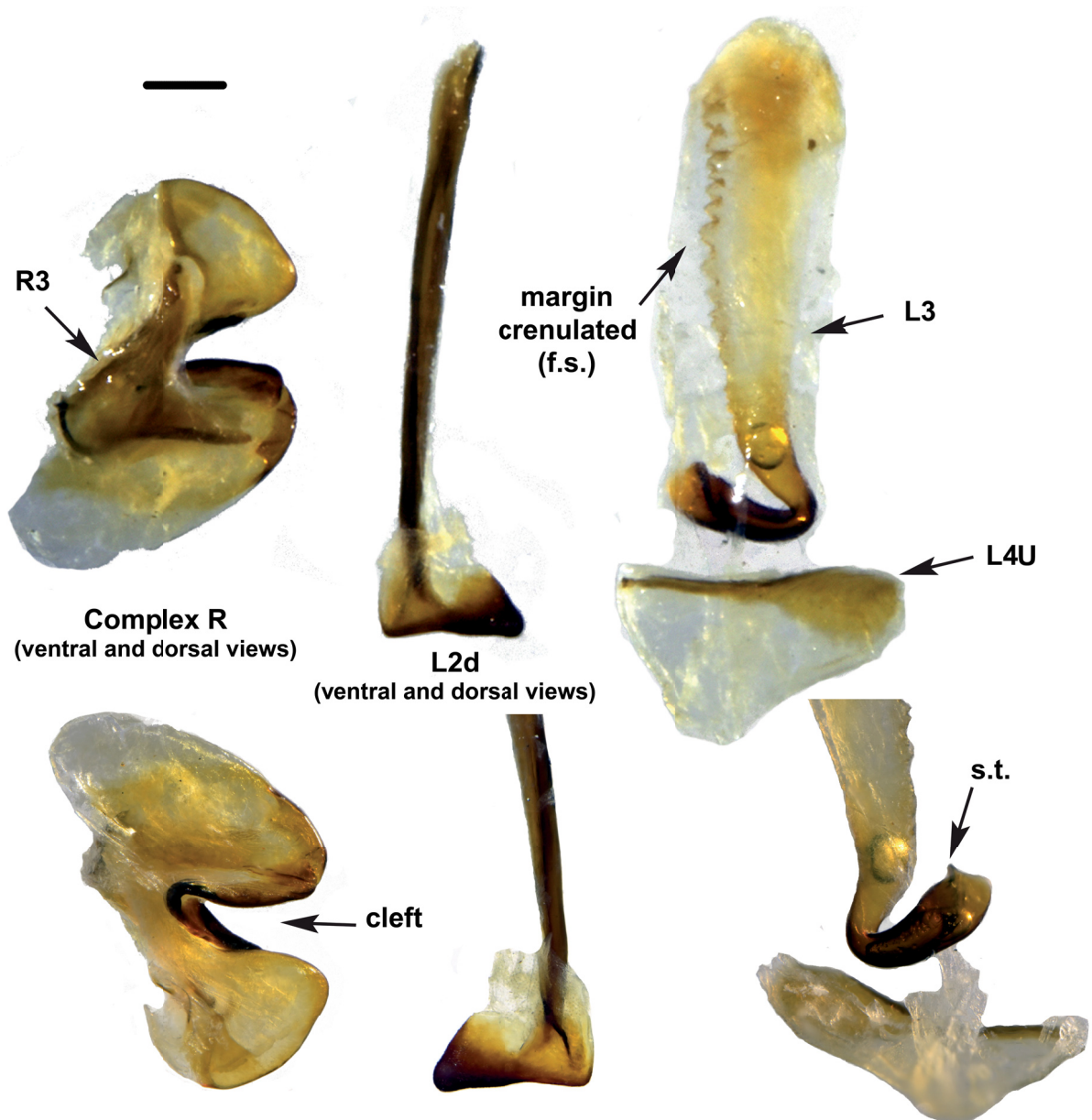


Fig. 5. *Africalolampra camerunensis* (Borg, 1902) comb. nov., male specimen (MNHN-EP7588), genitalia, each sclerite taken in dorsal and ventral views. Abbreviations: see Material and methods. Scale bar = 0.5 mm.

Table 2. List of published localities for *Africalolampra camerunensis* (Borg, 1902) comb. nov. This species is also mentioned in Sjöstedt (1933) but we have been unable to access this publication. Also, a female specimen at MNHN has the following label “Rég. Yaoundé, Cameroun”.

Combination in publication	Locality	Reference
<i>Epilampra camerunensis</i>	Cameroon	Borg 1902
<i>Epilampra camerunensis</i>	Equatorial Guinea [Spanish Guinea]	Shelford 1909b
<i>Epilampra camerunensis</i>	Cameroon	Shelford 1910
<i>Epilampra camerunensis</i>	Cabo San Juan, Equatorial Guinea	Anonymous 1910
<i>Epilampra camerunensis</i>	Cameroon (lectotype)	Princis 1963a
<i>Epilampra camerunensis</i>	Mundame, Cameroon	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba, Thio	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba (Nion, Gouan, Cavally)	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba (Sérenghara), Republic of Guinea	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba (Yisoro), Republic of Guinea	Princis 1963a
<i>Epilampra camerunensis</i>	Nimba (Zougoué), Republic of Guinea	Princis 1963a
<i>Rhabdoblatta camerunensis</i>	Moka, Fernando Poo	Kumar 1975

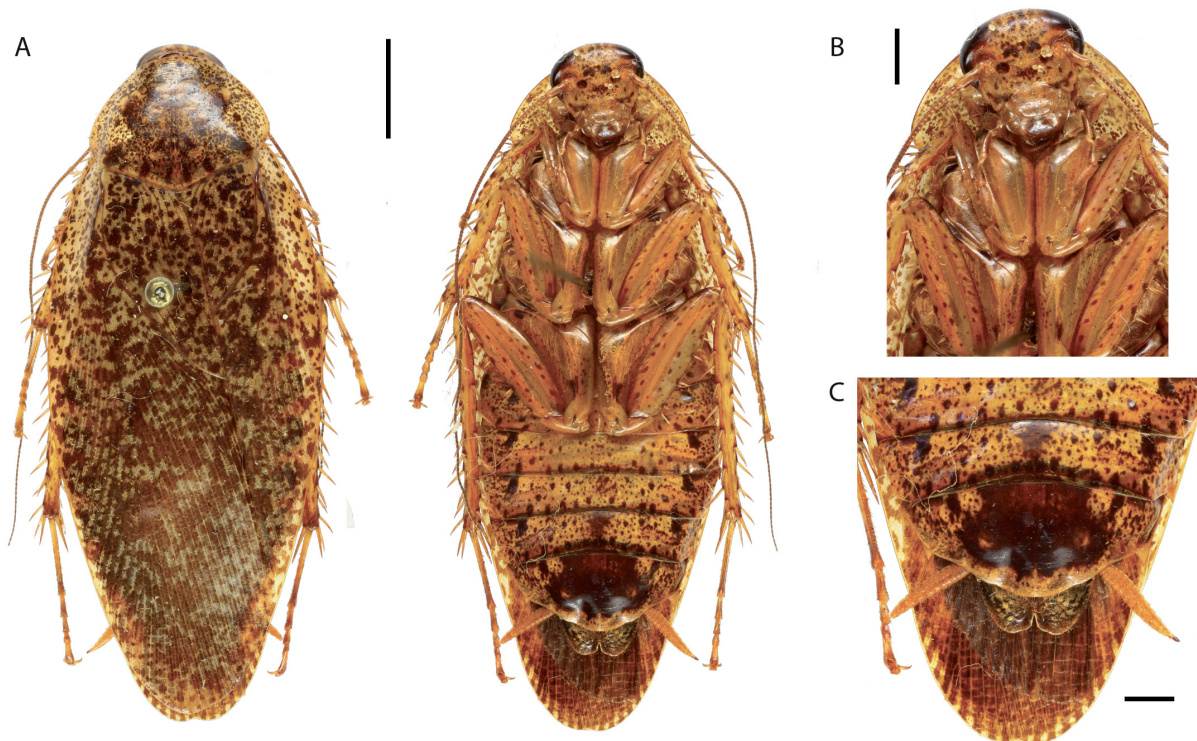


Fig. 6. *Africalolampra camerunensis* (Borg, 1902) comb. nov., female specimen (MNHN-EP7587). **A.** Habitus in dorsal and ventral views. **B.** Head and front legs. **C.** Subgenital plate. Scale bars: A = 5 mm; B–C = 2 mm.

PRONOTUM. Light brown with numerous black maculae and spots, and stripes at posterior margin (Fig. 4A). Pronotum roughly triangular but with middle of hind margin distinctly convex.

TEGMINA AND WINGS. Fully developed, extending beyond end of abdomen (Fig. 4A). Tegmina with rounded apex, light brown with veins darker and numerous dark brown maculae. Sc thickened in ventral view. Hindwings light brown, darker anteriorly than posteriorly, with veins darker (Fig. 4H).

LEGS. Anteroventral margin of front femur of type B2, with 4–5 strong spines proximally (Fig. 4B). Tibial spines well-developed. Metatarsus of hind leg slightly longer than other segments combined, inner margin with two rows of small spines (Fig. 4F). Arolium and tarsal pulvilli well-developed, the latter bordered by “additional spines” sensu Anisyutkin (2016). Claws symmetrical and finely serrated (Fig. 4G).

ABDOMEN. Abdominal sternites light brown with several darker maculae (Fig. 4A, C), largest ones near anterolateral corners, and with short stripes along posterior margin (except for last segments). First abdominal tergite specialized: tergal gland with a triangular, longitudinally keeled elevation, with tip directed anteriorly and provided with a posteriorly-oriented tuft of hair; both sides of triangle are also more or less densely covered with hairs (Fig. 4D). Second abdominal tergite with an anterodorsal ridge mesally (Fig. 4D). Supra-anal plate short, transverse and with wrinkles (Fig. 4E); caudal margin concave without medial incision. Subgenital plate asymmetrical, angularly projected on its right side. Cerci multisegmented, pubescent ventrally, with a black tip. Right stylus cylindrical, with sparse setae distally. Left stylus absent (Fig. 4C).

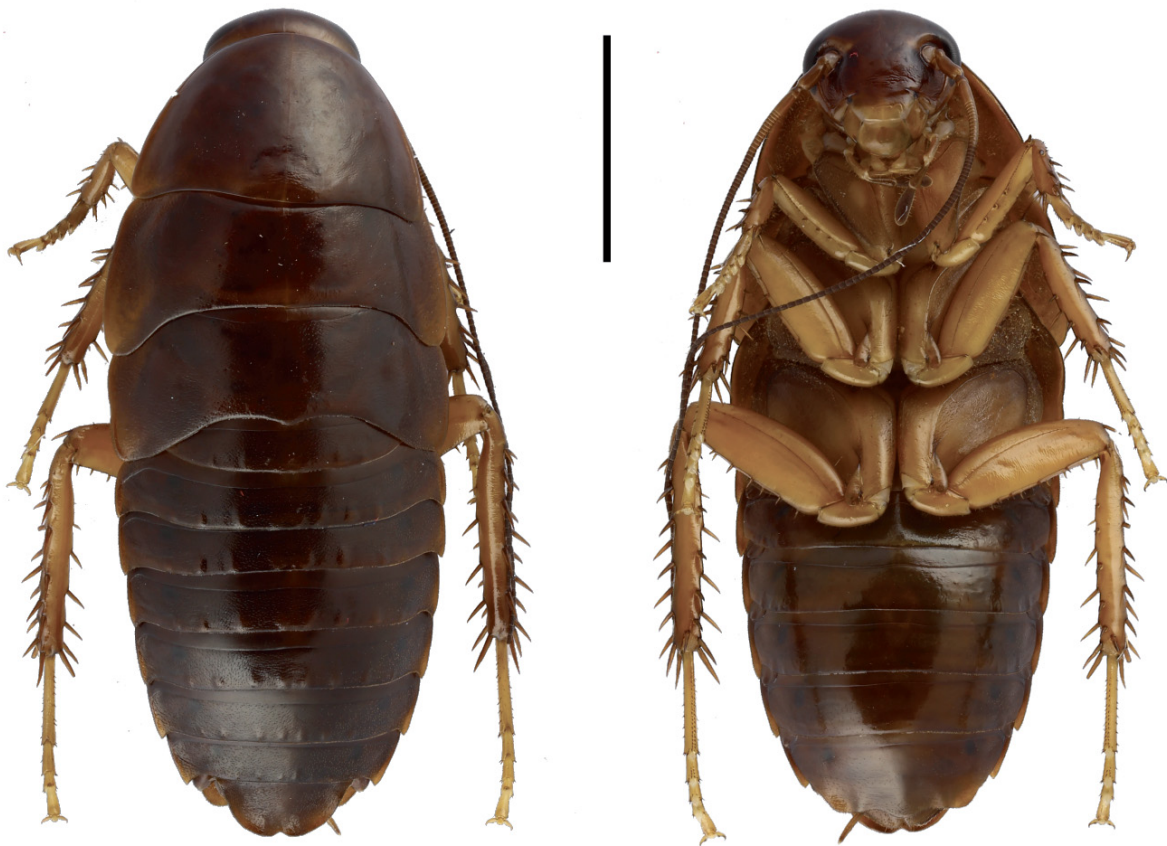


Fig. 7. *Africalolampra camerunensis* (Borg, 1902) comb. nov., male nymph in dorsal and ventral views (MNHN-EP7596). Scale bar = 5 mm.

MALE GENITALIA (Fig. 5). Left phallomere R complex (L1 of MK64 and R70, and R2+R3+N of G96): cleft between R1T and R2 without protuberance; R3 (sensu Anisyutkin 2016) in two parts, very broad; pl.s. sensu Anisyutkin (2016) present. Sclerite L2d shaped as a woodsman's axe; basal sclerite of L2d slender and rod-shaped (L1 of G96); apical sclerite of L2d (L2vm of MK64, L2v of R70 and L1 of G96) well-developed. Sclerite L3 (R2 of MK64, R70, and L2d of PG96) long, with a hook deeply bent, narrower where it bends, more bulbous at its apex with a distinct "small tooth" sensu Anisyutkin (2016); inner margin of the basal part of L3 crenulated on most of its length (i.e., folded structure f.s. of Anisyutkin 2016). L4U present, trigonal with a very slender vertex (likely homologous to trigonal sclerite of Roth 1995).

Female

The female of *A. camerunensis* was first described in Borg (1902). It looks like the male, except for the terminalia (Fig. 6C): supra-anal plate extending beyond subgenital plate, with a deep medial incision and with setae on its caudal margin; subgenital plate symmetrical, with several small setae postero-medially and a large black macula medially.

Measurements of adults

Male (n = 3): pronotum length × width: 5.3–6.1 × 7.5–8.7, tegmina length: 21.5–25.4, overall length × width 23.3–26 × 9.1–10.

Female: pronotum length × width: 6.8 × 9.3, tegmina length: 29, overall length × width: 30 × 11.8.

Nymphs

Pictures of nymph are provided in Fig. 7. Spiracular breathing tubes are visible dorsally, posteriorly to the penultimate tergite.

Molecular data

A portion of 12S rRNA has been obtained and is available under the GenBank accession number OR589772 (molecular extract BL946).

Habitat

Adults and nymphs of this species were found in all the rivers investigated.

Distribution

This species is known from Cameroon, Equatorial Guinea and the Republic of Guinea (Fig. 1). Details of localities are provided in Table 2.

Africalolampra stipata (Walker, 1868) comb. nov.
Figs 8–9; Table 3

Epilampra stipata Walker, 1868: 208.

Epilampra stipata – Kirby 1904: 123. — Shelford 1910: 14. — Princis 1958: 63; 1963a: 138.

Rhabdoblatta stipata – Weidner 1969: 101. — Kumar 1975: 80.

Material examined

Holotype

REPUBLIC OF GUINEA • ♀; "holotype; *Epilampra stipata* Walker"; BMNH, #BMNH(E)878073 [pictures only].

Additional specimens

REPUBLIC OF GUINEA • 1 ♂; “Nimba (Guinea), 9 Db”; MNHN-EP7593 • 2 ♂♂; “Nimba (Guinée), Yalanzou; II VI 42; M. Lamotte”; MNHN-EP7594, MNHN-EP7595 • 2 ♀♀; same data as for preceding;

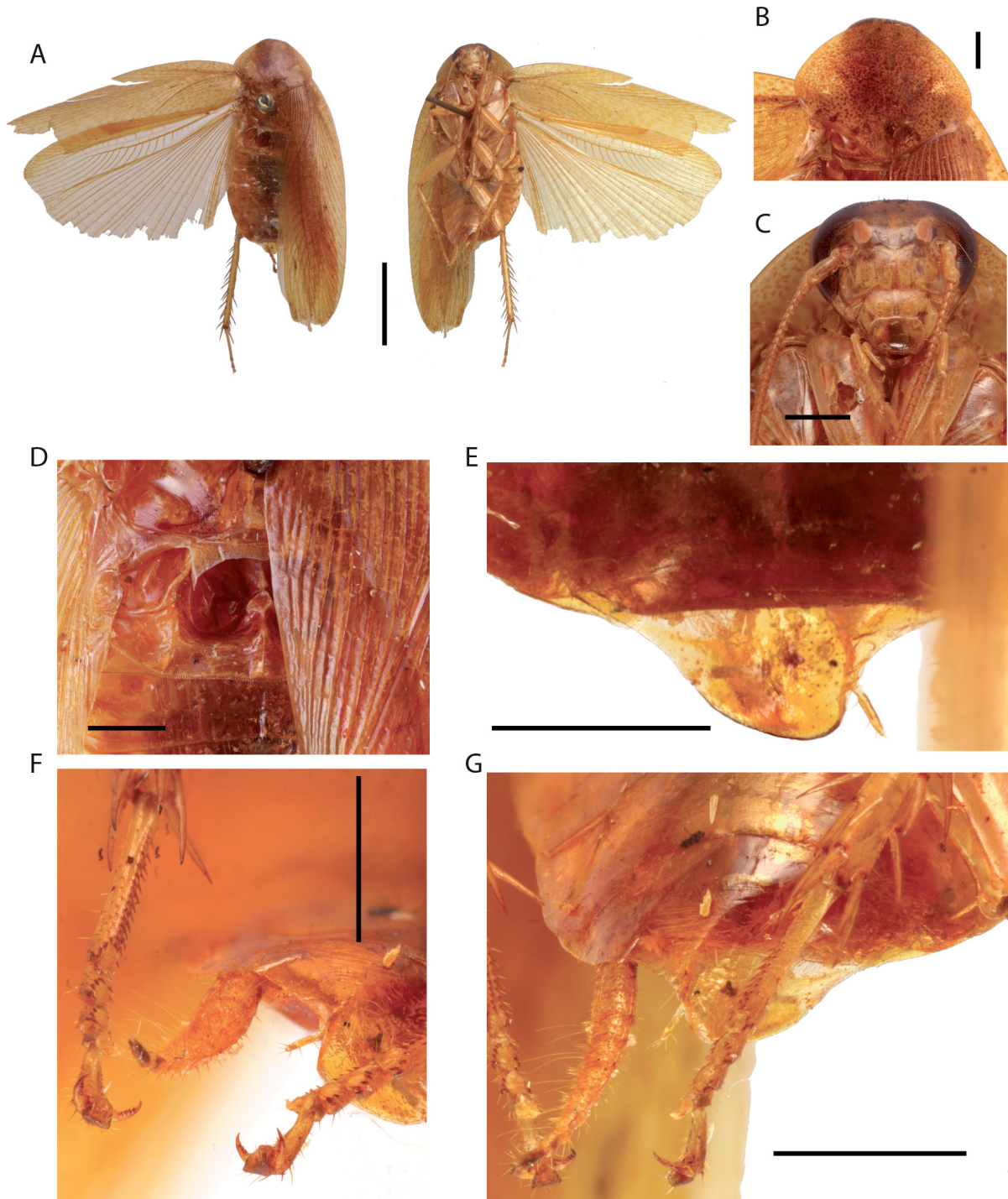


Fig. 8. *Africalolampra stipata* (Walker, 1868) comb. nov., male specimen (MNHN-EP7594). **A.** Habitus in dorsal and ventral views. **B.** Pronotum. **C.** Head. **D.** Tergal gland on 1st abdominal tergite. **E.** Supra-anal plate, dorsal view. **F.** Tarsi and serrated claws of midleg, ventral view. **G.** Subgenital plate and right cercus. Scale bars: A = 5 mm; B–F = 1 mm.

Table 3. List of published localities for *Africalolampra stipata* (Walker, 1868) comb. nov..

Combination in publication	Locality	Reference
<i>Epilampra stipata</i>	Sierra Leone	Walker 1868
<i>Epilampra stipata</i>	Sierra Leone	Princis 1958
<i>Epilampra stipata</i>	Yalanzou, Nimba, Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Kéoulenta, Nimba, Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Nimba (Sérengbara), Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Nimba (grotte de Blandé), Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Nimba (Nion), Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Nimba (Yéalé), Republic of Guinea	Princis 1963a
<i>Epilampra stipata</i>	Nimba (Gouan), Republic of Guinea	Princis 1963a
<i>Rhabdoblatta stipata</i>	Sherboro island, Sierra Leone	Princis 1963a
<i>Rhabdoblatta stipata</i>	Salala, Liberia	Weidner 1969
<i>Rhabdoblatta stipata</i>	Garbaya creek, Lofa county, Liberia	Weidner 1969
<i>Rhabdoblatta stipata</i>	Kwahu, Ashanti, 2 mls N of Tafo, Ghana	Kumar 1975
<i>Rhabdoblatta stipata</i>	Legon, Ghana	Kumar 1975
<i>Rhabdoblatta stipata</i>	Atewa, Ghana	Kumar 1975

MNHN-EP7611, MNHN-EP7612 • 1 ♂, largely damaged; “Nimba (Guinée), Nion; II.VI.42, 1969 1491; M. Lamotte”; LUHM.

Differential diagnosis and history

This species was described initially by Walker (1868), from what has been initially thought to be a male specimen but later identified as a female (Princis 1958). Princis (1963a) complemented this description and described the male for the first time, with a drawing of the male subgenital plate. He notably underlined the strongly specialized tarsal claws and described the tergal gland located on the first tergite, two characters that are, however, found in several species of *Africalolampra*. This species differs nonetheless from the congeneric species by the very strong intensity of the specialization of the tarsal claws (males and females), the shape of the subgenital plate (asymmetric, concave on the right side but convex on the left side), and the shape of the male tergal gland (i.e., a pit with two transverse fold-like elevations that meet mesally – Fig. 8D). In addition, we here illustrate its male genitalia (Fig. 9). For females, Kumar (1975) underlined that *A. stipata* can be distinguished from other species by the following combination of characters: wings fully developed, absence of a median brown longitudinal band on the subgenital plate, its size, and the strongly serrated claws.

Description of male genitalia (Fig. 9)

Left phallomere R complex (L1 of MK64 and R70, and R2+R3+N of G96): cleft between R1T and R2 with large protuberance at its base. Sclerite L2d with its basal sclerite rod-shaped, broader at its base (L1 of G96); apical sclerite of L2d (L2vm of MK64, L2v of R70 and L1 of G96) in two parts, with a rounded sclerite in the hollow of the crescent-like sclerite (visible in caudal view). Sclerite L3 (R2 of MK64, R70, and L2d of PG96) long, with a slender hook deeply bent and a membranous outgrowth (m.o.); inner margin of the basal part of L3 slightly crenulated along most of its length. L4U large, broadly trapezoidal.

Measurements of adults

Male (n = 3): pronotum length×width: 3.6–4.1×4.9–5.3, tegmina length: 15.8–16.5, overall length×width: 13.1–15.3×5.4–5.9.

Female (n = 2): pronotum length×width: 4.1–4.4×5.1–5.3, tegmina length: 18.2–18.9, overall length×width: 16.3–16.5×6.4–6.6

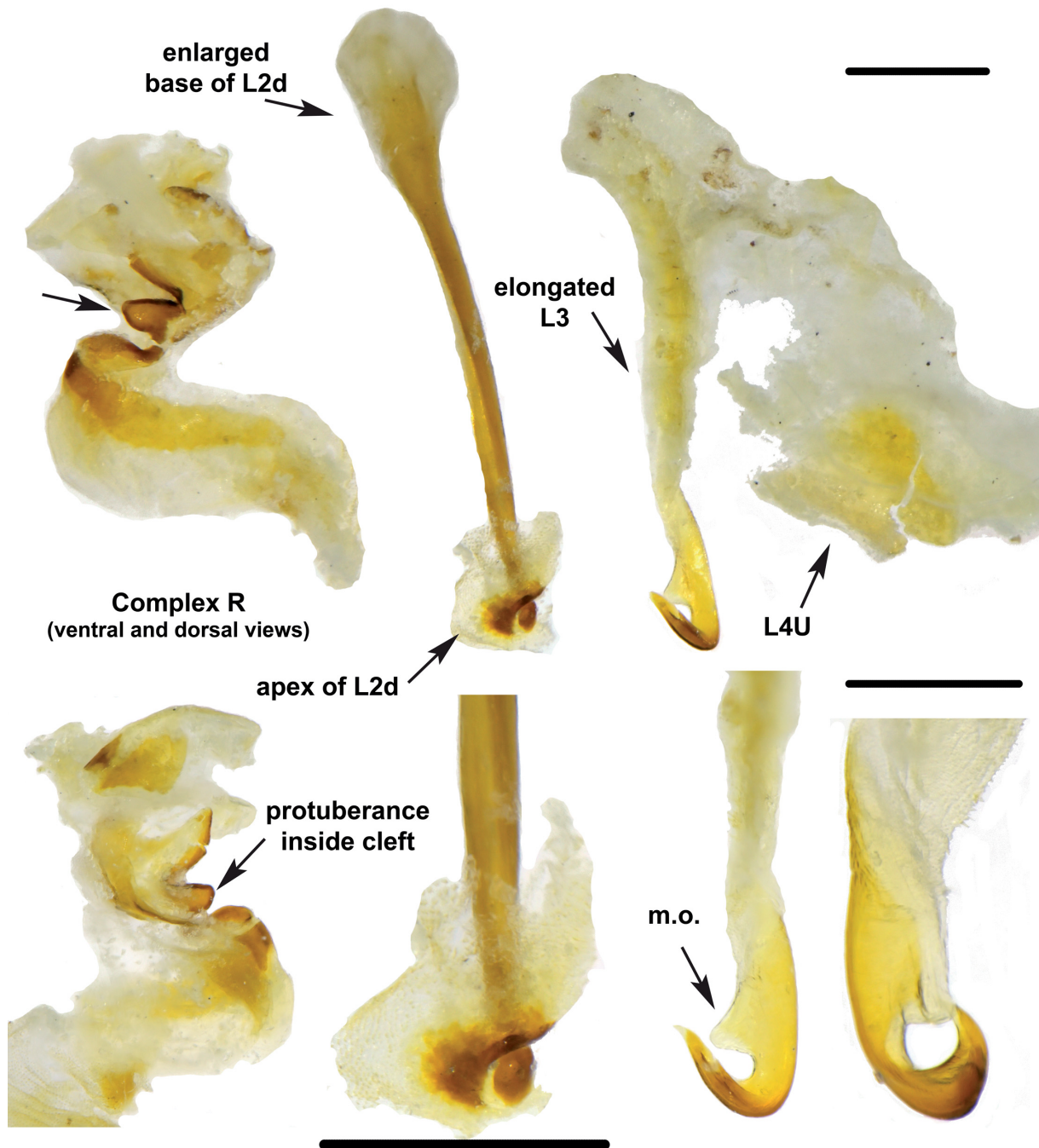


Fig. 9. *Africalolampra stipata* (Walker, 1868) comb. nov., male specimen (MNHN-EP7595), genitalia. Abbreviations: see Material and methods. Scale bars = 0.5 mm.

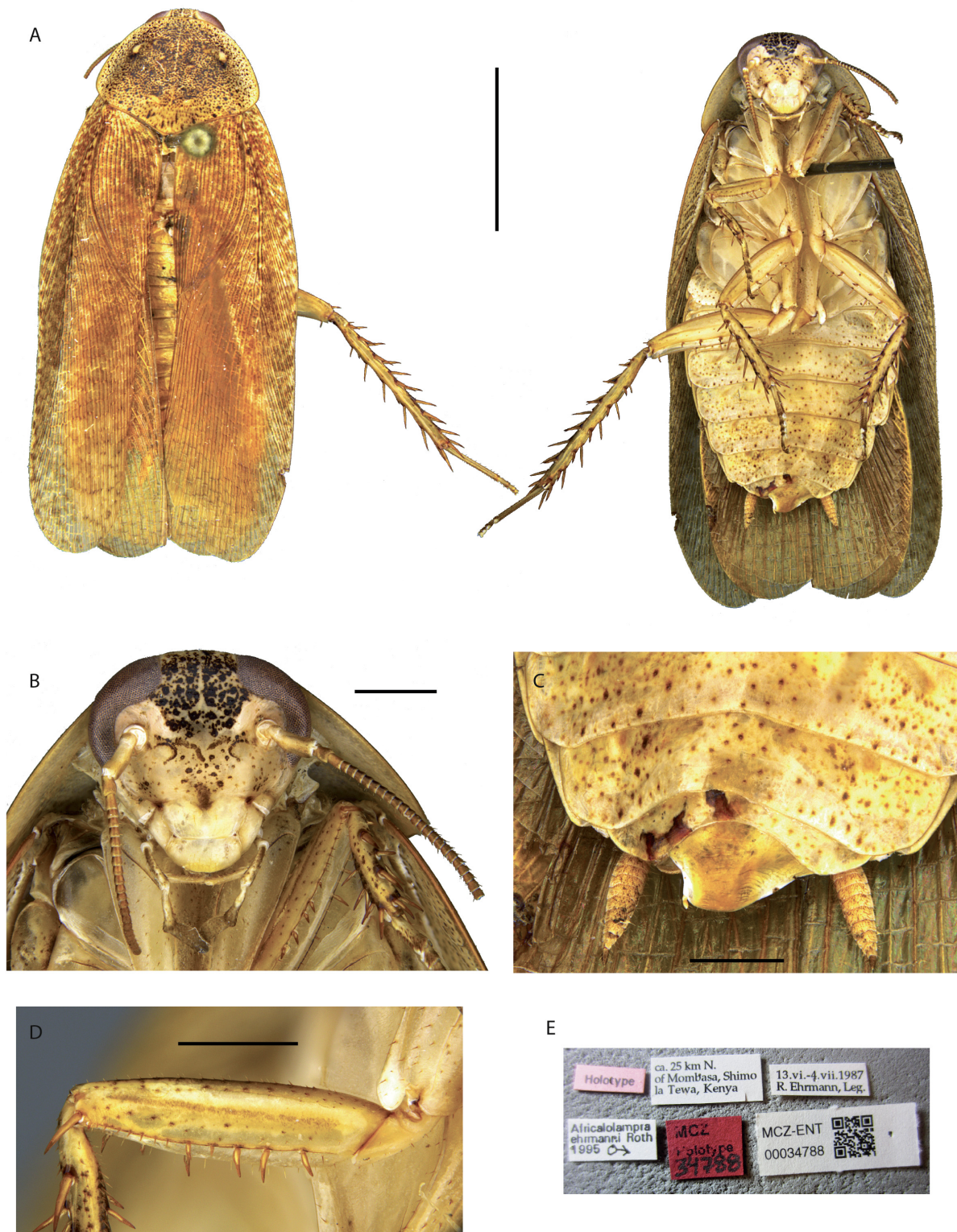


Fig. 10. *Africalolampra ehrmanni* Roth, 1995, holotype, ♂ (MCZ-ENT00034788). **A.** Habitus in dorsal and ventral views. **B.** Head. **C.** Subgenital plate, ventral view. **D.** Front femur (type B2) with the most distal spine distinctly serrated. **E.** Labels. Photographed by Charles Whittemore Farnum, made available by the Museum of Comparative Zoology, Harvard University; ©President and Fellows of Harvard College, CC-BY 4.0. Scale bars: A = 5 mm; B–D = 1 mm.

Habitat

This species has been reported as a water-dwelling cockroach (Weidner 1969).

Distribution

This species is known from Sierra Leone, Liberia, Ghana and the Republic of Guinea (Fig. 1). Details of localities are provided in Table 3.

Africalolampra ehrmanni Roth, 1995

Fig. 10

Africalolampra ehrmanni Roth, 1995: 89.

Material examined

Holotype

KENYA • ♂; Shima la Tewa, ca 25 km N of Mombasa; 13 Apr.–4 Jul. 1987; R. Ehrmann leg.; MCZ-ENT 00034788 [pictures only].

Differential diagnosis

Type species of the genus *Africalolampra*, it is described with several drawings from five males and one female from the same locality (Roth 1995). Note, however, that we were unable to examine the series of specimens and that the MCZ curators reported six male and no female specimens. We here complement the drawings in Roth (1995) with a few pictures obtained from MCZ (Fig. 10). The pronotal and head pattern coloration (Fig. 10A–B), as well as the shape of the tergal specialization, allows one to readily differentiate *A. ehrmanni* from its conspecifics.

Habitat

“The original specimens were collected in dense undergrowth in a damp *Galeria* woods” (Roth 1995).

Distribution

This species is only known from its type locality in Kenya (Fig. 1).

Africalolampra erubescens (Gerstaecker, 1883)

Figs 11–13; Table 4

Epilampra erubescens Gerstaecker, 1883: 54.

Epilampra erubescens – Borg 1902: 8. — Shelford 1908: 29; 1909b: 479; 1910: 14. — Rehn 1933: 451.
— Morales Agacino 1954: 95. — Princis 1962: 210.

Heterolampra erubescens – Kirby 1904: 123.

Rhabdoblatta erubescens – Vanschuytbroeck 1970: 14. — Kumar, 1975: 81. — Grandcolas 1996b: 231.

Africalolampra erubescens – Anisyutkin 2016: 140.

Material examined

Holotype

CAMEROON • ♂; “Victoria; Buchholz leg.; holotype”; ZIMG-II-27340a [pictures only].

Allotype

CAMEROON • ♀; “Victoria Buchh., Limbar. Buchh.; allotype”; ZIMG-II-27340b [pictures only].

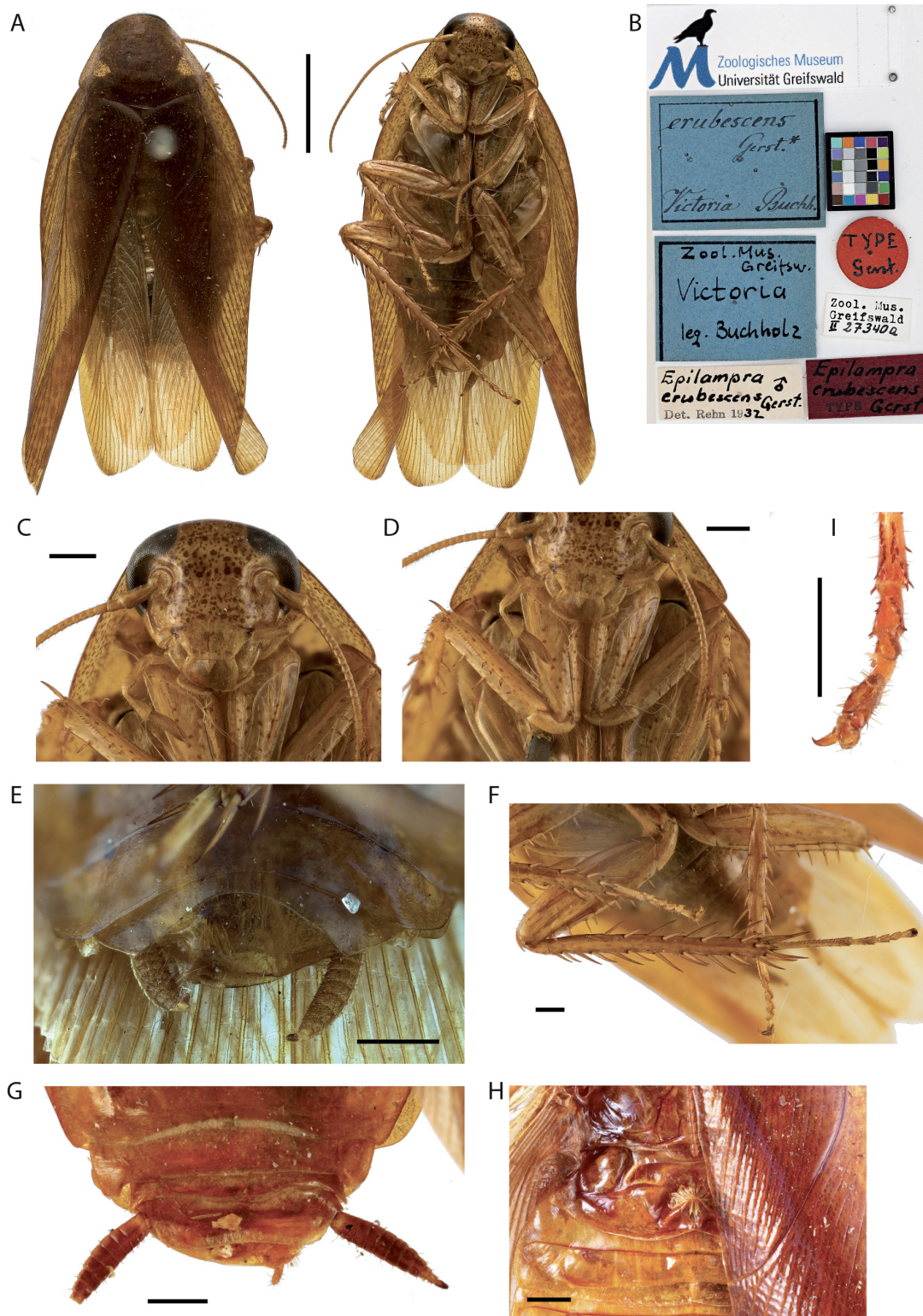


Fig. 11. *Africalolampra erubescens* (Gerstaecker, 1883). A–F. Holotype, ♂ (ZIMG-II-27340a). A. Habitus in dorsal and ventral views. B. Labels. C. Head. D. Front femora (type B2) with the most distal spine distinctly serrated. E. Subgenital plate. F. Hind leg, ventral view. G–I. Male specimen (MNHN-EP7613). G. Supra-anal plate. H. Tergal gland. I. Tarsi and claws of hindleg. Photographs A–F by Lara Lopardo (ZIMG). Scale bars: A = 5 mm; C–I = 1 mm.

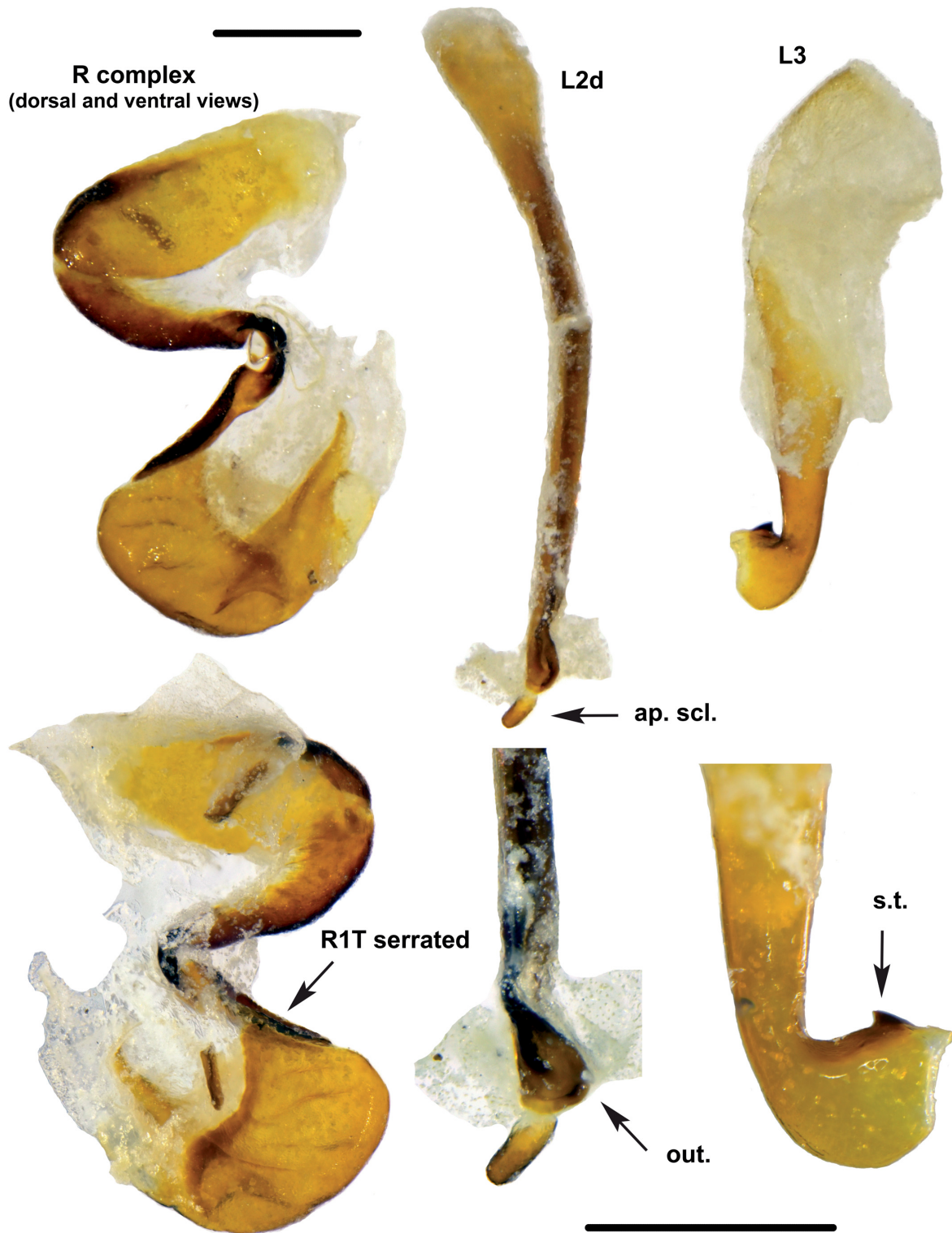


Fig. 12. *Africalolampra erubescens* (Gerstaecker, 1883), male genitalia (specimen from LUHM). The rod of L2d is broken, and probably R3 as well (compare with Anisyutkin 2016: fig. 9). Abbreviations: see Material and methods. Scale bars = 0.5 mm.

Note that this female allotype has labels with two different localities (Victoria in Cameroon and Limbareni in Gabon, Fig. 11; see also Rehn (1933) for localities reported by Gerstaecker).

Paratype

CAMEROON • 1 ♂; “paratype Victoria Buchh.”; ZIMG-II-27340c [pictures only].

Additional specimens

CAMEROON • 1 ♂; “Cam. Oberth”; MNHN-EP7613 • 1 ♂; “Camerun; Sjöstedt”; NHRS, NRM-BLAT 0002106 [pictures only] • 1 ♂; “Camerun, Itoki; 31/1 91, 31.I.1891; Sjöstedt”; NHRS, NRM-BLAT 0002107 [pictures only].

GABON • 1 ♂; “Gaboun; Coll. Br. v. W.; Standinger; 21.299”; LUHM.

NIGERIA • 1 ♀; “Biafra, Escalena”; NHRS, NRM-BLAT 0002108 [pictures only].

Differential diagnosis and history

The male and female were described from specimens collected in Victoria, Cameroon, and in Lambarene (= Limbareni), Gabon (Gerstaecker 1883), and largely redescribed from specimens collected in Bitje, Cameroon (Rehn 1933), with drawings of the head and male subgenital plate. Later, Princis (1962) and Anisyutkin (2016) complemented those descriptions, including male and female genitalia as well as the shape of the tergal specialization on the 1st tergite. Described in the genus *Epilampra* Burmeister, 1838,

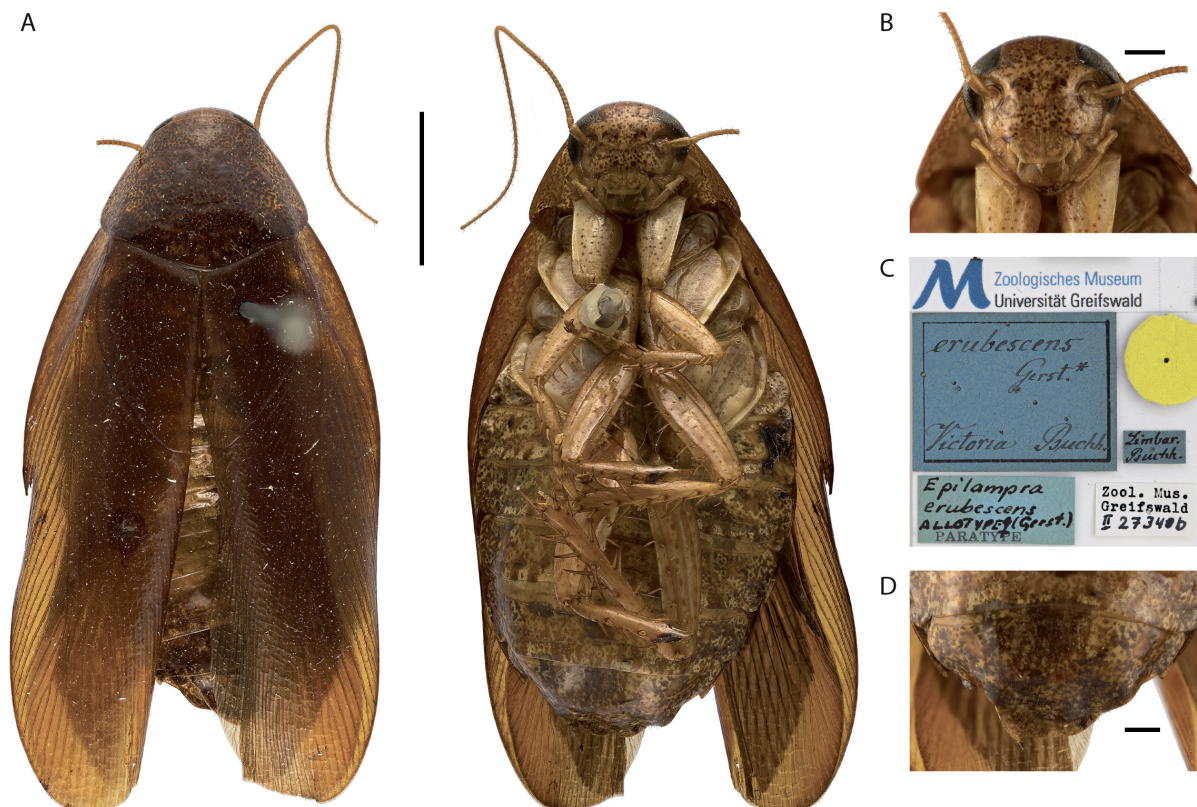


Fig. 13. *Africalolampra erubescens* (Gerstaecker, 1883), allotype, ♀ (ZIMG-II-27340b). **A.** Habitus in dorsal and ventral views. **B.** Head. **C.** Labels. **D.** Subgenital plate. Photographed by Lara Lopardo (ZIMG). Scale bars: A = 5 mm; B–D = 1 mm.

Table 4. List of published localities for *Africalolampra erubescens* (Gerstaecker, 1883).

Combination in publication	Locality	Reference
<i>Epilampra erubescens</i>	Victoria, Cameroon	Gerstaecker 1883
<i>Epilampra erubescens</i>	Lambarene, Ogowe River, Gabon	Gerstaecker 1883
<i>Epilampra erubescens</i>	Itoki, Cameroon	Borg 1902
<i>Epilampra erubescens</i>	Bonge, Cameroon	Borg 1902
<i>Epilampra erubescens</i>	Bibundi, Cameroon	Shelford 1908
<i>Epilampra erubescens</i>	Equatorial Guinea [Spanish Guinea]	Shelford 1909b
<i>Epilampra erubescens</i>	Cabo San Juan, Equatorial Guinea	Anonymous 1910
<i>Epilampra erubescens</i>	Cameroon	Shelford 1910
<i>Epilampra erubescens</i>	Bitje, Ja River, Cameroon	Rehn 1933
<i>Epilampra erubescens</i>	Dundo, Angola	Morales Agacino 1954
<i>Epilampra erubescens</i>	Mundame, Cameroon	Princis 1962
<i>Epilampra erubescens</i>	Case du Nyong, Cameroon	Princis 1962
<i>Epilampra erubescens</i>	Réserve forestière du Makak, Cameroon	Princis 1962
<i>Epilampra erubescens</i>	Bikoë, 30 km S of Nyong, Cameroon	Princis 1962
<i>Epilampra erubescens</i>	Réserve forestière du Nyong, Cameroon	Princis 1962
<i>Epilampra erubescens</i>	Gabon	Princis 1962
<i>Epilampra erubescens</i>	Kouilo River, Republic of Congo	Princis 1962
<i>Rhabdoblatta erubescens</i>	Mukondje Farm, Cameroon	Vanschuytbroeck 1970
<i>Rhabdoblatta erubescens</i>	Kade, Ghana	Kumar 1975
<i>Rhabdoblatta erubescens</i>	Mt Atewa, Ghana	Kumar 1975
<i>Rhabdoblatta erubescens</i>	Aledjo, Togo	Kumar 1975
<i>Rhabdoblatta erubescens</i>	Oban dist., Nigeria	Kumar 1975
<i>Rhabdoblatta erubescens</i>	Dja Posten, Cameroon (3°15' N, 13°30' E)	Kumar 1975
<i>Rhabdoblatta erubescens</i>	Makandé affl. Offoué (0°41' S, 11°55' E), Gabon	Grandcolas 1996b
<i>Rhabdoblatta erubescens</i>	N'Gotto, W Lobaye, 75 km WNW of Mbaiki, Central African Republic	Grandcolas 1996b
<i>Africalolampra erubescens</i>	Mundanie Mungo, Cameroon	Anisyutkin 2016

it was first transferred to the genus *Rhabdoblatta* (Princis 1967) and then to the genus *Africalolampra* (Anisyutkin 2016). We complement previous descriptions with pictures of the habitus and diagnostic characters of the male – including genitalia – and female (Figs 11–13). Note that in one of the two male specimens dissected, a slightly sclerified sclerite has been observed, ventrally to the apical part of L3; it could be homologous of the ‘trigonal’ sclerite sensu Roth (1995), but it deserves further examination to be ascertained.

As reported in Kumar’s key (1975), the shape of the tergal specialization (Fig. 11H) is the main diagnostic character for this species, especially by comparison with *A. camerunensis*. Note that, like *A. camerunensis* and contrary to Kumar’s key, *A. erubescens* does have serrated claws (Anisyutkin 2016; Fig. 11I).

Measurements of adults

Male (n = 2): pronotum length × width: 5.1–5.4 × 6.7–7.2, tegmina length: 20.1–21.4, overall length × width: 21.8–25.6 × 8.6–8.9.

Habitat

Unknown, but this species is believed to be relatively frequent in West Africa (Rehn 1933).

Distribution

This species is known from Cameroon, Gabon, Togo, Ghana, Nigeria, Central African Republic and Congo Republic (Fig. 1). Details of localities are provided in Table 4.

Key for males in the genus *Africalolampra* Roth, 1995

1. Overall length, from the vertex to the tip of the abdomen, smaller than 20 mm 2
– Overall length, from the vertex to the tip of the abdomen, larger than 20 mm 3
2. Tegmina and abdominal sternites with several brown maculae, pronotum with uneven dots and maculae *A. camerunensis* (Borg, 1902) comb. nov.
– Tegmina and abdominal sternites mostly unicolored, pronotum with rather uniform pattern of dots *A. erubescens* (Gerstaecker, 1883)
3. Face, frons and vertex speckled with dark dots and blotches, tergal specialization fleshy, nonsetose and white *A. ermanni* Roth, 1995
– Face, frons and vertex without conspicuous black dots, tergal specialization as a pit with two transverse fold-like elevations that meet mesally *A. stipata* (Walker, 1868) comb. nov.

Genus *Rhabdoblatta* Kirby, 1903

Type species

Rhabdoblatta praecipua (Walker, 1868).

Diagnosis and history

This genus is composed of more than 150 species distributed in Asia and Africa (Beccaloni 2014), and is known to be polyphyletic (e.g., Legendre *et al.* 2017; Yang *et al.* 2019; Wang *et al.* 2023). Clarifying its delineation is not within the aim of this manuscript. The latest diagnosis of the genus was given in Yang *et al.* (2019), but that diagnosis might rely mainly on Asian species and may not fit well with some African species (e.g., the widest part of the pronotum is not necessarily in the middle). The following African species share the diagnostic features of *Rhabdoblatta* but not those of *Africalolampra*: *Rhabdoblatta punctulata* (Saussure, 1891) has serrated claws but two styli and no tergal gland, *R. parva* (Chopard, 1952) has two styli, unserrated claws and a tergal specialization on the 7th tergite, *R. lynceae* (Gerstaecker, 1883) has slightly serrated claws but two styli and a tergal specialization on the 5th tergite, *R. pluriramosa* (Karny, 1915) has two styli, unserrated claws and no tergal gland, and the female has brachypterous wings, *R. pallida* (Borg, 1902) has one stylus and serrated claws but a tergal specialization at the junction of the 8th and 9th tergites, *R. punctipennis* (Saussure, 1895) has one stylus and slightly serrated claws but no tergal specialization, *R. fotoi* sp. nov. has serrated claws but two styli and a tergal gland on the 4th abdominal tergite.

For the following African species of *Rhabdoblatta*, their original descriptions did not mention all the diagnostic characters or were based on female specimens only, so that it is premature to envision any taxonomic change or confirmation: *Rhabdoblatta cincta* (Brunner von Wattenwyl, 1865), *R. trilobata*

(Saussure, 1891), *R. usambarensis* (Rehn, 1931), *R. malagassa* (Saussure & Zehntner, 1895) and *R. wittei* (Jolivet, 1954). Note that the type specimen of *R. usambarensis* (Rehn, 1931) is supposed to be deposited in the Berlin Zoological Museum but it was impossible to locate this specimen. As for *R. wittei* (Jolivet, 1954), the description mentions tegmina that do not extend beyond the 3rd tergite (sex not specified).

Rhabdoblatta fotoi Nyame Mbia, Legendre & Biram *sp. nov.*
urn:lsid:zoobank.org:act:5DDC7759-63FE-4690-B2F2-D77F9BCBE701
Figs 14–17

Differential diagnosis

Males can be readily distinguished from all other congeneric species by the presence and shape of the tergal gland on the 4th tergite. Males of *Rhabdoblatta lyncea* also have a tergal gland on the 4th tergite – although with a different shape – but no bulge on the 5th one; instead, they show a small, translucent, posteromedial knob on the 3rd tergite (compare Fig. 13E with Fig. 30C).

Etymology

Named after the Professor Foto Menbohan Samuel, who initiated this work.

Material examined

Holotype

CAMEROON • 1 ♂; Centre Region, Mefou watershed, Eloundem; elev. 569–675 m; Dec. 2019–Nov. 2020; molecular sample BL943; MNHN-EP7600.

Allotype

CAMEROON • 1 ♀; same data as for holotype; MNHN-EP7601.

Additional specimens

CAMEROON • 1 ♀, 2 ♂♂; same data as for holotype; MNHN-EP7590 to MNHN-EP7592.

Description

Male

HEAD. Triangular, about as long as wide, mostly brown (Fig. 14C). Eyes black, ocellar spots creamish with one dark spot below each of them. Labrum and clypeus brown, lighter than frons and vertex. Scape and pedicel light brown, while other antennal segments darker. Distance between eyes equals distance between antennal sockets.

PRONOTUM. Light brown, with scattered brown freckles except on its border (Fig. 14D). Pronotum roughly triangular but with middle of hind margin distinctly convex. Laterally deflexed.

TEGMINA AND WINGS. Fully developed, extending well beyond end of abdomen (Fig. 14A–B). Tegmina with rounded apex, light brown with veins darker, with numerous small dark brown maculae and few other larger. Sc thickened in ventral view. Hindwings light brown, darker anteriorly than posteriorly, with veins darker (Fig. 14B).

LEGS. Anteroventral margin of front femur of type B2, with 3 strong spines proximally (Fig. 14C). Tibial spines well-developed. Metatarsus of hind leg longer than other segments combined (Fig. 14H), inner margin with two rows of small spines (Fig. 14I). Arolium and tarsal pulvilli well-developed, the latter bordered by “additional spines” sensu Anisyutkin (2016). Claws symmetrical and finely serrated (Fig. 14I).

ABDOMEN. Coloration of abdominal sternites variable (Fig. 14A, F), dark brown medially but with dark spots of different sizes laterally. Fourth abdominal tergite specialized: tergal gland as in Fig. 14E, with two reddish rod-like processes directed anteriorly and meeting medially in an oval papilla with a deeply emarginated posterior margin. Fifth abdominal tergite also slightly specialized with a little bulge antero-medially (Fig. 14E). Supra-anal plate with its caudal margin with a slight medial incision and with fine, sparse setae (Fig. 14G). Subgenital plate uniformly caramel-colored, symmetrical, convex, with two curled and flattened styli (Fig. 14F). Cerci multisegmented, pubescent ventrally, with a black tip.

GENITALIA (Fig. 15). Left phallomere R complex (L1 of MK64 and R70, and R2+R3+N of G96); cleft between R1T and R2, very thin, without protuberance; R3 membranous, indistinct (sensu Anisytukin, 2016), in two parts. Sclerite L2d with its basal sclerite rod-shaped, very tapered, slightly enlarged at its

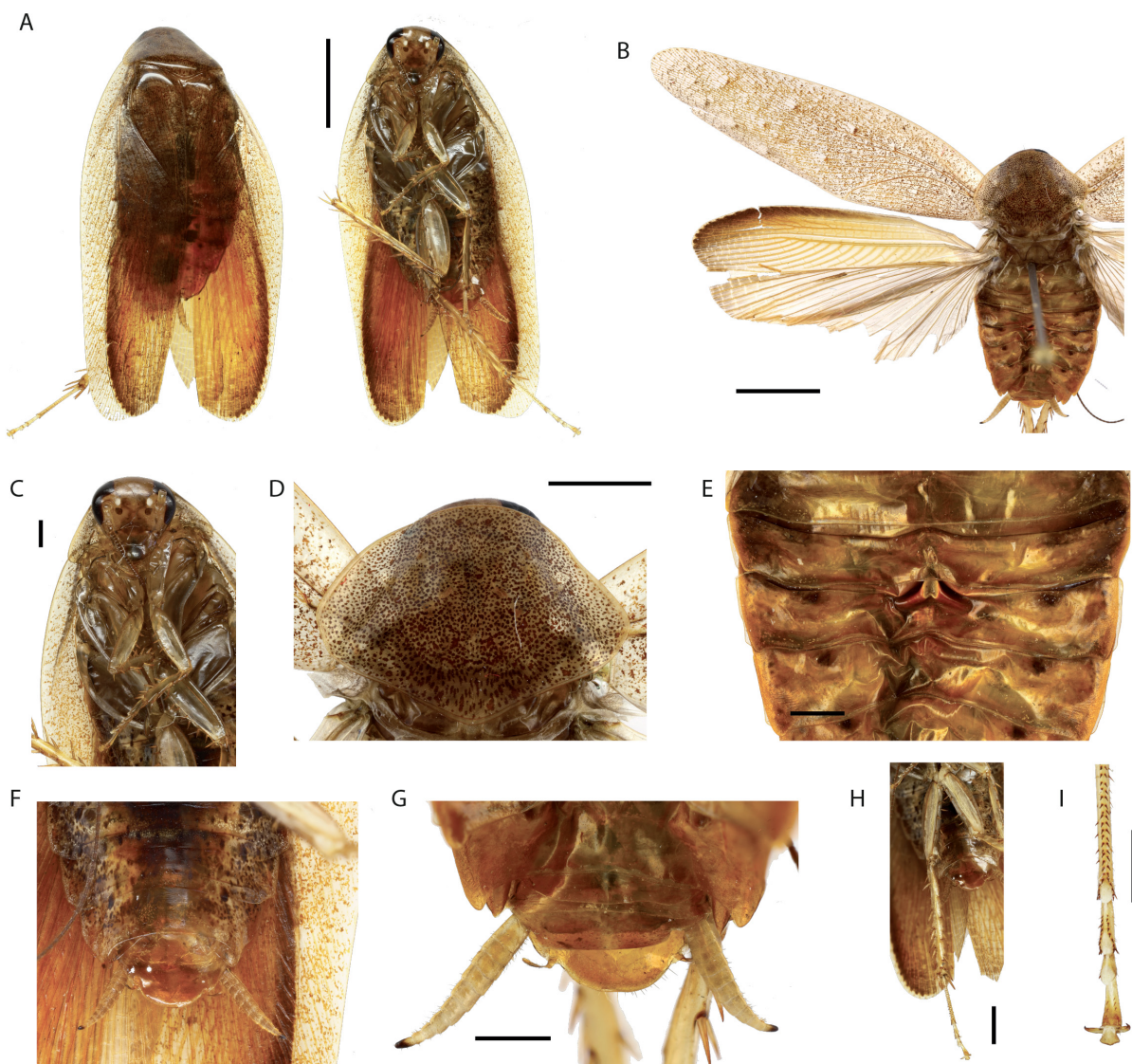


Fig. 14. *Rhabdoblatta fotoi* Nyame, Legendre & Biram sp. nov., holotype, ♂ (MNHN-EP7600). **A.** Habitus in dorsal and ventral views. **B.** Frontwing and hindwing expanded. **C.** Head and frontlegs. **D.** Pronotum. **E.** Tergal gland on 4th abdominal tergite. **F.** Subgenital plate. **G.** Supra-anal plate, dorsal view. **H.** Hindleg, ventral view. **I.** Close-up on tarsi and serrated claws, ventral view. Scale bars: A–B = 5 mm; C, E–G, I = 1 mm; D, H = 2 mm.

base (L1 of G96); apical sclerite of L2d (L2vm of MK64, L2v of R70 and L1 of G96) crescent-like, its apical vertex more elongated than its basal vertex, and somehow bifid. Sclerite L3 (R2 of MK64, R70, and L2d of PG96) long but sclerotized only at its distal end, with a slender hook extremely bent and elongated, with a subapical incision (groove hge. sensu Klass 1997); inner margin of basal part of L3 not crenulated. No sclerite L4U.

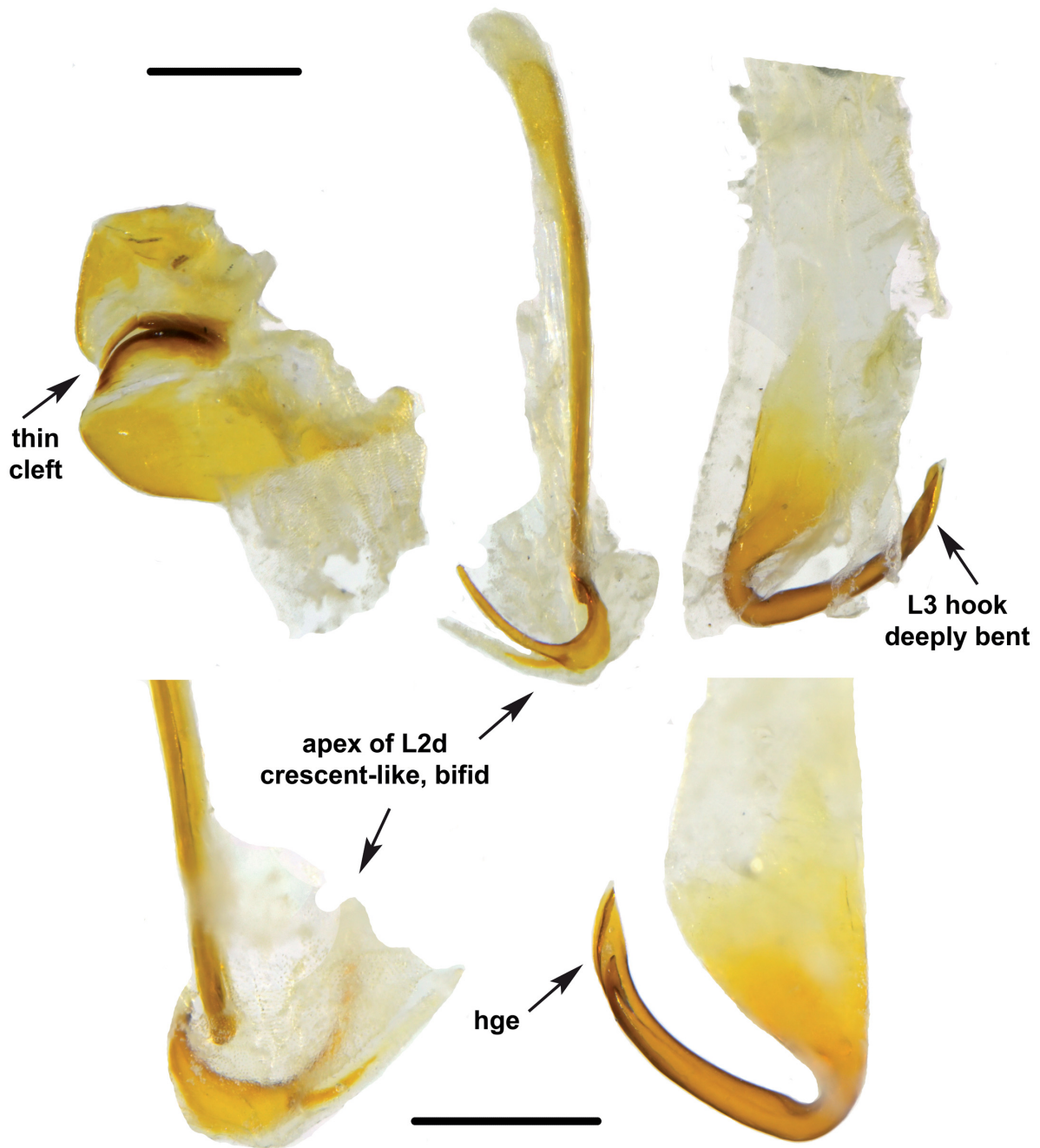


Fig. 15. *Rhabdoblatta fotoi* Nyame, Legendre & Biram sp. nov., holotype, ♂ (MNHN-EP7600), genitalia. Abbreviations: see Material and methods. Scale bars = 0.5 mm.

Remarks

The male genitalia of *Rhabdoblatta fotoi* sp. nov. show some similarities with those of the genus *Rhabdoblattella* known from South-East Asia and India (Anisyutkin 1999; Anisyutkin & Youshkova 2017). However, the new species lacks a median tooth along the hind margin of the subgenital plate, a diagnostic character of the genus *Rhabdoblattella*. Furthermore, the phylogenetic analysis using the 12S marker does not suggest a close relationship between *Rhabdoblattella disparis* Wang, Yang & Wang, 2017 and the new species (Fig. 2). We therefore prefer to place the new species in the genus *Rhabdoblatta*.

Female

The female is very similar to the male, although a bit larger and without tergal specialization. Its subgenital plate is symmetrical, semi-circular, without styli but with very sparse setae postero-medially and on its hind margin (Fig. 16).

Measurements of adults

Male (n = 1): pronotum length × width: 4.5 × 6.3, tegmina length: 20, overall length × width 15.3 × 7.

Female (n = 1): pronotum length × width: 6 × 6.8, tegmina length: 24.5, overall length × width: 28.5 × 11.

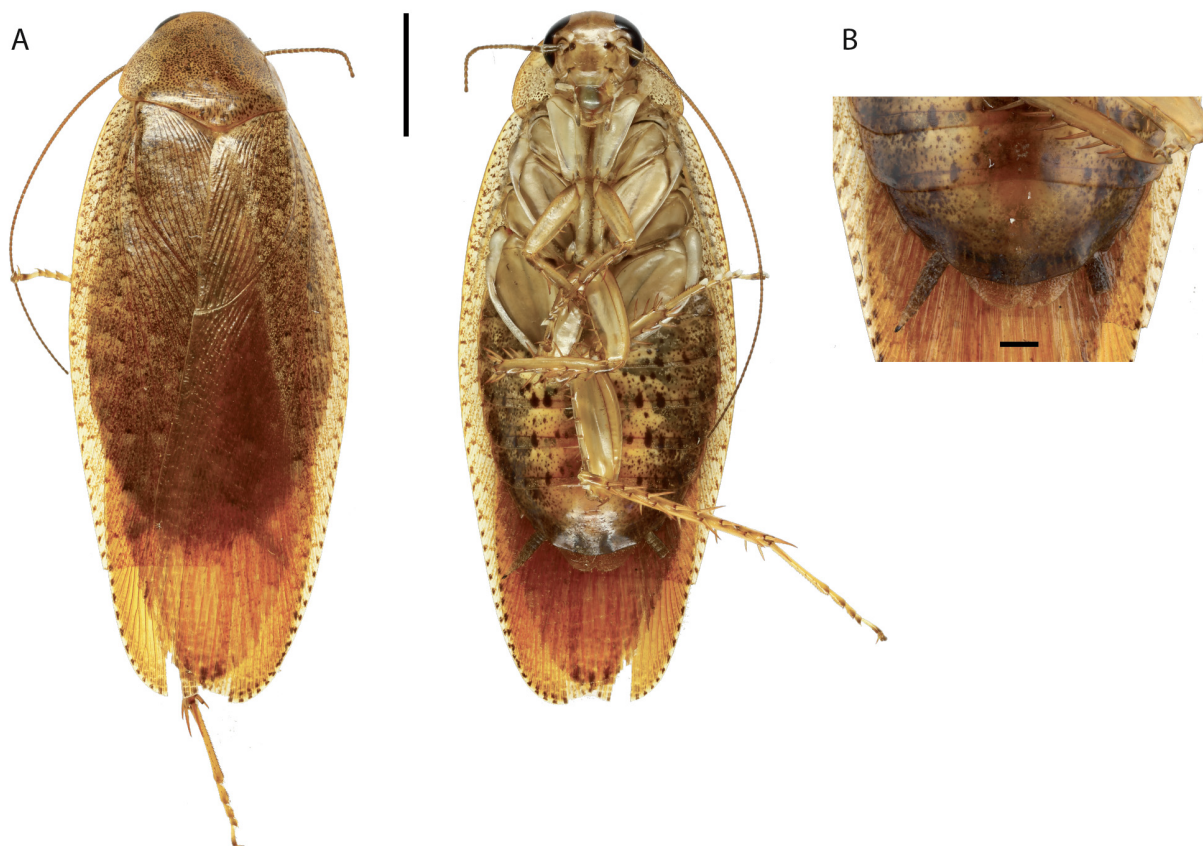


Fig. 16. *Rhabdoblatta fotoi* Nyame, Legendre & Biram sp. nov., allotype, ♀ (MNHN-EP7601). **A.** Habitus in dorsal and ventral views. **B.** Subgenital plate, ventral view. Scale bars: A = 5 mm; B = 1 mm.



Fig. 17. *Rhabdoblatta fotoi* Nyame, Legendre & Biram sp. nov., male nymph (MNHN-EP7590). **A.** Habitus in dorsal and ventral views. **B.** Close-up on tarsi. Arrows point at some of the long yellowish bristles found on the tarsi. Scale bar = 5 mm.

Nymphs

Pictures of nymph are provided in Fig. 17. In both male and female juveniles, tarsi of all legs with large yellowish bristles on the inner face; supra-anal plate serrated with a deep, rounded, medial incision. Male juveniles have two styli.

Molecular data

A portion of 12S rRNA has been obtained and is available under the GenBank accession number OR589771 (molecular extract BL943).

Habitat

Adults and nymphs of this species were found in all the rivers investigated.

Distribution

This species is only known from Cameroon.

Rhabdoblatta punctipennis (Saussure, 1895)

Fig. 18; Table 5

Epilampra punctipennis Saussure, 1895: 355.

Heterolampra punctipennis – Kirby 1904: 123.

Epilampra punctipennis – Shelford 1910: 14. — Kevan & Knipper 1961: 409. — Princis 1963b: 200.

Rhabdoblatta punctipennis – Princis 1967: 681.

Africalolampra punctipennis – Anisyutkin 2016: 141.

Material examined

TANZANIA • 1 ♂, with cristallized genitalia slide; “D.O. Afrika (Morogoro); Nachl. Schmitt; 1969; 1492”; LUHM.

Diagnosis and history

This species was initially described as *Epilampra punctipennis* (Saussure 1895) before first being transferred to the genus *Rhabdoblatta* (Princis 1967) and then to the genus *Africalolampra* (Anisyutkin 2016). However, this species does not share the diagnostic characters of *Africalolampra* as defined by Roth (1995) and adopted here. It notably has a strong sexual dimorphism and no tergal specialization. Anisyutkin (2016) also noted that the structure of the head of *R. punctipennis* strongly differs from that of the type species, *Africalolampra ehrmanni*, and of *A. erubescens*. Therefore, we transfer this species back to the genus *Rhabdoblatta*.

Saussure (1895) described and illustrated the habitus of a female specimen, while Princis (1963b) was the first to describe the male of this species. Anisyutkin (2016) complemented this description, including

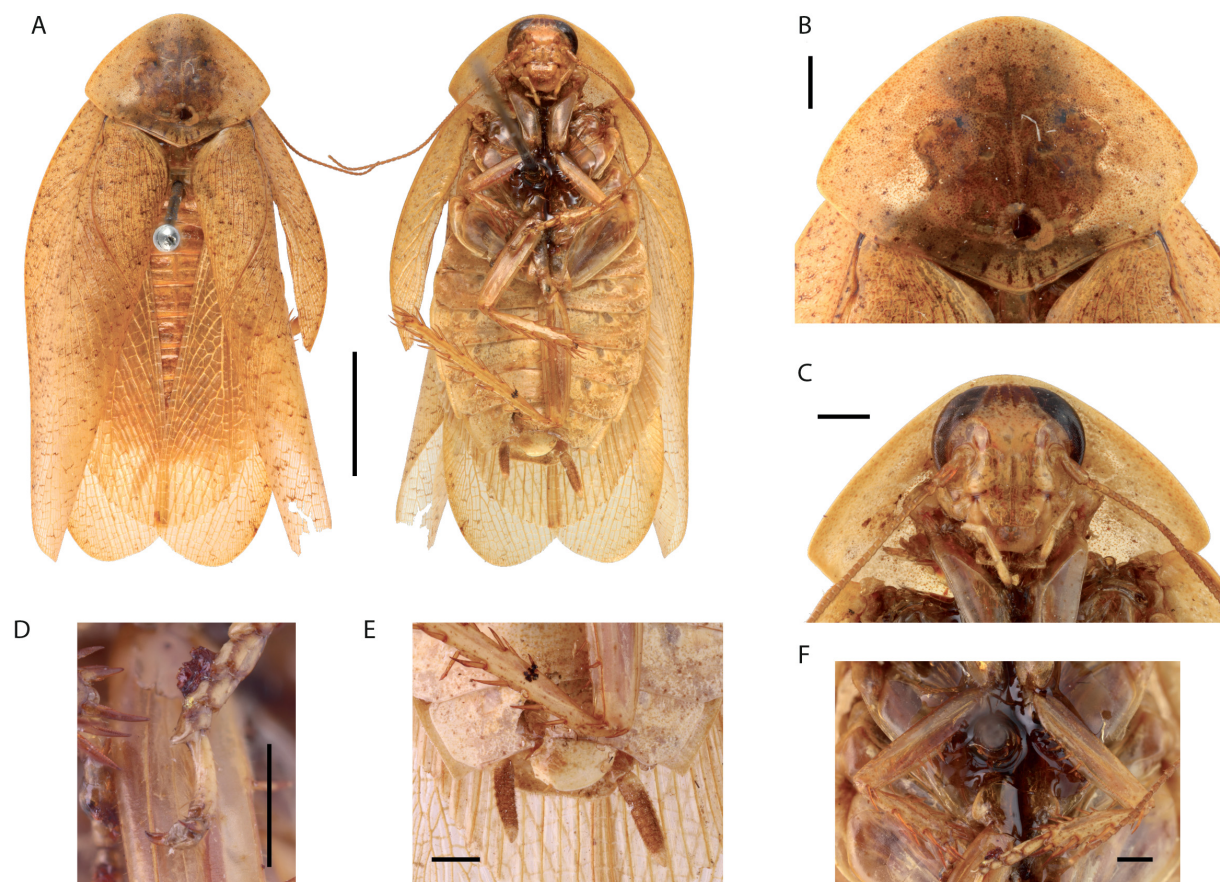


Fig. 18. *Rhabdoblatta punctipennis* (Saussure, 1895), male specimen (LUHM-1492). **A.** Habitus in dorsal and ventral views. **B.** Pronotum. **C.** Head. **D.** Tarsi and claws of front leg. **E.** Subgenital plate. **F.** Front femora. Scale bars: A = 5 mm; B–F = 1 mm.

Table 5. List of published localities for *Rhabdoblatta punctipennis* (Saussure, 1895).

Combination in publication	Locality	Reference
<i>Epilampra punctipennis</i>	Zanzibar, Tanzania	Saussure 1895
<i>Epilampra punctipennis</i>	Msala, Tanzania	Kevan & Knipper 1961
<i>Epilampra punctipennis</i>	Mozambique	Princis 1963b
<i>Epilampra punctipennis</i>	Morogoro, Tanzania	Princis 1963b
<i>Epilampra punctipennis</i>	Ndanda, Lindi, Tanzania	Princis 1963b
<i>Africalolampra punctipennis</i>	Daressalam, Tanzania	Anisyutkin 2016

with male genitalia. We complement this description with pictures of the habitus and close-ups on diagnostic characters (Fig. 18), and with a list of published localities for this species (Table 5).

Measurements of adults

Male (n = 1): pronotum length × width: 5.5 × 7.9, tegmina length: 20.4, overall length × width: 18.2 × 9.5.

Habitat

Reported from understory of coconut plantations (Kevan & Knipper 1961).

Distribution

This species is known from Tanzania (including Zanzibar) and Mozambique.

Rhabdoblatta pallida (Borg, 1902)

Figs 19–21; Table 6

Epilampra pallida Borg, 1902: 13.

Epilampra minuta Borg, 1902: 14.

Epilampra borgi Shelford, 1910: 14 (unnecessary replacement name for *Epilampra pallida*).

Epilampra minuta – Shelford 1909b: 479; 1910: 14. — Anonymous 1910: 579. — Sjöstedt 1933: 7.

Epilampra pallida – Sjöstedt 1933: 7. — Princis 1947: 59; 1962: 210; 1963a: 137.

Rhabdoblatta pallida – Vanschuytbroeck 1970: 14. — Kumar 1975: 83.

Material examined

Holotype

CAMEROON • ♀; “Camerun; Sjöstedt; *Epilampra pallida* Borg, det. K. Princis 1957; 123 57; 453 73; Typus”; NHRS, NRM-BLAT 0002115 [pictures only].

Additional specimens

CAMEROON • 1 ♂; “Camerun; 10/2 91, 10.II.1891; Sjöstedt”; NHRS, NRM-BLAT 0002113 [pictures only] • 1 ♂; “Camerun, Itoki; 22/1 91, 22.I.1891; Sjöstedt; typus of *minuta* Borg; 398 57”; NHRS, NRM-BLAT 0002114 [pictures only].

DEMOCRATIC REPUBLIC OF THE CONGO • 1 ♀; “Congo Belge, Kivu Masisi, Le Moul; 1938” LUHM.

REPUBLIC OF GUINEA • 1 ♀; “Mt Nimba N.E., 500–700 m; IFAN – 1946; A. VILLIERS”; MNHN-EP7614 • 1 juv.; “Nimba (Guinée), Serengbara; II.VI.42; M. Lamotte; *Epilampra pallida* Borg juv., det. K. Princis 1960”; MNHN-EP7604.

UNKNOWN • 1 ♀; “*Epilampra pallida* ♀ Borg, det. K. Princis 1956”; MNHN-EP7615.

Diagnosis and history

This species was described as *Epilampra pallida* from a female specimen, whose habitus was described and drawn (Borg 1902). Its junior synonym *Epilampra minuta* was described in the same work, from a male and a female specimen. Note that Borg apparently described the species from two female specimens but he also reported drawing a male specimen, which was later confirmed by Princis (1963a) who illustrated the male subgenital plate and tergal specialization (near the junction of tergites VIII–IX). The shape and localization of this tergal gland is diagnostic (Kumar 1975).

Measurements of adults

Female (n = 3): pronotum length × width: 4.5–5.6 × 5.9–6.9, tegmina length: 19.2–22.2, overall length × width: 17.2–23.4 × 7.5–8.7.

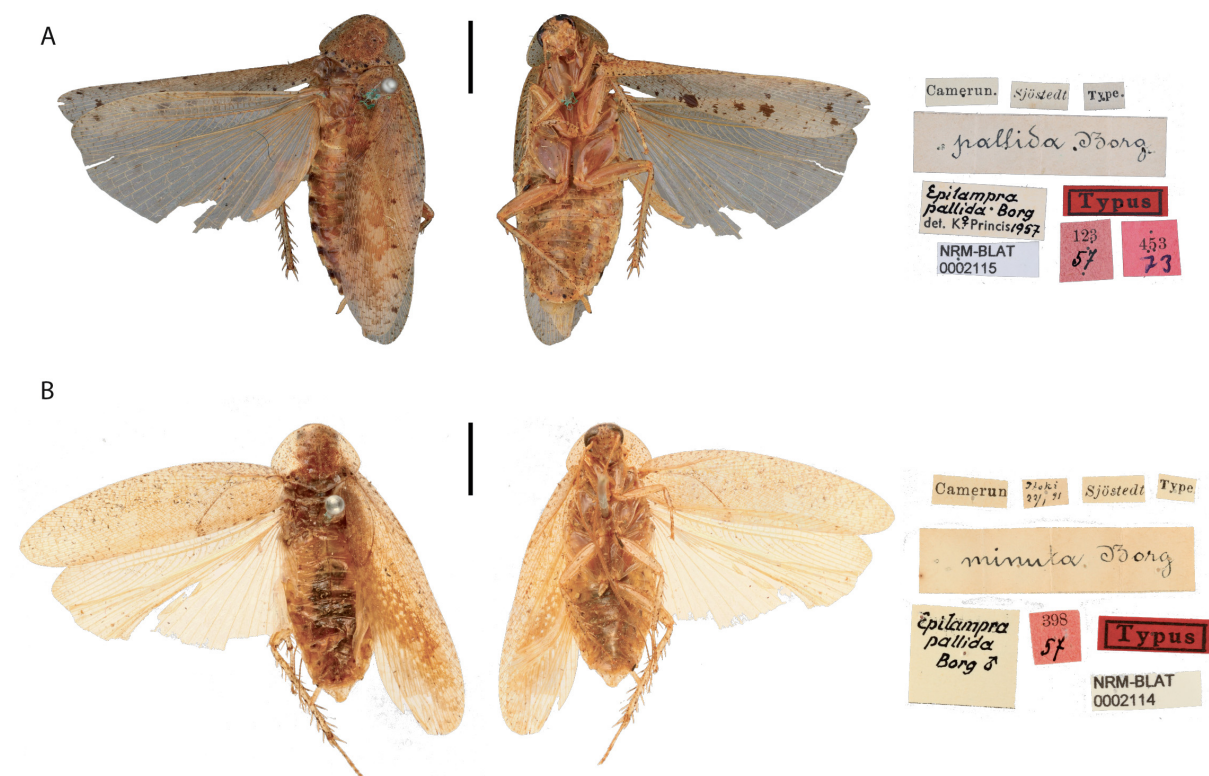


Fig. 19. Types of *Rhabdoblatta pallida* (Borg, 1902), habitus in ventral and dorsal views, and labels. **A.** Holotype, ♀ (NRM-BLAT 0002115). **B.** *Epilampra minuta* Borg, 1902, holotype, ♂ (NRM-BLAT 0002114), its junior synonym. Both photographed by Gunvi Lindberg (©2023 Naturhistoriska riksmuseet). Original photos cropped, light levels and contrast adjusted. Made available by the Swedish Museum of Natural History under Creative Commons Attribution 4.0 International Public License, CC-BY 4.0. Scale bars = 5 mm.

Habitat

Unknown.

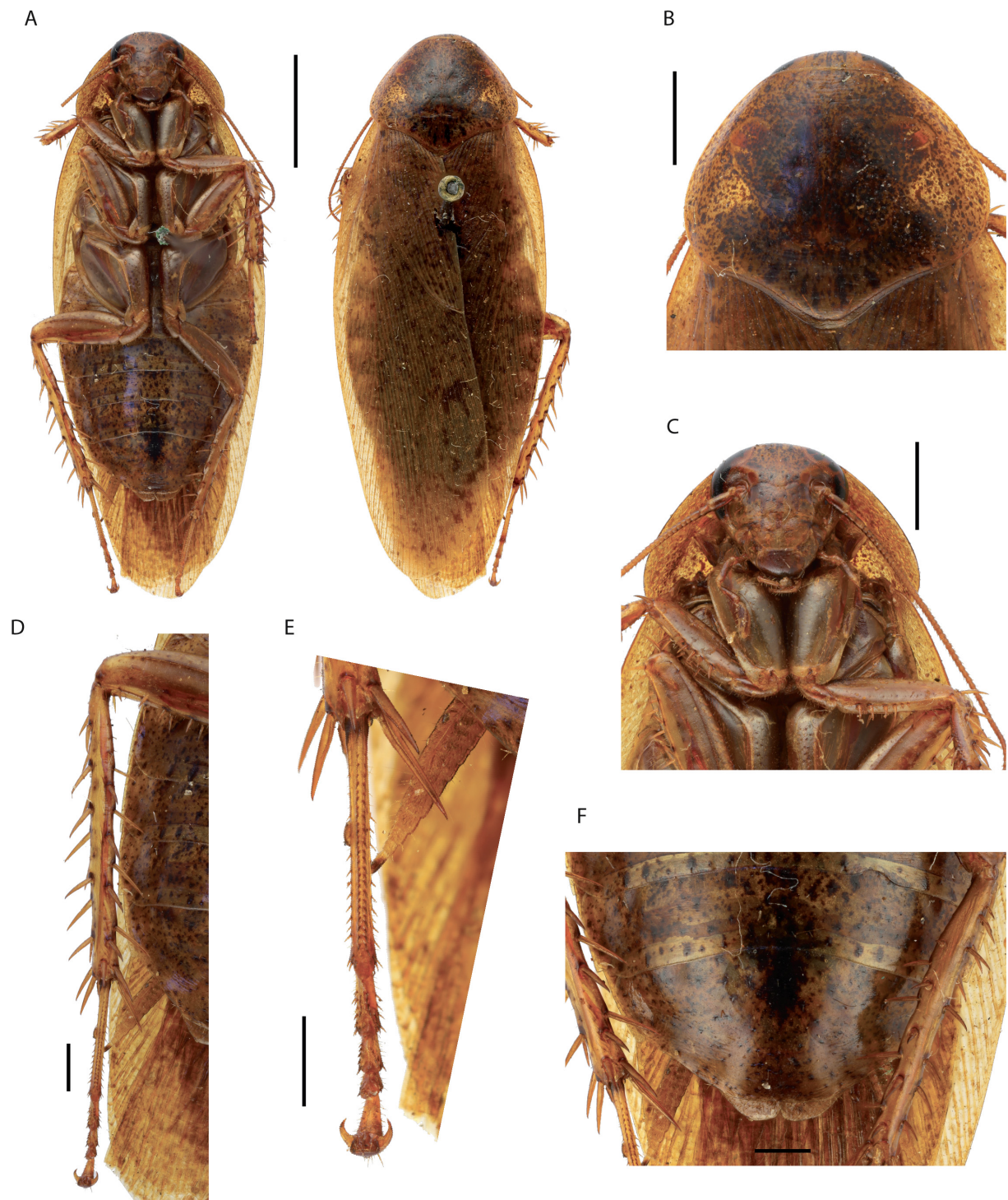


Fig. 20. Female specimen of *Rhabdoblatta pallida* (Borg, 1902) (MNHN-EP7614). **A.** Habitus in dorsal and ventral views. **B.** Pronotum. **C.** Head and fore femora. **D.** Hind leg **E.** Close-up on tarsi and claws. **F.** Subgenital plate. Scale bars: A = 5 mm; B–C = 2 mm; D–F = 1 mm.

Table 6. List of published localities for *Rhabdoblatta pallida* (Borg, 1902).

Combination in publication	Locality	Reference
<i>Epilampra pallida</i>	Cameroon	Borg 1902
<i>Epilampra minuta</i>	Cameroon	Borg 1902
<i>Epilampra minuta</i>	Equatorial Guinea [Spanish Guinea]	Shelford 1909b
<i>Epilampra minuta</i>	Cabo San Juan, Equatorial Guinea	Anonymous 1910
<i>Epilampra pallida</i>	Gabon	Princis 1962
<i>Epilampra pallida</i>	Nimba (Séréngbara), Republic of Guinea*	Princis 1963a
<i>Rhabdoblatta pallida</i>	Mukondje Farm, Cameroon	Vanschuytbroeck 1970

*nymph

Distribution

This species is known from Cameroon, Gabon, Equatorial Guinea and, putatively, the Republic of Guinea (Table 6).

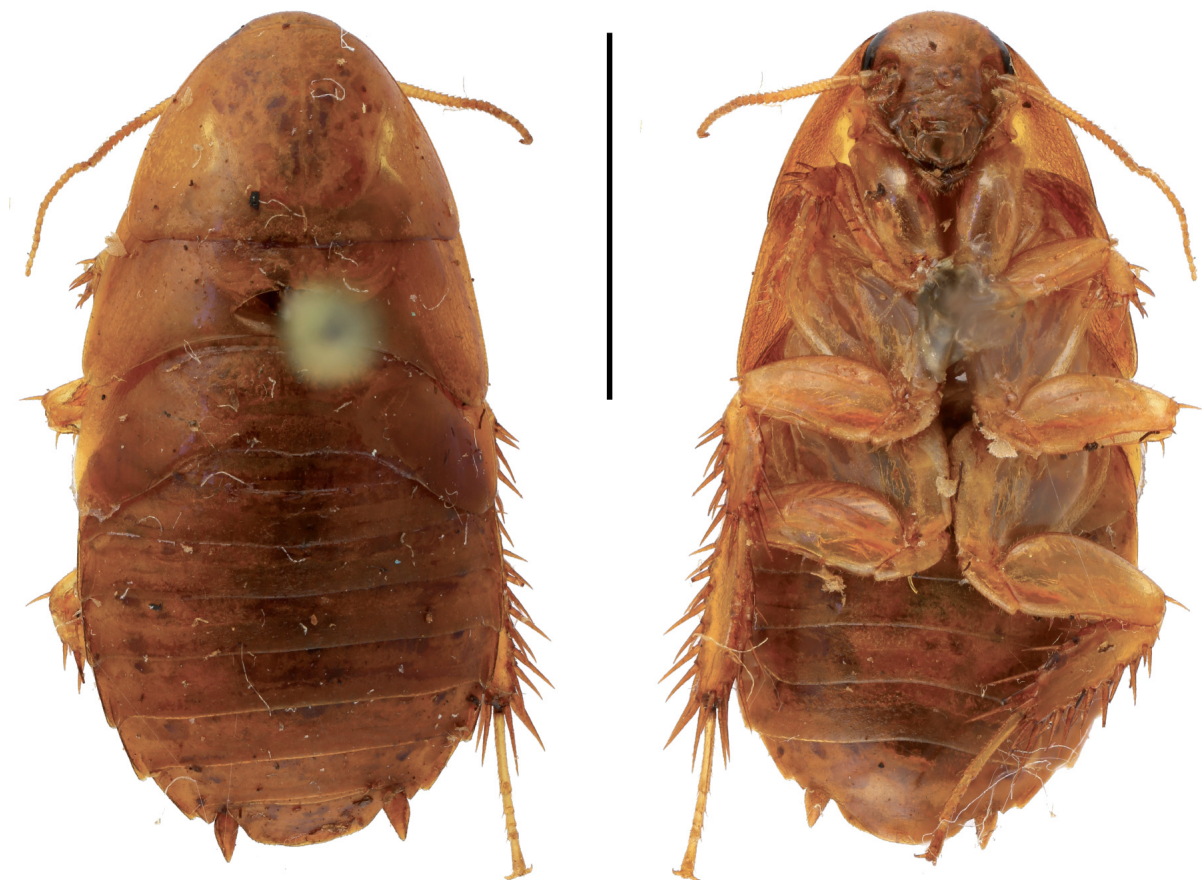


Fig. 21. Juvenile identified as *Rhabdoblatta pallida* (Borg, 1902) by K. Princis (MNHN-EP7604), habitus in dorsal and ventral views. Scale bar = 5 mm.

Rhabdoblatta pluriramosa (Karny, 1915)

Figs 22–25; Table 7

Ischnoptera pluriramosa Karny, 1915: 144.

Epilampra pluriramosa – Lamotte & Roy 1961a: 4040; 1961b: 4209; 1962: 26. — Princis 1963a: 138.

Rhabdoblatta pluriramosa – Kumar 1975: 81. — Lamotte & Roy 2003: 62.

Material examined

REPUBLIC OF GUINEA • 1 ♂; “Guinée, Nimba, Camp I; 12-13 XII 1951; Lamotte et Roy leg.”;
LUHM • 1 ♂; “Guinée, Nimba; XII 56–V 57; Lamotte, Amiet, Vanderplaetsen; n°52”; MNHN-EP7616

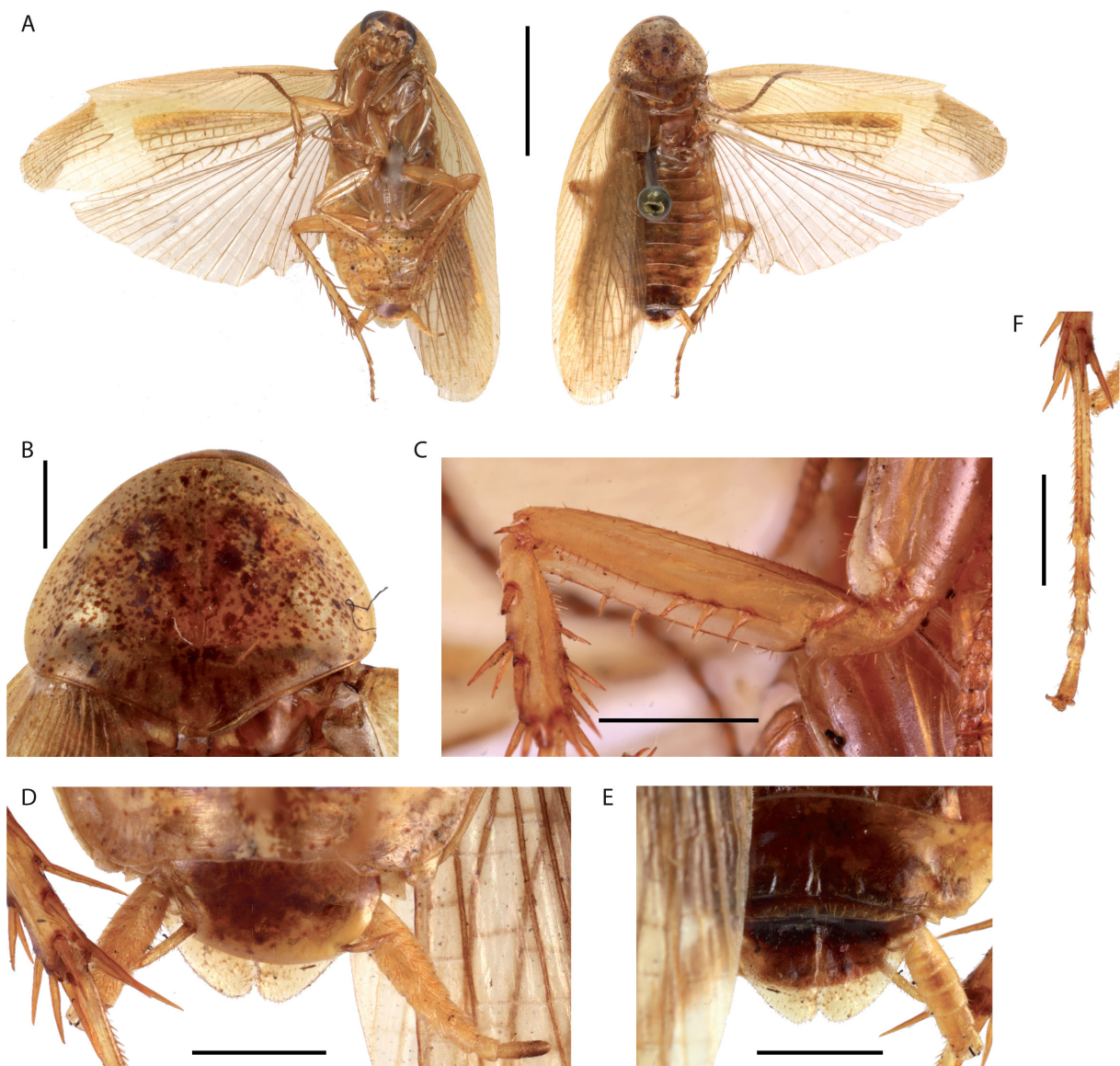


Fig. 22. *Rhabdoblatta pluriramosa* (Karny, 1915), male specimen (MNHN-EP7616). **A.** Habitus in dorsal and ventral views. **B.** Pronotum. **C.** Front femur. **D.** Subgenital plate. **E.** Supra-anal plate. **F.** Tarsi and claws of hind leg. Scale bars: A = 5 mm; B–F = 1 mm.

• 1 ♂; “Guinée, Nimba, Pr. Camp I; 5 avril 57, XII 56–V 57; Lamotte, Amiet, Vanderplaetsen; R. Roy det. 1961”; MNHN-EP7617 • 1 ♂; “Nimba (Guinée), Mt To (1600m), Camp 1; II. VI. 42; M. Lamotte”; MNHN-EP7621 • 3 ♀♀; “Nimba (Guinée); II. VI. 42; M. Lamotte”; MNHN-EP7618–20 • 1 juv.; “Nimba (Guinée), Camp I, ravin; IX 56 – XI 56, 23/10/1956; Lamotte”; MNHN-EP7605.

Diagnosis and history

This species, devoid of tergal specialization, was erroneously described in the genus *Ischnoptera* from a male specimen. It owes its specific epithet to its hindwing venation (Karny 1915). The type specimen was not found in Vienna (NMW); its location is unknown. Princis (1963a) described male, female and nymph specimens from several localities (Table 7). We complement these descriptions with pictures of male, female and juvenile specimens, as well as male genitalia (Figs 22–25). Females are readily distinguished from all other species except *R. wittei* because of their short wings. The shape of these wings distinguish the two species (Kumar 1975). Males are distinguished by their absence of a tergal specialization, combined with a pair of styli.

Description of male genitalia (Fig. 24)

Genitalia weakly sclerotized overall; left phallomere R complex (L1 of MK64 and R70, and R2+R3+N of G96); cleft between R1T and R2, thin, without protuberance; R3 Y-shaped (sensu Anisyutkin 2016), the base of the Y less sclerotized. Sclerite L2d with its basal sclerite rod-shaped, tapered, thinner and more sclerotized near the apex (L1 of G96); apical sclerite of L2d (L2vm of MK64, L2v of R70 and

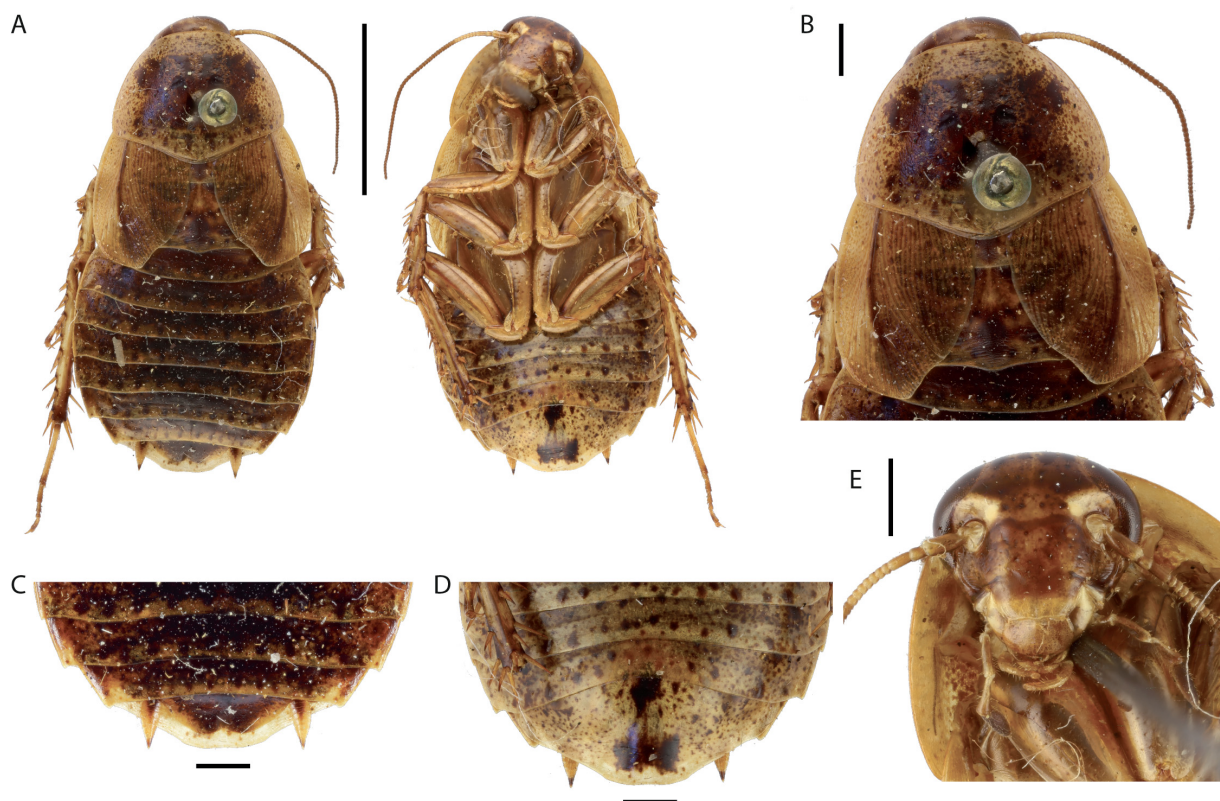


Fig. 23. *Rhabdoblatta pluriramosa* (Karny, 1915), female specimen (MNHN-EP7618). **A.** Habitus in dorsal and ventral views. **B.** Pronotum and tegmina. **C.** Supra-anal plate. **D.** Subgenital plate. **E.** Face. Scale bars: A = 5 mm; B–E = 1 mm.

L1 of G96) quadrangular. Sclerite L3 (R2 of MK64, R70, and L2d of PG96) rather short, with a strong hook; inner margin of the basal part of L3 slightly crenulated. No sclerite ventrally to L3.

Measurements of adults

Male (n=3): pronotum length \times width: 2.9–3.3 \times 4.1–4.7, tegmina length: 13.3–12.6, overall length \times width: 12.3–12.5 \times 4.7–4.8.

Female (n=3): pronotum length \times width: 3.5–3.7 \times 4.7–5.1, tegmina length: 3.5–3.8, overall length \times width: 13.4–13.6 \times 6.3–7.

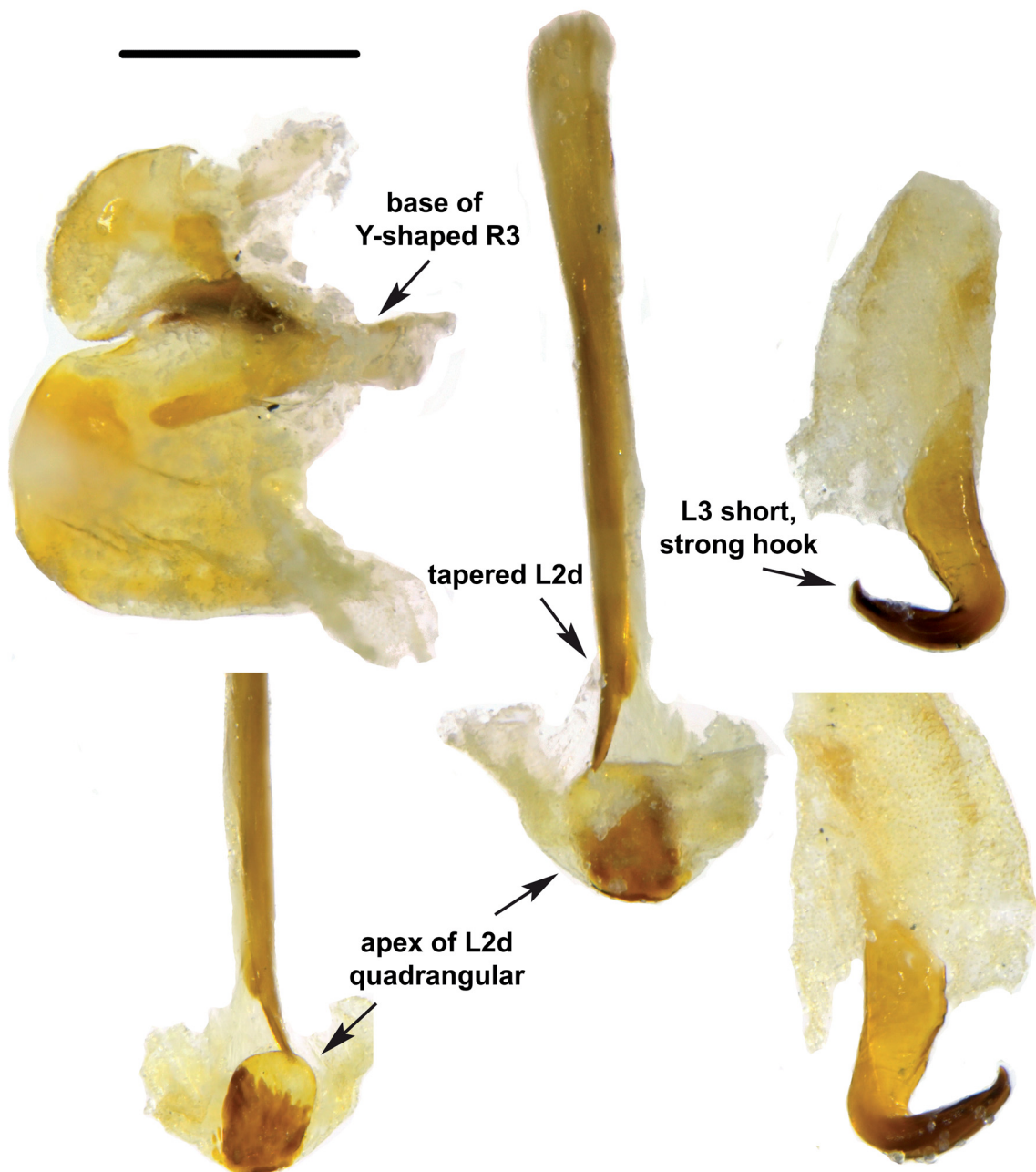


Fig. 24. *Rhabdoblatta pluriramosa* (Karny, 1915), male genitalia (MNHN-EP7621). Scale bar = 0.5 mm.

Table 7. List of published localities for *Rhabdoblatta pluriramosa* (Karny, 1915). An unidentified specimen in the MNHN collection from Kisangani (Congo) could belong to this species.

Combination in publication	Locality	Reference
<i>Ischnoptera pluriramosa</i>	Mamou, Republic of Guinea	Karny 1915
<i>Epilampra pluriramosa</i>	Mount Nimba, Republic of Guinea	Lamotte & Roy 1961a
<i>Epilampra pluriramosa</i>	Nimba (Nion), Republic of Guinea	Princis 1963a
<i>Epilampra pluriramosa</i>	Mont Tô, Nimba, Republic of Guinea	Princis 1963a
<i>Epilampra pluriramosa</i>	Nimba, Cavally, Ravin du Zié, Republic of Guinea	Princis 1963a
<i>Epilampra pluriramosa</i>	Nimba (piste de Zougouépo), Republic of Guinea	Princis 1963a

Habitat

Orophilous (Lamotte & Roy 1961b, 1962).

Distribution

This species is only known from the Republic of Guinea (Table 7). Note that an unidentified specimen at MNHN from the surroundings of Kisangani (Congo) could belong to this species.



Fig. 25. *Rhabdoblatta pluriramosa* (Karny, 1915), juvenile specimen (MNHN-EP7605), habitus in dorsal and ventral views. Scale bar = 5 mm.

Rhabdoblatta cincta (Brunner von Wattenwyl, 1865)

Fig. 26; Table 8

Epilampra cincta Brunner von Wattenwyl, 1865: 172.

Epilampra cincta – Walker 1869: 128. — Shelford 1910: 14. — Princis 1965: 122.

Heterolampra cincta – Kirby 1904: 123.

Rhabdoblatta cincta – Princis 1967: 681.

Material examined

TANZANIA • 1 ♀; “Tanganyika Terr.: Bunduki, Ulguru Mts., 1500 m, gorge Mungula; Forêt transition, dans l’humus; 1/6-V-1957; Mission Zoolog. I.R.S.A.C. en Afrique orientale; P. Basilewsky et N. Leleup; coll. mus. congo”; LUHM • 1 ♀; same data as for preceding; RMCA.

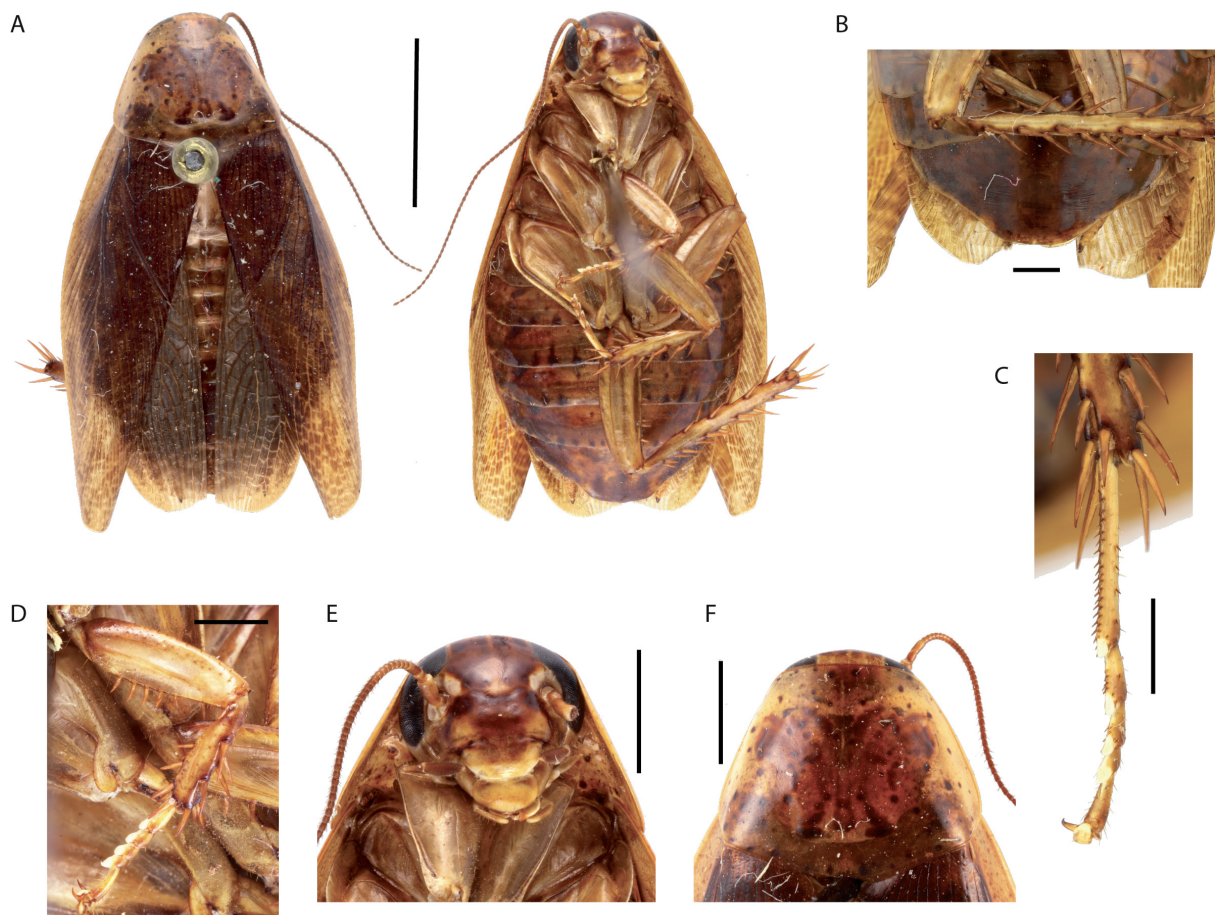


Fig. 26. *Rhabdoblatta cincta* (Brunner von Wattenwyl, 1865), females. **A–D.** Specimen from RMCA. **E–G.** Specimen from LUHM. **A.** Habitus in dorsal and ventral views. **B.** Subgenital plate, ventral view. **C.** Tarsi of hind leg, ventral view. **D.** Front femur, ventral view. **E.** Head, ventral view. **F.** Pronotum, dorsal view. Scale bars: A = 5 mm; B–D = 1 mm; E–F = 2 mm.

Table 8. List of published localities for *Rhabdoblatta cincta* (Brunner von Wattenwyk, 1865).

Combination in publication	Locality	Reference
<i>Epilampra cincta</i>	Uluguru Mts, gorge de la Mungula, Bunduki, Tanzania	Princis 1965
<i>Epilampra cincta</i>	Uluguru Mts, sommet du Kidunda, Tanzania	Princis 1965
<i>Epilampra cincta</i>	Uluguru Mts, moy. Mgeta, Bunduki, Tanzania	Princis 1965

Diagnosis and history

This rather small species is only known from a few localities within the Uluguru Mountains in Tanzania (Table 8). It was described from a male specimen, without any locality and supposedly deposited at NMW but not found there. This type specimen might be considered lost. Shelford (1910) suspected this species was African, which was later confirmed by Princis (1965) after observation of female specimens matching with the succinct original description. Besides its coloration pattern, this species is readily identifiable from its small size, its laterally deflexed pronotum and relatively short tarsi (Fig. 26).

Measurements of adults

Female (n = 2): pronotum length × width: 4.2–4.5 × 5.3–5.4, tegmina length: 12.8–13.5, overall length × width: 15–16.1 × 7.5–7.7.

Habitat

The labels read: transitional forest, in humus.

Distribution

This species is only known from Tanzania (Table 8).

Rhabdoblatta usambarensis (Rehn, 1931)

Fig. 27; Table 9

Epilampra usambarensis Rehn, 1931: 375.

Epilampra usambarensis – Princis 1965: 122.

Rhabdoblatta usambarensis – Princis 1967: 679.

Material examined

TANZANIA • 1 ♀; “Tanganyika Terr., Bunduki, Uluguru Mts., moy. Mgeta 1300 m; 30-IV/11-V-1957; Mission Zoolog. I.R.S.A.C. en Afrique orientale; P. Basilewsky et N. Leleup; Coll. Mus. Congo”; RMCA.

Diagnosis and history

Rehn (1931) gave a complete description, apart from the genitalia, of this species from a unique male specimen. Later, the female was found and told to be very similar to the male (Princis 1965). Although the type specimen is mentioned as deposited in the Berlin Zoological Museum, it was not found there and might be lost. We complement Rehn’s description with some pictures of this elongated species, only known from Tanzania (Fig. 26).

Measurements of adults

Female (n = 1): pronotum length × width: 4.8 × 6.3, tegmina length: 21.7, overall length × width: 20 × 7.9.

Table 9. List of published localities for *Rhabdoblatta usambarensis* (Rehn, 1931).

Combination in publication	Locality	Reference
<i>Epilampra usambarensis</i>	Usambara, inland from Tanga, Tanzania	Rehn 1931
<i>Epilampra usambarensis</i>	Uluguru Mts, moy. Mgeta, Bunduki, Tanzania	Princis 1965

Habitat

Unknown.

Distribution

This species is only known from Tanzania (Table 9).

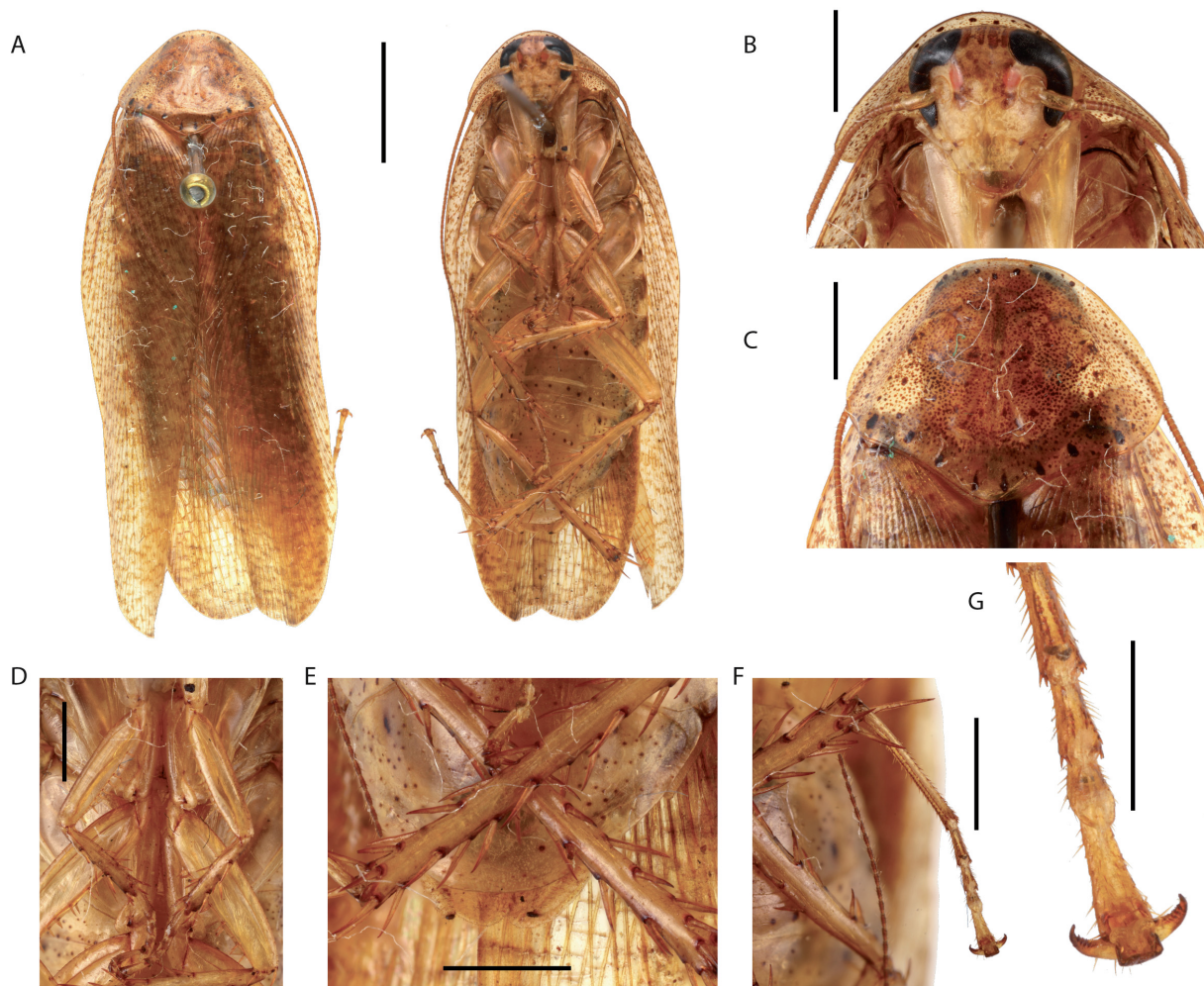


Fig. 27. *Rhabdoblatta usambarensis* (Rehn, 1931), female specimen (RMCA). **A.** Habitus in dorsal and ventral views. **B.** Head. **C.** Pronotum. **D.** Front femora. **E.** Subgenital plate, ventral view. **F.** Hind leg, ventral view. **G.** Metatarsi, ventral view. Scale bars: A = 5 mm; B–F = 2 mm; G = 1 mm.

***Rhabdoblatta lyncea* (Gerstaecker, 1883)**

Figs 28–30; Table 10

Epilampra lyncea Gerstaecker, 1883: 53.

Epilampra electa Borg, 1902: 10.

Epilampra infinita Borg, 1902: 11.

Epilampra sjostedti Borg, 1902: 12.

Heterolampra lyncea – Kirby 1904: 122.

Epilampra infinita – Shelford 1909b: 479; 1910: 14. — Anonymous 1910: 579. — Sjöstedt 1933: 7.

Epilampra electa – Shelford 1910: 14. — Sjöstedt 1933: 7.

Epilampra sjostedti – Shelford 1910: 14. — Sjöstedt 1933: 7. — Chopard 1945: 163. — Princis 1947: 59.

Epilampra lyncea – Shelford 1910: 14. — Rehn 1933: 408, 451. — Princis 1962: 209.

Rhabdoblatta lyncea – Vanschuytbroeck 1970: 14. — Kumar 1975: 80.

Material examined

Paratype

CAMEROON • 1 juv.; “Mungo Buchh.; *Epilampra lyncea* Gerst., juv.; Zool. Mus. Greifswald II 27341”: ZIMG.

Additional specimens

CAMEROON • 1 ♂, with genitalia slide; “1969; 1494, 18 512, 237; Nat. Kabinet Stuttgart, Coll. Br. v. W.”; LUHM • 1 ♀; “Camerun; Sjöstedt; 400 57; type of *Epilampra electa* Borg; *Epilampra lyncea* Gerst. ♀, det. K. Princis 1957”; NHRS, NRM-BLAT-0002103 [pictures only] • 1 ♀; “Camerun; Sjöstedt; 396 57; type of *Epilampra infinita* Borg; *Epilampra lyncea* Gerst. ♀, det. K. Princis 1957”; NHRS,



Fig. 28. *Rhabdoblatta lyncea* (Gerstaecker, 1883), paratype, juvenile (ZIMG-II 27341). Habitus in dorsal and ventral views, with labels. Photographed by Lara Lopardo (ZIMG). Scale bar = 5 mm.

NRM-BLAT-0002104 [pictures only] • 1 ♂; “Camerun, N’dian; 23/5 91, 23.V.1891; Sjöstedt; 397 57; type of *Epilampra sjöstedti* Borg; *Epilampra lyncea* Gerst. ♂, det. K. Princis 1957”; NHRS, NRM-BLAT-0002105 [pictures only].

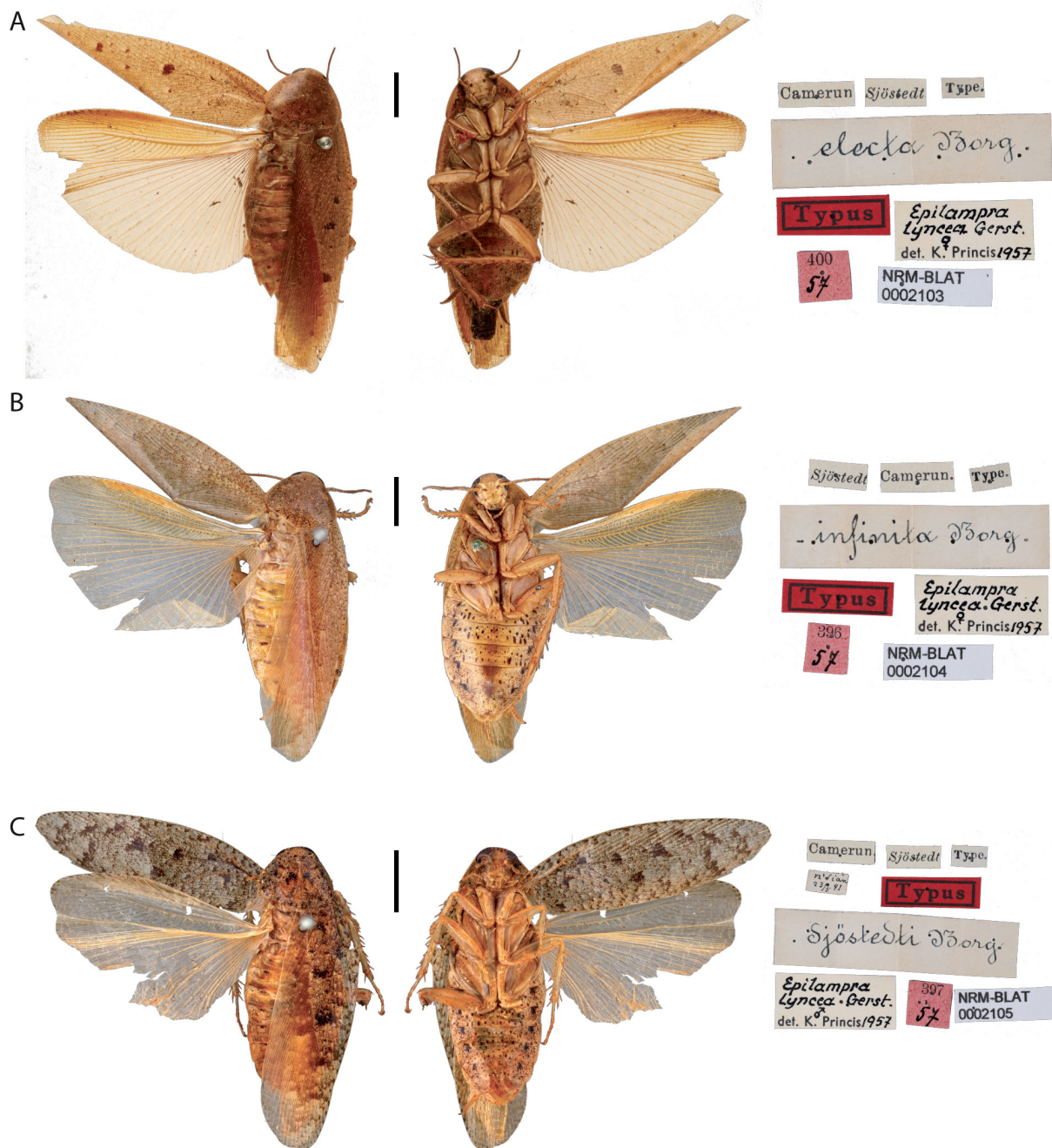


Fig. 29. Habitus and labels of the holotypes of the synonyms. **A.** *Epilampra electa* Borg, 1902, holotype, ♀ (NRM-BLAT 0002103). **B.** *Epilampra infinita* Borg, 1902, holotype, ♀ (NRM-BLAT 0002104). **C.** *Epilampra sjöstedti* Borg, 1902, holotype, ♂ (NRM-BLAT 0002105). Photographed by Gunvi Lindberg (©2023 Naturhistoriska riksmuseet). Original photos cropped, light levels and contrast adjusted. Made available by the Swedish Museum of Natural History under Creative Commons Attribution 4.0 International Public License, CC-BY 4.0. Scale bars = 5 mm.

Diagnosis and history

This species was described from a female specimen, with a juvenile as a paratype (Gerstaecker 1883). At ZIMG, only the paratype remains (Fig. 28) and the female holotype is most likely lost, as previously suggested (Rehn 1933). This species has three junior synonyms, described and illustrated by Borg (1902), synonymized by Princis (1962), and whose types are deposited at NHRS (Fig. 29). Kumar (1975) included this species in his key to species of *Rhabdoblatta* found in West Africa and the Congo Basin; the male specialization on the 4th abdominal tergite is a diagnostic character (Kumar erroneously mentioned the 5th tergite in his key; see Fig. 30 and Princis 1962). Genitalia of the male specimen from LUHM were already prepared; they are pictured here (Fig. 30G) for the record although hardly visible.

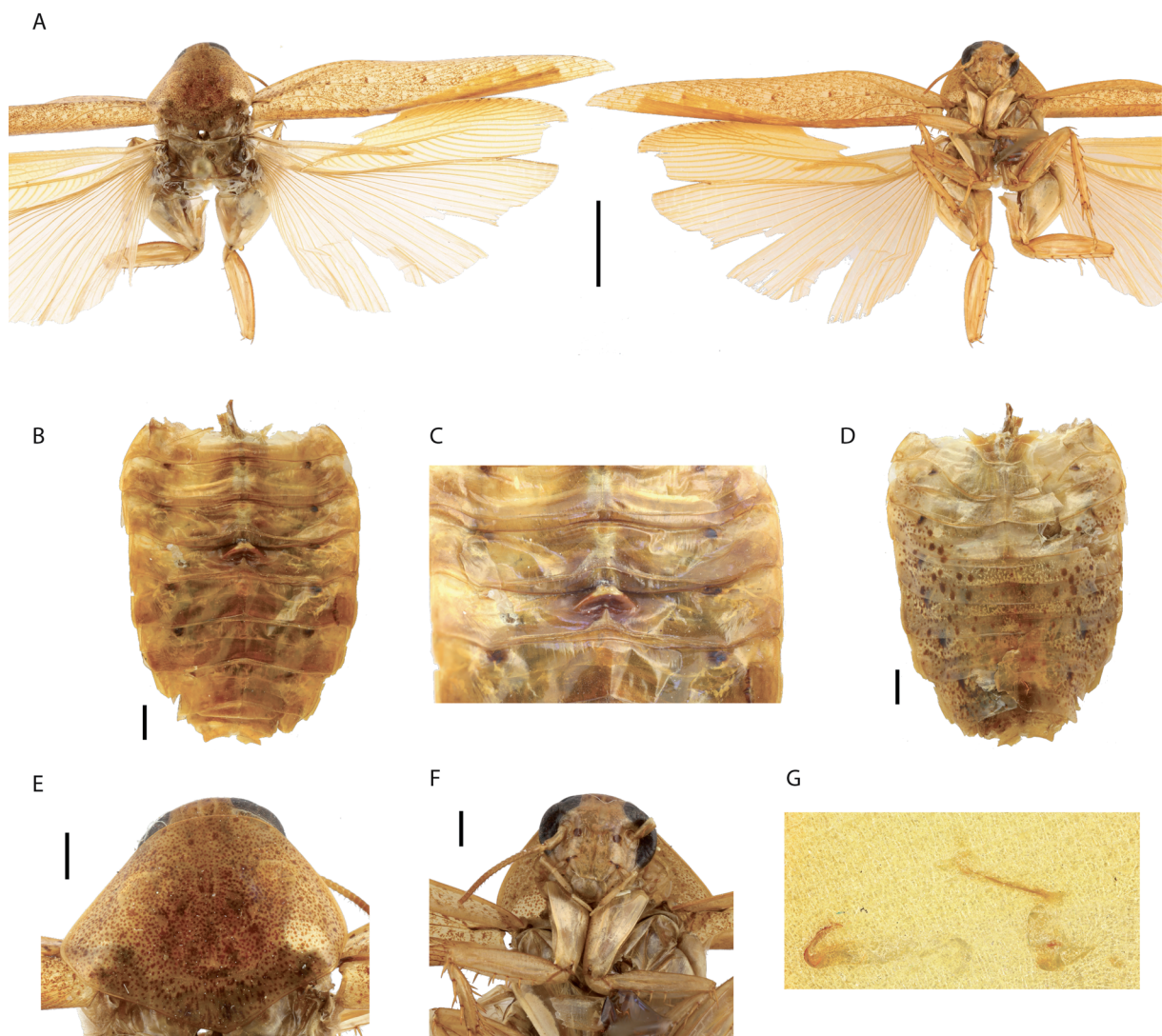


Fig. 30. *Rhabdoblatta lyncea* (Gerstaecker, 1883), male specimen (LUHM). **A.** Habitus in dorsal and ventral views. **B–C.** Abdomen and close-up on tergal gland (C) in dorsal views. **D.** Abdomen in ventral view. **E.** Pronotum. **F.** Head and front femorae. **G.** ‘Cristallized’ slide of male genitalia. Scale bars: A = 5 mm; B, D–F = 1 mm. C, G not to scale.

Table 10. List of published localities for *Rhabdoblatta lyncea* (Gerstaecker, 1883).

Combination in publication	Locality	Reference
<i>Epilampra lyncea</i>	Victoria, Cameroon	Gerstaecker 1883
<i>Epilampra lyncea</i>	Mungo, Cameroon	Gerstaecker 1883
<i>Epilampra electa</i>	Cameroon	Borg 1902
<i>Epilampra infinita</i>	Cameroon	Borg 1902
<i>Epilampra infinita</i>	Equatorial Guinea [Spanish Guinea]	Shelford 1909b
<i>Epilampra infinita</i>	Cabo San Juan, Equatorial Guinea	Anonymous 1910
<i>Epilampra sjostedti</i>	N'dian, Cameroon	Borg 1902
<i>Epilampra sjostedti</i>	N'Kongsamba, mont N'Lonako, Cameroon	Chopard 1945
<i>Epilampra sjostedti</i>	Masisi, NW of Kiwu-see, Democratic Republic of the Congo	Princis 1947
<i>Epilampra lyncea</i>	Mundame, Cameroon	Princis 1962
<i>Epilampra lyncea</i>	Johann-Albrechtshöhe, Cameroon	Princis 1962
<i>Epilampra lyncea</i>	Batoki, Cameroon	Princis 1962
<i>Epilampra lyncea</i>	campement Despierres, 4 km S of Makak, Cameroon	Princis 1962
<i>Epilampra lyncea</i>	Yaoundé, Cameroon	Princis 1962
<i>Epilampra lyncea</i>	Gabon	Princis 1962
<i>Epilampra lyncea</i>	Fernando Poo, Equatorial Guinea	Princis 1962
<i>Rhabdoblatta lyncea</i>	Mukondje Farm, Cameroon	Vanschuytbroeck 1970
<i>Rhabdoblatta lyncea</i>	Erin-Odo, Nigeria	Kumar 1975
<i>Rhabdoblatta lyncea</i>	Principe Island, São Tomé and Príncipe	Kumar 1975

Measurements of adults

Male (n = 1): pronotum length × width: 4.9 × 6.7, tegmina length: 21.1 [specimen examined, too damaged for other measurements].

Habitat

Unknown.

Distribution

This species is known from Cameroon, Democratic Republic of the Congo, Equatorial Guinea, Gabon, Nigeria and São Tomé and Príncipe (Fig. 1). Details of localities are provided in Table 10.

? *Rhabdoblatta wittei* (Jolivet, 1954)

Blatta assiniensis wittei Jolivet, 1954: 16.

Rhabdoblatta wittei – Kumar 1975: 82.

We were unable to observe any specimen from this species, originally described as a subspecies of what is known as *Hebardina assiniensis* (Bolivar, 1893), a Blattidae, from the Democratic Republic of Congo. Thus, the generic assignation of this species to *Rhabdoblatta* is doubtful.

Table 11. List of published localities for ?*Rhabdoblatta wittei* (Jolivet, 1954).

Combination in publication	Locality	Reference
<i>Blatta assiniensis wittei</i>	Mabwe, Upemba lake, Democratic Republic of the Congo	Jolivet 1954
<i>Blatta assiniensis wittei</i>	Kanonga, Democratic Republic of the Congo	Jolivet 1954

Malagasy species of *Rhabdoblatta*

The four Malagasy species listed below were not observed and we only provide here a list of their published localities (Tables 12–13).

***Rhabdoblatta trilobata* (Saussure, 1891)**

Epilampra trilobata Saussure, 1891: 25.

Epilampra trilobata – Saussure 1895: 356. — Saussure & Zehntner 1895: 60. — Shelford, 1910: 14. — Chopard 1952: 466.

Heterolampra trilobata – Kirby 1904: 123.

Rhabdoblatta trilobata – Princis 1967: 682.

Remarks

The habitus and subgenital plate of a female specimen was figured in Saussure & Zehntner (1895). Chopard (1952) reported this species from moss forest (“forêt de mousses”) on Mount Tsaratanana.

***Rhabdoblatta punctulata* (Saussure, 1891)**

Epilampra punctulata Saussure, 1891: 25.

Epilampra punctulata – Saussure 1895: 356; 1899: 578. — Saussure & Zehntner 1895: 63. — Shelford 1910: 14.

Heterolampra punctulata – Kirby 1904: 123. — Giglio-Tos 1907: 1.

Rhabdoblatta punctulata – Princis 1967: 682.

Remarks

The habitus of male and female specimens were figured in Saussure & Zehntner (1895).

***Rhabdoblatta malagassa* (Saussure & Zehntner, 1895)**

Epilampra malagassa Saussure & Zehntner, 1895: 65.

Heterolampra malagassa – Kirby 1904: 123.

Epilampra malagassa – Shelford 1910: 14.

Rhabdoblatta malagassa – Princis 1967: 682.

Remarks

This species is reported from Madagascar, without further indication.

Table 12. List of published localities for *Rhabdoblatta trilobata* (Saussure, 1891).

Combination in publication	Locality	Reference
<i>Rhabdoblatta (Epilampra) trilobata</i>	Diego-Suarez, Madagascar	Saussure 1891
<i>Rhabdoblatta (Epilampra) trilobata</i>	Antananarivo, Madagascar	Saussure & Zehntner 1895
<i>Rhabdoblatta (Heterolampra) trilobata</i>	Madagascar	Kirby 1904
<i>Rhabdoblatta (Epilampra) trilobata</i>	Madagascar	Shelford 1910
<i>Rhabdoblatta (Epilampra) trilobata</i>	Mont Tsaratanana, Madagascar	Chopard 1952

Table 13. List of published localities for *Rhabdoblatta punctulata* (Saussure, 1891).

Combination in publication	Locality	Reference
<i>Rhabdoblatta (Epilampra) punctulata</i>	Madagascar	Saussure 1891
<i>Rhabdoblatta (Epilampra) punctulata</i>	Madagascar	Saussure & Zehntner 1895
<i>Rhabdoblatta (Epilampra) punctulata</i>	Majunga, Madagascar	Saussure 1899
<i>Rhabdoblatta (Epilampra) punctulata</i>	Madagascar	Kirby 1904
<i>Rhabdoblatta (Heterolampra) punctulata</i>	Ankarahara (Tananariva), Madagascar	Giglio-Tos 1907
<i>Rhabdoblatta (Epilampra) punctulata</i>	Madagascar	Shelford 1910

Rhabdoblatta parva (Chopard, 1952)

Epilampra parva Chopard, 1952: 466.

Rhabdoblatta parva – Princis 1967: 682.

Remarks

To our knowledge, this species has not been mentioned in the literature since its description, where the habitus of a male is figured and the species reported from “Mont Tsaratanana, forêt de mousse” (Chopard 1952).

Unidentified species of the family Blattellidae (Fig. 31)

Material examined

CAMEROON • 2 ♀♀; South Region, Mvilla watersheds, exact locality unknown; elev. 570–594 m; Dec. 2019–Nov. 2020; MNHN, MNHN-EP7602, MNHN-EP7603.

Description

Female

HEAD. Triangular, longer than wide, mostly light brown, darker near vertex (Fig. 31C). Eyes black, ocellar spots indistinct. Labrum and clypeus light brown. Scape light brown, while other antennal segments darker. Distance between eyes smaller than distance between antennal sockets.

PRONOTUM. Light brown with darker spots, scattered with sparse setae near its lateral and anterior borders (Fig. 31B). Pronotum roughly trapezoidal but with middle of hind and anterior, although to a lesser extent, margins convex. Laterally deflexed.

TEGMINA AND WINGS. Fully developed, extending well beyond end of abdomen (Fig. 31A, E). Tegmina with rounded apex, light brown with veins darker. Sc thickened in ventral view. Hindwings light brown, darker anteriorly than posteriorly, with veins darker.



Fig. 31. Unidentified female specimen (MNHN-EP7602). **A.** Habitus in dorsal and ventral views. **B.** Pronotum. **C.** Head. **D.** Hindleg with close-up on tarsi and serrated claws, ventral view. **E.** Subgenital plate and cerci. **F.** Front femur. Scale bars: A = 5 mm; B–F = 1 mm.

LEGS. Anteroventral margin of front femur of type A2, with 3–4 stronger spines proximally, distinctly serrated (Fig. 31F). Tibial spines well-developed. Metatarsus of hind leg longer than other segments combined (Fig. 31D), inner margin with two rows of small spines. Arolium and tarsal pulvilli well-developed, the latter bordered by “additional spines” sensu Anisyutkin (2016). Claws symmetrical and very finely crenulated (only visible at higher magnification).

ABDOMEN. Coloration of abdominal sternites variable, mostly light brown (Fig. 31A, E). Supra-anal plate sub-triangular, its caudal margin with long, fine setae. Subgenital plate light brown, mostly symmetrical, convex (Fig. 31E). Cerci long, multisegmented, pubescent ventrally, with a black tip (Fig. 31E).

Male

Although no male was either preserved or pictured, a few of them were observed by one of us (DLNM). Males have two styli and a tergal gland on the 1st abdominal tergite with a truncated pyramidal shape on its upper part. In genitalia, the apical part of L2d is bifid.

Measurements of adults

Female (n = 2): pronotum length × width: 2.7–2.9 × 3.6–3.8, tegmina length: 13.5–13.7, overall length × width: 11.1–11.7 × 3.9–4.3.

Habitat

In all the rivers investigated, adults and nymphs of this species were only found in Sounou and Lo’o rivers.

Remarks

This unidentified species was labeled as the morphotype MNCA in Nyame Mbia (2024).

Discussion

Since the earliest discovery of cockroaches associated with water, morphological adaptations to this habitat have been scrutinized, especially regarding respiration. Breathing or respiratory tubes projecting near the end of the abdomen were among the first suspected adaptations (Annandale 1906; Shelford 1909a, 1912). These abdominal conical projections have spiracular openings used for inspiring (Weidner 1969; Gurney & Roth 1976). However, such morphological characters are also frequently seen in terrestrial cockroaches so that their adaptative nature to water habitats remains to be proven (Shelford 1907; Chopard 1938).

Differences were found, however, in the tracheal systems of semi-aquatic and terrestrial cockroaches. These differences have been hypothesized to be related to the cockroach’s ability to dive and sink effortlessly, the peculiar tracheal system of semi-aquatic cockroaches negatively impacting their buoyancy (Shelford 1907, 1916). Likewise, semi-aquatic cockroaches are known to be able to trap air (Crowell 1946; Legendre & Grandcolas 2020: pl. 4), although the associated morphological specializations remain to be deciphered (Bell *et al.* 2007).

Here, spiracular openings have been observed in nymphs of *Rhabdoblatta fotoi* sp. nov. and *Africalolampra camerunensis*. But, most interestingly, nymphs of *A. camerunensis* have long bristles on the hind tarsi, which undoubtedly contribute to swimming efficiency. Although this remains to be fully investigated, those bristles represent a remarkable external morphological adaptation to their aquatic environment. It would be worth looking at nymphs of other semi-aquatic cockroach species, including a few unidentified specimens collected during this study (like molecular voucher BL945) as the specific diversity of African semi-aquatic cockroaches remains underappreciated.

The study of African species of *Rhabdoblatta* and *Africalolampra* revealed a high diversity, both in shape and localization, of abdominal tergal glands, involved in courtship and mating (Roth 1969; Bell *et al.* 2007). Tergal specialization is known in several cockroach families but is rare in Blaberidae, where it is restricted to the Oxyhaloinae Finot, 1897 and Epilamprinae (Roth 1969). While a tergal specialization on the 1st tergite is one of the diagnostic characters of *Africalolampra* (Roth 1995), some African *Rhabdoblatta* spp. have no tergal gland, while others have them either on the 4th, 5th, 7th or at the junction of the 8th–9th abdominal segments. Intrageneric variety in the number and position of tergal glands is not uncommon (Roth 1969), but it remains quite remarkable for *Rhabdoblatta*, providing this genus is monophyletic, which is far from certain (Legendre *et al.* 2017; Yang *et al.* 2019; Wang *et al.* 2023), even for African species only. Pursuing the taxonomic revision of this genus is needed and might contribute to a better understanding of the deep nodes of Blaberidae phylogenetics, as Asian and African Epilamprinae have been suggested as potential first-diverging lineages (Evangelista *et al.* 2021, 2023; Wang *et al.* 2023), including the genus *Rhabdoblattella*, which might be closely related to African Epilamprinae like *Rhabdoblatta fotoi* sp. nov. (cf. similarity in male genitalia) and *Africalolampra* (Anisyutkin & Yushkova 2017).

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Supplementary files

Supp. file 1. Molecular matrix (12S rRNA) used for the ML analysis, comprising 78 taxa and 401 positions. <https://doi.org/10.5852/ejt.2024.946.2615.11977>

Suppl. file 2. List of taxa used in the ML analysis, with voucher codes, countries and GenBank accession numbers. <https://doi.org/10.5852/ejt.2024.946.2615.11979>