



New Cockroaches (Dictyoptera: Blattodea) from French Guiana and a Revised Checklist for the Region

DA EVANGELISTA^{1,2} , Z KOTYKOVÁ VARADÍNOVÁ^{3,4}, F JUNA³, P GRANDCOLAS¹, F LEGENDRE¹

¹Institut Systématique Evolution Biodiversité (ISYEB), Muséum national d'Histoire naturelle, CNRS, Sorbonne Université, EPHE, Paris, France

²Dept of Ecology & Evolutionary Biology, The Univ of Tennessee, Knoxville, TN, USA

³Dept of Zoology, Faculty of Science, Charles Univ, Prague, Czech Republic

⁴Dept of Zoology, National Museum, Prague, Czech Republic

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Correspondence

DA Evangelista, Institut Systématique Evolution Biodiversité (ISYEB), Muséum national d'Histoire naturelle, CNRS, Sorbonne Université, EPHE, Paris, France; dominicev@gmail.com

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Abstract

Although French Guiana is one of the greatest hotspots of cockroach biodiversity on Earth, there are still undocumented species. From both newly collected and museum specimens, we provide species descriptions for *Buboblatta vlasaki* sp. nov., *Lamproblatta antoni* sp. nov., and *Euhypnorna bifusca* sp. nov. and report new geographic records for species in the genera *Epilampra* Burmeister, *Euphyllodromia* Shelford, *Ischnoptera* Burmeister, and *Euhypnorna* Hebard. Finally, we update the checklist of species known from the region to 163 total species records from French Guiana, making it the second greatest hotspot of known cockroach biodiversity on Earth.

Introduction

French Guiana is a hotspot of cockroach biodiversity. It has a higher number of known species per unit area than any region in the neotropics, other than the state of Rio de Janeiro in Brazil Evangelista *et al* (2015, 2016). Yet, this may be an artifact of higher sampling effort in the region since this pattern of species richness is not congruent with that of other taxa (Joppa *et al* 2011, Orme *et al* 2005).

There have indeed been numerous focused taxonomic efforts to catalogue and describe the cockroach taxa of French Guiana. Hebard (1921b, 1926) did the first comprehensive studies on this fauna and was followed by Bonfils (1975) and Grandcolas (1992a, b, 1993a, b, 1994a, b). Other taxonomic papers have contributed to the knowledge of this fauna although they did not specifically focus on French Guiana (reviewed in Evangelista *et al* 2015). Despite these efforts, there are still taxa to be described. Grandcolas (1994b) lists 124 species from French Guiana that he believed

were new to science, including 23 new genera, but these are still mostly undescribed.

In this paper, we describe three new species and present eight new records of species from French Guiana. Additionally, the checklists of Evangelista *et al* (2015, 2016) omit species noted in two publications (Grandcolas 1994a, b), so we add them here. We also amend previous errors in the report of one synonym from Guyana (British Guiana).

Material and Methods

Dissections of specimens were done as in Evangelista *et al* (2016). Specimen photographs were taken using a Leica MZ12 microscope camera and manually compiled in GIMP free image editing software.

Morphological terminology for genitalia follows Klass (1997) unless otherwise noted. Terminology for wing and tegminal morphology follows Rehn (1951) with modifications by Kukalova-Peck & Lawrence (2004) with original

terminology (Rehn 1951) in parentheses. Extensive measurements were taken for each specimen in the manner of Evangelista *et al* (2016). Morphological features that are missing from the specimens, due to natural or artificial (damage) absence, are recorded as “NA.” If a structure is partially damaged, its total length may be estimated and noted with “est.”

For the material examined, we provide transcriptions of specimen label information. To maintain precision, we provide these without translation to English.

Deposition of the specimens is indicated by their voucher number. The types with a specimen number alphanumeric code beginning with “MNHNEP,” “NHFLFG,” or “GF-FL” are deposited in the MNHN, Paris. Those only with a number prefaced by “RUDEFG” (and not an additional “MNHNEP” number) are deposited in Charles University, Prague.

Results

Genus *Buboblatta* Hebard, 1920

Superfamily: Corydioidea; Family: Corydiidae; Subfamily: Latindiinae

History. The genus was originally erected to contain one Panamanian species, *Latindia armata* Caudell, 1914, whose male and female were both macropterous (female in plate VI 6–8). Hebard (1920) believed the genus was closest to *Melestora* Hebard, 1920, which was assigned to the Latindiinae by Princis (1971). Bruijning (1959) added a second species (figures 5, 6 in Bruijning 1959), which was collected in Suriname and for which the female is unknown. Grandcolas (1994a) noted a taxon he referred to as “N. gen. 6 aff. *Buboblatta* n.sp.1” from French Guiana. In the MNHN, Paris, collection, there are unidentified specimens of this genus from Peru, and from French Guiana.

Buboblatta vlasaki Evangelista, Kotyková Varadínová and Jůna, **sp. nov.**

Figs 1, 2, and 3; Table 1

Material examined: 2 females, 1 male. Holotype: RUDEFG38, female. Paratype: MNHN-EP4279, female. Allotype: NHDE0018/MNHN-EP-EP4280, male. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W) (RUDEFG38); Arataye Affl. Approuagues aval du Saut Parare 18.VII.1988, chasse de nuit branche, Museum Paris Guyane Francaise (MNHN-EP-4279); Arataye Affl. Approuagues 8 km NE pied Saut Parare 19.IV.1988, chasse de nuit surtige plante LAXY appuyee sur tronc, Museum Paris Guyane Francaise (NHDE0018, MNHNEP4280). Collectors: František Jůna (RUDEFG38); L. Desutter & P. Grandcolas rec. (NHDE0018).

Diagnosis: The male and female of this species are dimorphic in body shape and genitalia but the body coloration and morphology of the head, legs, and abdomen are very similar

between the sexes. The morphological similarities, and the shared locality of the paratype female and allotype male, support the association of these morphs under one species.

These individuals were identified as *Buboblatta* Hebard, 1920 by the presence of a valvate subgenital plate, fuscous coloration, small body size, and distinct Corydiid type venation of the male hind wings. Within *Buboblatta*, this species was differentiable from *B. geijskesi* Bruijning, 1959 by the male paraprocts' shape. *Buboblatta vlasaki* is differentiable from *B. armata* (Caudell, 1914) by wing state of the female (macropterous in *B. armata*, brachypterous in *B. vlasaki*) and the symmetry of the male subgenital plate (produced to the right in *B. armata* and symmetrical in *B. vlasaki*).

Description of female holotype: Head covered in moderately long setae. Interocular space (~1.0 mm) significantly wider than interantennal space (~0.8 mm). Ocelli whitish, noticeable, but very reduced in size. Frons black above antennal sockets and dark brown-amber below, with slightly lighter coloration under antennal sockets. Clypeus and labrum, lighter than frons and amber. Palps dark in color, similar to upper frons.

All legs dark brown overall with distal sections of segments light amber. Foreleg anterior ventral margin of femur with a row of small spines (46 right, 41 left), one large pre-apical spine and one larger apical spine; posterior ventral margin with small spines or setae (9 right, 8 left) approximately uniformly spaced; tibia and tarsomeres densely covered with setae with a few large spines at margin but only one spine preceding margin. Middle and hind leg tibia and femur also densely covered with setae; tibia with large spines throughout; apical spine present on anterior ventral margin of femora; tibia with a transverse stripe of light amber at its halfway point. Pulvilli absent from front and middle legs (hind legs not examined). Arolia very small. Pretarsal claws slender, symmetrical and unspecialized. Genicular spines present on hind leg femora (middle leg not observed due to damage) and absent on front leg femora.

Ventral abdomen entirely covered with setae, more densely posteriorly. Overall coloration dark brown, but slightly lighter anteriorly and with very light amber spots laterally. Subgenital plate valvate. Dorsal abdomen mostly without long setae, except laterally and posteriorly. Coloration black or dark brown overall with orange amber spots (Figs 1 and 2). Supra-anal plate is symmetrical, very wide (~2 mm), and very short (~0.2 mm). Cerci long, slender, and with two amber bands.

Pronotum subtrapezoidal with widest point in the posterior quarter. Surface punctate. Also, with the anterior lateral portions slightly lower than rest of the shield. Coloration as in remainder of body, but with a small light spot on either side of the medial line and a light region on both lateral sections of the posterior margin. Mesonotum greatly narrowed and postero-lateral corners square, with the remainder of their

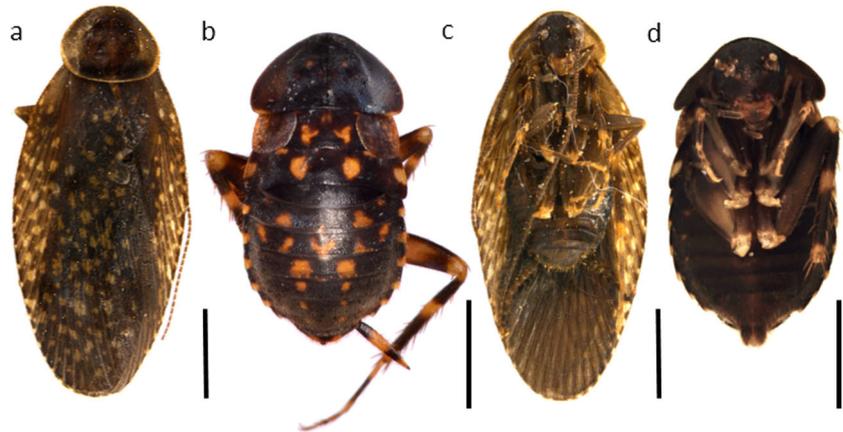


Fig 1 *Buboblatta vlasaki* sp. nov. **a, b** Dorsal habitus. **c, d** Ventral, whole body. **a, c** Adult male. **c, d** Adult Female. All scale bars 3 mm.

typical width covered by tegmina. Tegmina brachypterous; length only just surpassing the posterior margin of the mesonotum; width less than a third of the width of the metanotum. Tegmina also with very prominent dark setae. Only traces of a subcosta and two other tegminal veins (possibly the radius and media/cubitus) visible. Wings absent entirely. Coloration as of rest of body but mottled with light spots.

Description of female paratype: Same as holotype except: slightly lighter (more brownish) coloration overall, ~ 40 (right) or ~ 37 (left) piliform spines on anterior ventral margin of foreleg femur and 7 (right) or 9 (left) small spines or setae on posterior ventral margin; foreleg tibia with two spines preceding margin; pulvilli and arolia absent from all legs; genicular spine present on middle and hind leg femur.

Description of male allotype: Head as in female except interocular space and inter antennal space roughly equal.

Forelegs as in female except with 43 setae on foreleg ventro-anterior margin (left); arolia present on all legs but very small; foreleg tibia with two spines preceding margin.

Abdomen as in female except terminal segments. Subgenital plate roughly symmetrical, with simple finger-like styli of medium to small size. Supra-anal plate with anterior margin (concave) and posterior margin (convex) each approximately triangular; anterior margin triangle comes to a narrow round point while posterior margin triangle comes to a wider truncate point. Supra-anal plate with long setae at margin. Paraprocts asymmetrical and specialized as in Fig 3d; a few robust setae on medial margin pointing inwards.

Genital phallomeres as in Fig 3f and g; hooked phallomere (L3) short; L1 with a bulbous end bearing some short setae or rugosity.

Tegmina large; brown as on rest of body, but with light brown speckles; covered densely with short setae dorsally, and scarcer on ventral side. Venation as in Fig 3a; subcosta branched; radius extensive and reaching to apical margin; medial (M) vein either stalked on radius (after 3rd branching point of radius) or entirely merged with cubitus (CuA); cubitus or Cu+M (CuA+M) vein branched and with veins roughly



Fig 2 *Buboblatta vlasaki* sp. nov. **a, b, c** Adult male. **d, e** Adult female. **a** Ventral view of head. **b** Ventral view of posterior male segments and styli. **c** Dorsal view of male pronotum. **d** Dorsal view of female pronotum. **e** Setae and pitting on tegmina and pronotum of female. All scale bars 1 mm.

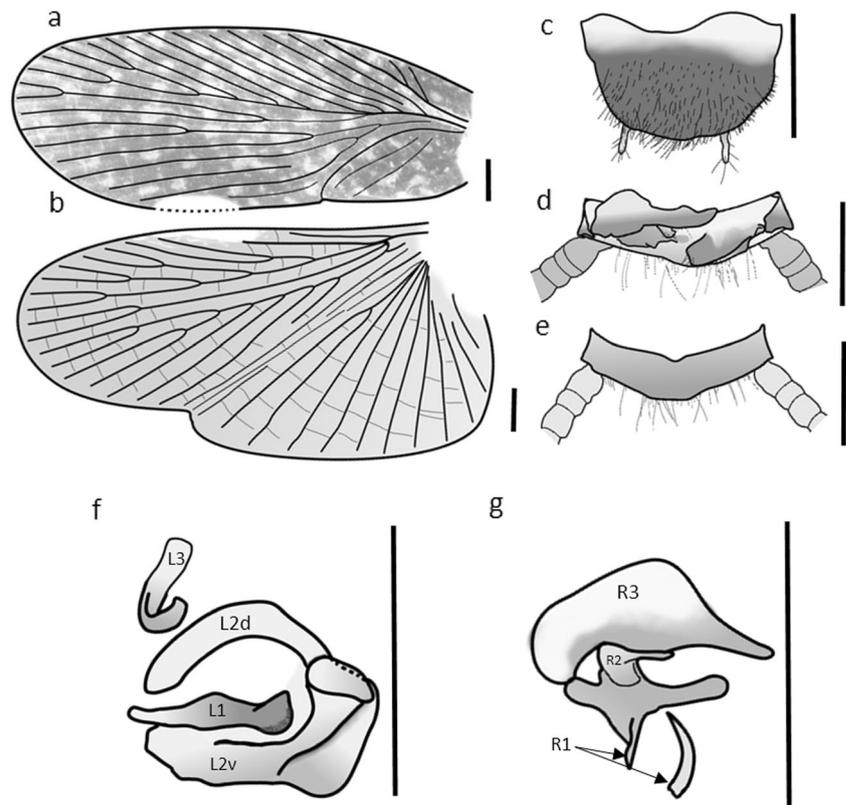


Fig 3 *Buboblatta vlasaki* sp. nov. illustrations of male type. **a** Tergina. **b** Hind wing. **c** Ventral view of subgenital plate and styli. **d** Ventral view of supra-anal plate, and paraprocts. **e** Dorsal view of supra-anal plate. **f** Left genital complex with phallomeres labeled. **g** Right genital complex with phallomeres labeled. Scale bars 1 mm.

paralleling anterior and posterior margin; plical furrow (CuP) arched; anal area with few discernable veins. Wings (Fig 3b) with thin banded coloration on anterior margin with a white area at the apical end of the subcostal vein (Sc); no intercalated triangle. Venation as in Fig 3b; unbranched subcosta stalked on radius with small accessory vein preceding it on stalk; radius extensive and reaching anterior

margin; media (M) and cubitus (CuA) appear to have a common origin on radial stalk; media with only one bifurcation; cubitus (CuA) many branched; plical veins not continuous but all three touching apical margin; 11 anal veins, the anterior two sharing a common branch, the posterior three or four not connected to the remainder; intercalaries present throughout.

Table 1 Allometry of *Buboblatta vlasaki* sp. nov. and *Lamproblatta antoni* sp. nov. "NA" indicates a missing morphological feature.

Morphological feature		<i>Buboblatta vlasaki</i> sp. nov.		<i>Lamproblatta antoni</i> sp. nov.		
		Adult ♀	Adult ♂	Adult ♂	Adult ♀	
Head	Greatest width	2.0	1.7	3.5	3.5	
	Medial length	2.3	2.0	4.3	4.0	
Pronotum	Greatest width	4.3	3.3	7.0	7.0	
	Medial length	3.0	2.5	5.5	6.0	
Leg	Front	Femur	2.5	2.2	4.0	NA
		Tibia	1.7	1.7	3.0	NA
	Middle	Femur	3.0	NA	5.5	5.0
		Tibia	2.8	NA	4.8	4.5
	Hind	Femur	4.0	3.4	6.4	6.0
		Tibia	4.3	NA	7.0	7.1
Cerci length		2.0	2.5	NA	3.9	
Tegminal length		1.2	11.5	NA	NA	
Total body length		9.1	8.9	15.6	19.5	

Etymology: Blanka Vlasáková led the expedition to French Guiana during which the female specimen was collected. Moreover, “vlas” in the Czech language means “hair,” a reference to the abundant setae on this species.

Known geographic distribution: French Guiana (new record).

Genus *Lamproblatta* Hebard, 1919

Family: Lamproblattidae; Subfamily: Lamproblattinae

Lamproblatta antoni Evangelista, Kotyková Varadínová and Jůna, **sp. nov.**

Figs 4 and 5; Table 1

Material examined: 1 male. Holotype: RUDEFG20. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: This individual was identified as *Lamproblatta* preliminarily by the apterous state of the adult and dark black coloration, and then confirmed by examination of the male genital configuration and comparison with illustrations of Evangelista *et al* (2016) and Klass (1997).

We were not able to associate this with any known species of *Lamproblatta*. It is closest to *L. mimetes* Rehn, 1930, *L. albipalpus* Hebard, 1919 and *L. ancistroides* Rehn, 1930. It is separable from all three species by genital features. Among others, the differences are as follows: *L. mimetes* Rehn, 1930 has a wide circular protrusion between the styli that is absent in *L. antoni*; *L. albipalpus* Hebard 1919 has a spine (sra) on sclerite R1 that is absent in *L. antoni*; both *L. albipalpus* Hebard 1919 and *L. ancistroides* Rehn, 1930 differ from *L. antoni* in the shape of sclerite R2 and the shape of the protrusions on L2B (l2d).

Description of male: Head with interocular space (~ 2.1 mm) slightly wider than interantennal space (~ 1.8 mm). Ocelli whitish. Frons uniformly black with a maroon

undertone. Clypeus and labrum lighter than frons and amber. Palps buffy with a light amber distal segment.

Legs with more visible maroon color but still very dark, with the basal coxae, and tibia being the darkest parts. Forelimb anterior ventral margin of femur with a row (15 left, 13 right) of large spines, approximately equal in size, followed by two larger preapical spines, and an even larger apical spine. Posterior ventral margin of fore-femur with three large spines, all in the distal half, and an apical spine. Lacking a genicular spine on foreleg femur but with genicular spine in middle leg femur (hind leg not examined). Pulvilli present on the basal four tarsomeres; bordered on both sides with a row of short, distally pointed spines; basal pulvillus reaching more than halfway down length of tarsomere. Basal tarsomere on front and middle legs not slender and slightly inflated. Arolia present and small (not reaching halfway up tarsal claws). Pretarsal claws symmetrical and unspecialized.

Overall coloration of ventral abdomen dark maroon. Subgenital plate mostly symmetrical; area between styli only slightly bowed posteriorly (not drastically bowed as in *L. mimetes* (Rehn 1930; Pl.II Fig 1); styli roughly equal in size; overall shape as in *L. albipalpus* (Rehn, 1930; Pl.II Fig 2). Dorsal abdomen mostly without setae on anterior five segments, and some short stubble on posterior five segments. Coloration as frons, uniformly black with undertones of maroon. Supra-anal plate symmetrical, trapezoidal with tip moderately narrow (4 mm width at base, 1 mm at tip); whitish tip (typical of genus).

Pronotum subtrapezoidal with widest point in the posterior quarter. Surface smooth and without sulci or punctae. Coloration of thorax same as frons and dorsal abdomen. Wings and tegmina entirely lacking. Head visible from a dorsal view of pronotum.

Etymology: The specific epithet derives from the first name of the primary author's father.

Known geographic distribution: French Guiana (new record).

Genus *Epilampra* Burmeister, 1838

Superfamily: Blaberoidea; Family: Blaberidae; Subfamily: Epilamprinae

Epilampra amapae Rocha e Silva Albuquerque & Gurney, 1962

Figs 6 and 7; Table 2

Material examined: 5 males, 4 females. Male: RUDEFG11, RUDEFG09, NHDEFG01/MNHN-EP-EP4101, NHDEFG03/MNHN-EP-EP4103, NHFLFG447/MNHN-EP-EP4105. Female: RUDEFG10, NHDEFG02/MNHN-EP-EP4102, NHFLFG066/MNHN-EP-EP4104. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W) (RUDEFG specimens); Arataye Affl. Approuagues 8 km NE pied Saut Parare (NHDEFG01-03 specimens); Sinnamary Piste de St Elie PK15. Collection date: 22.VII.1988 (NHDEFG01/MNHN-EP-EP4101), 13.VI.1988 (NHDEFG02/MNHN-EP-EP4102),

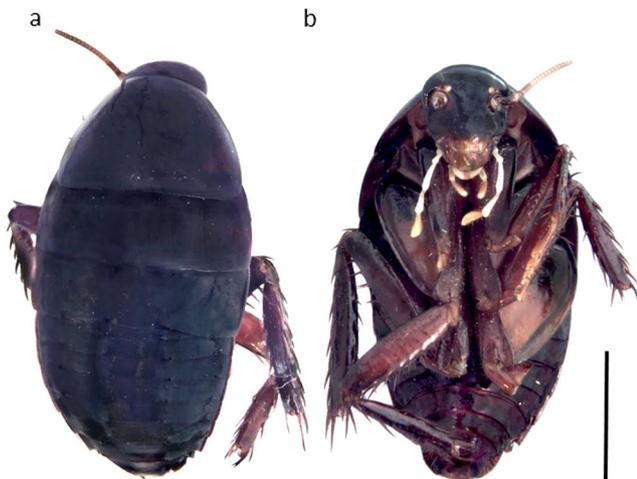


Fig 4 *Lamproblatta antoni* sp. nov. full body, adult male. **a** Dorsal habitus. **b** Ventral, full body. Scale bar 5 mm.

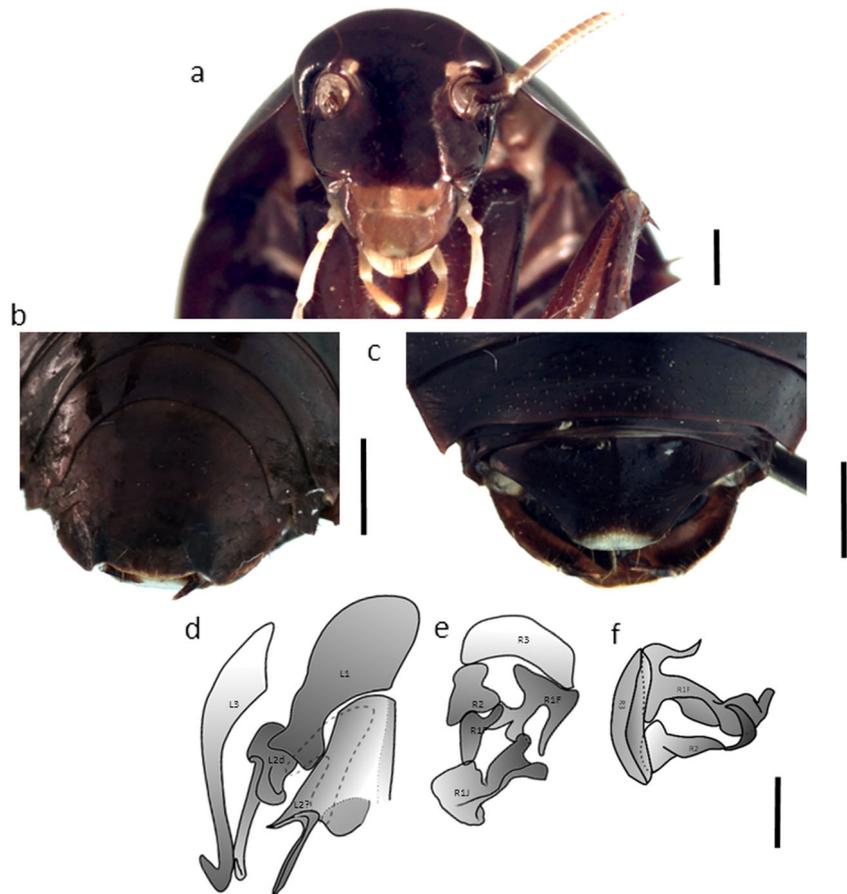


Fig 5 *Lamproblatta antoni* sp. nov. details of adult male. **a** Ventral head. **b** Ventral view of posterior end, subgenital plate, and styli. **c** Dorsal view of posterior end and supra-anal plate. **d** Left genital complex with phallomeres labeled. Dorsal view with anterior end oriented upwards. **e, f** Right genital complex with phallomeres labeled. **e** Dorsal view with anterior end oriented upwards. **f** Left lateral view, anterior end oriented left on page. All scale bars 1 mm.

2015 (NHFLFG447/MNHN-EP-EP4105); 4.VIII.1988 (NHFLFG066/MNHN-EP-EP4104). Collectors: František Jůna (RUDEFG specimens); L. Desutter and P. Grandcolas (NHDEFG specimens).

Diagnosis: These specimens match the description by Rocha e Silva Albuquerque & Gurney (1962). Specifically, the coloration of the pronotum, forelimbs, and body proportions of the females. Head coloration is somewhat similar to that of *Epilampra azteca* Saussure, 1868 but it is differentiable from this species by the shape of L2d (teardrop or globular in *E. amapae*, while blocky or globular in *E. azteca*), tegmina coloration (amber orange in *E. amapae* and light brown with large speckles in *E. azteca*) and coloration of the pronotum (solidly filled color with slightly lighter area medially in *E. amapae* and “Aztec-like” pattern in *E. azteca*).

Remarks: Rocha e Silva Albuquerque & Gurney (1962) did not describe the genitalia of *E. amapae* so we include illustrations of them here (Fig 7e). We place *E. amapae* in subgroup C of the Burmeisteri group of *Epilampra* based on the following characteristics (morphological terms here follow Roth 1970): absence of a dense setal brush on L1; separation of L2d and prepuce; slightly scale-like appearance of the prepuce; shape of L2d; and shape and setae of L1. The genitalia most closely resemble those of *E. azteca*, which we consider

its sister species. Based on the variation in genitalia shown in Roth (1970) and the variation we observe in our specimens, the shape of sclerite L2d may be too variable to use as a differentiating feature of these two species. We keep them as separate species first to preserve the taxonomy and because there are obvious and distinct color differences between the two. Future evidence, possibly in genetics, could reveal these to be color morphs of the same species.

Known geographic distribution: Brazil (Amapa), French Guiana.

Epilampra azteca Saussure, 1869

Table 2

Material examined: 1 male, 2 females. Male: RUDEFG26. Female: RUDEFG05, RUDEFG06. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: These specimens match the description by Rocha e Silva Albuquerque & Gurney (1962). Specifically, coloration of pronotum and frons, and allometry, though the examined females are slightly smaller than the described specimens.

Remarks: This species is already known from French Guiana (Evangelista et al 2015). *Epilampra colorata* (Rocha e Silva Albuquerque & Gurney 1962) was synonymized with

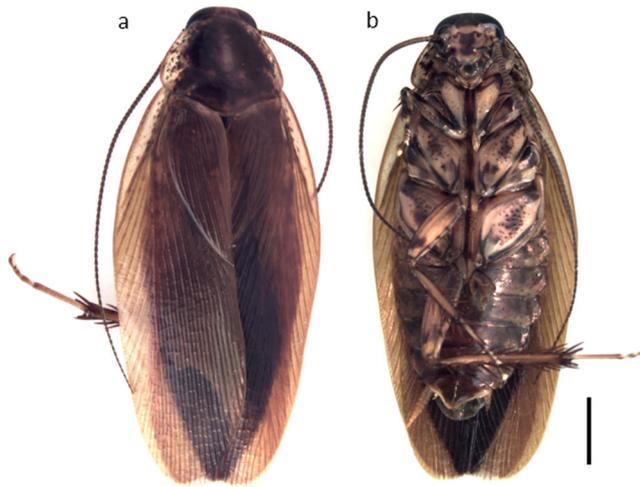


Fig 6 *Epilampra amapae* Rocha e Silva Albuquerque & Gurney, 1962, adult male. a Dorsal habitus. b Ventral whole body. Scale bar 3 mm.

E. azteca Saussure, 1869 by Roth with agreement by Gurney (Roth 1970). Evangelista *et al* (2016) reported a new record of *E. azteca* in Guyana, but under the name *E. colorata*. We amend that here (Online Resource 1).

Known geographic distribution: Mexico, Panama, Colombia, Ecuador, Venezuela, Trinidad and Tobago, French Guiana, Suriname, Brazil, Guyana (new record).

Epilampra opaca Walker, 1868

Fig 8

Material examined: *Epilampra opaca opaca*: FLFG164, 165, 485, 489, 490, "Planète Revisitée Guyane, 2015, Monts Tumuc-Humac, Massif du Mitaraka," "54.44768 O 2.235494 N (C100) 350m" – "54.4419 O 2.233664 N (C1000) 415m," "23 II – 10 III 2015," "nuit." Collector: "Frédéric Legendre & Sylvain Hugel rec." (GF-FL164/MNHN-EP-EP4106 and GF-FL165/MNHN-EP-EP4107); "Planète Revisitée Guyane, 2015, Monts Tumuc-Humac, Massif du Mitaraka," "54.455612 O 2.235396 N (sommets) 415m" – "54.462592 O 2.232997 N (savane) 510m," "23 II – 10 III 2015," "nuit," "Frédéric Legendre & Sylvain Hugel rec." (GF-FL485/MNHN-EP-EP4108, GF-FL489/MNHN-EP-EP4109, GF-FL490/MNHN-EP-EP4110) – APA 973-1; 3 labels: "Arataye Affl. Approuagues aval du Saut Parare. 5.VII.1988 '1'," "chasse de nuit 'petite boucle' 'plant'," "MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec."; NHDEFG04/MNHN-EP-EP4111, "Saul. 16.VIII. 1988 '4'," "foret indondable remblais d'orpaillage, 'plante' chasse de nuit," "MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec."; NHDEFG05/MNHN-EP-EP4112 "Sinnamary Piste de st Elie PK15. 4.VIII.1988 '2'," "chasse de nuit 'petite parallele' 'plant'," "MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec."; NHDEFG06/MNHN-EP-EP4113, "Saul. 16.VIII.1988 '4'," "foret indondable remblais d'orpaillage, 'plante' chasse de nuit," "MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec." *Epilampra*

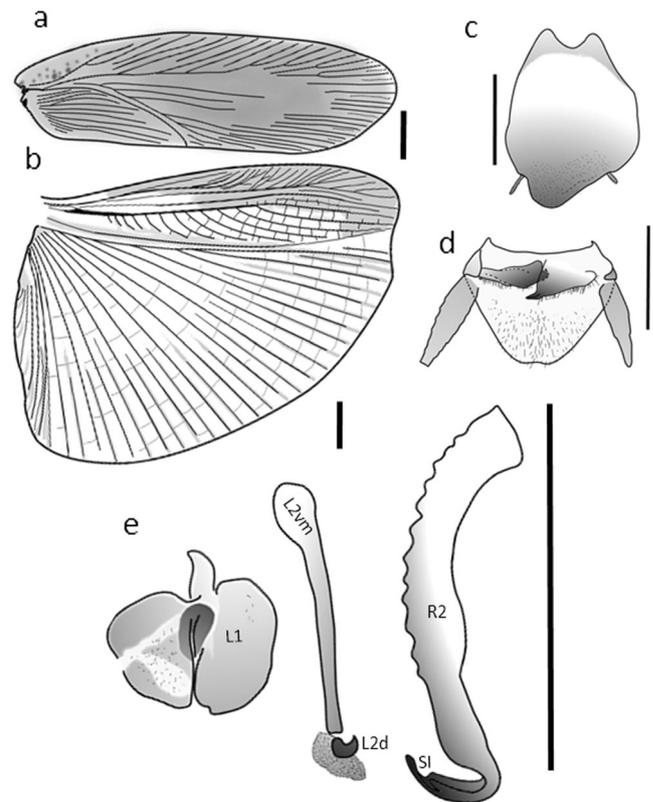


Fig 7 *Epilampra amapae* Rocha e Silva Albuquerque & Gurney, 1962, adult male illustrations. a Tegmina. b Hind wing. c Subgenital plate and styli, ventral view. d Supra-anal plate and paraprocts, ventral view. e Genitalia with phallomeres labeled as seen from ventral view with posterior end oriented downward on page. All scale bars 2 mm.

opaca conca: "GUYANE FRANCAISE, GOURDONVILLE. COLL. LE MOULT." "MUSEUM PARIS. COLLECTION, LUCIEN CHOPARD 1927"; "CEIBA Biological Station, Madewini, Guyana (6°29'N, 58°13'W). Date: 18.VIII.2012." "Collectors. Dominic A. Evangelista and William R. Kuhn."

Diagnosis: This species was identified by comparison of the genitalia (specifically, the shape of L2d) of multiple specimens to figures in Roth (1970).

Remarks: There appears to be a color polymorphism in this species, although future work could find these forms to be distinct species. One color form, which we refer to as *Epilampra opaca conca* (type A), has a neutral gray as a base color, a pearly white abdomen, and an interocular marking of the shape of the base of a tooth. The other color form, *Epilampra opaca opaca* (type B), has an earthy brown tinge, the abdomen is deep brown, and the interocular coloration is also brown but with light vertical stripes. The holotype of *Epilampra opaca* (NHMUK012501958) has the color form of *E. opaca opaca*. The genitalia of this species is variable (Roth 1970), but the two color forms appear to both fall within this variation and we are unaware of any morphological

Table 2 Allometry of some *Epilampra* individuals reported from French Guiana. “NA” indicates a missing morphological feature. “est.” indicates an estimated length, usually because the specimen was damaged.

Morphological feature		<i>Epilampra amapae</i>				<i>E. azteca</i>			<i>E. sagitta</i>	
		Adult ♀		Adult ♂		Adult ♀	Adult ♀	Adult ♂	Adult ♂	
		RUDEFG10	65792	RUDEFG09	RUDEFG11	RUDEFG06	RUDEFG05	RUDEFG26	RUDEFG08	
Head	Greatest width	3.0	–	3.1	2.8	2.9	3.2	2.5	3.2	
	Medial length	3.0	–	3.0	3.0	2.5	3.0	2.1	3.4	
Pronotum	Greatest width	5.5	5.7	4.8	5.0	5.0	5.5	4.1	6.0	
	Medial length	4.1	4.0	4.0	4.0	4.0	4.0	3.3	4.0	
Leg	Front	Femur	3.0	–	3.0	2.7	2.8	2.5	2.1	2.8
		Tibia	2.8	–	2.8	2.2	1.5	1.3	1.9	1.7
	Middle	Femur	3.5	–	3.0	3.2	3.2	3.5	3.1	4.0
		Tibia	3.5	–	3.4	3.1	3.0	3.2	2.5	3.6
	Hind	Femur	4.5	–	4.0	NA	4.0	NA	3.5	5.0
		Tibia	6.0	–	4.5	NA	5.0	NA	5.0	7.0
Cerci length		2.0	–	2.0	2.0	1.8	1.5	1.7	3.1	
Tegminal length		18.0	17.0	16.2	16.5	17.0	16.8	15.0	21.3	
Total body length		19.5	22.0	17.0	16.5 (est.)	20.0	17.1	15.5	22.0	

characters separating them other than color. If this species uses color pattern in its recognition of potential mates, it is possible they could be distinct biological species. The coloration of most *Epilampra* species is distinct in the pronotum and frons (pers. obs. Evangelista), but the evolutionary factors underlying this variation are entirely unknown.

Known geographic distribution: Venezuela, Guyana, Suriname, French Guiana, Brazil.

Epilampra sagitta Hebard, 1929

Table 2

Material examined: 1 male. RUDEFG08. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: These specimens match the figures of Roth (1970). Specifically, the shape of L2d and the prepuce very closely match these structures that Roth (1970) reported from a specimen from Amapa, Brazil.

Known geographic distribution: Brazil (Amazonas, Amapa, Mato Grosso), French Guiana (new record).

Epilampra egregia Hebard, 1926

Figs 9 and 10

Material examined: 1 male. RUDEFG0712. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: We identified this species by the unique shape and sculpturing of the adult pronotum, and comparison of the shape of genital sclerites with Bonfils (1975).

Remarks: This species was not treated in Roth (1970) but its genitalia were illustrated in Bonfils (1975) who placed this

species in the *abdomennigrum* group of *Epilampra*. We have included illustrations of it here to aid others in identification and systematics.

Known geographic distribution: French Guiana, Suriname.

Genus *Euphyllodromia* Shelford, 1908

Family: “Ectobiidae”; Subfamily: Pseudophyllodromiinae
Euphyllodromia spiculata Lopes & da Silva, 2012

Material examined: 1 male. RUDEFG32. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: This specimen was initially identified by the distinctive coloration of the head and pronotum. Since coloration in this genus is variable (Sonia M. Lopes, pers. comm.), the identification was confirmed through comparison of the subgenital plate and internal genitalia. Specifically, the small medial projection on the subgenital plate, the shape of the left phallomere and the presence of an accessory brush-like sclerite confirmed the identification of this species.

Known geographic distribution: Brazil (Amazonas), French Guiana (new record).

Genus *Ischnoptera* Burmeister, 1838

Family: “Ectobiidae”; Subfamily: Blattellinae
Ischnoptera miuda Lopes, 2009

Figs 11 and 12

Material examined: 1 male. RUDEFG36. Collection locality: Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna.

Diagnosis: We identified this specimen as *Ischnoptera* based on the comb-like structures on the dorsal tergal gland,

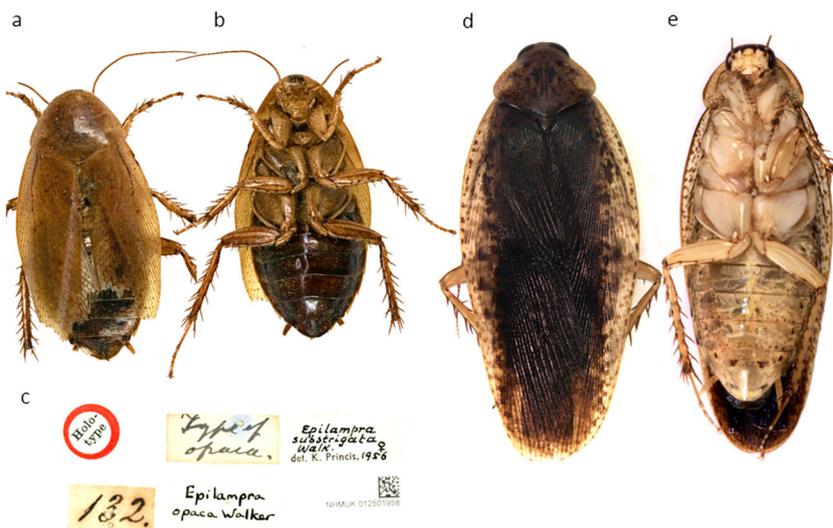


Fig 8 *Epilampra opaca* Walker, 1868, representatives of two color morphs. **a, b** *Epilampra opaca* holotype, NHMUK012501958. Representative of *Epilampra opaca opaca* color form. DECBA1845. **c** Labels for holotype. **d, e** *Epilampra opaca conca* color form. **a, d** Dorsal side. **b, e** Ventral side.

the shape of the subgenital plate, the spination on the front femora and the sulci of the pronotum. We were further certain of our identification of this species by comparison with the genital morphology of *I. miuda*. Although there are some minor differences in coloration of the frons, coloration of the tergal gland, and width of the interocular space.

Description of male RUDEFG36 (in addition to description in Lopes 2009): Head solidly dark colored as the remainder of the body. Ocellar spots light, whitish. Interocellar space distinctly less than interantennal space and interocular space drastically less than interocellar space. Face rugose, mostly from ocelli to clypeus.

Leg coloration as in remainder of body, but with tarsi lighter and more amber colored. Basal segments slightly rugose or punctate. Anterior ventral margin of front leg femur with two large basal spines followed by ten (right) or nine (left) spinules, one large preapical spine and a large apical spine. Front leg

genicular spine absent. Middle leg with two large spines on anterior ventral margin and one large genicular spine.

Abdomen mostly solidly colored ventrally and dorsally. Subgenital plate slightly asymmetrical; divided medially with peg-like styli positioned apically on the two narrow lobes; some large setae scattered throughout with small setae concentrated apically. Dorsal tergal gland (T7) with combs; medial lump pronounced; solidly colored. Medium sized setae scattered throughout dorsal abdomen and most obvious on posterior margins. Supra-anal plate nearly trapezoidal; only slightly sclerotized at margin; symmetrical.

Pronotum semicircular anteriorly and truncate posteriorly, with a nearly straight posterior margin. Surface with slight elevational changes and low rugosity originating from many small punctae. Small setae present on anterior margin.

Tegmina long and slender, reaching far past the end of the body with small delicate setae on ventral side. Coloration lighter than remainder of body, medium brown overall; subcostal area light with Sc vein blackened. Veins modified into robust cells basally, giving tegmina appearance of rugosity.

Overall body is dark brown or black with a chestnut base color.

Known geographic distribution: Brazil (Rio de Janeiro), French Guiana (new record).

Ischnoptera hercules Rehn, 1928

Material examined: 4 males. GF-FL14/MNHN-EP-EP4119, GF-FL161/MNHN-EP-EP4120, GF-FL243/MNHN-EP-EP4121, GF-FL482/MNHN-EP-EP4122. Collection locality: "Planète Revisitée Guyane, 2015, Monts Tumuc-Humac, Massif du Mitaraka," (54.450529 O 2.234979 N (D1) 300 m) – (54.454609 O 2.240465 N (A500) 360 m ("23 II – 10 III 2015," "nuit" (GF-FL14); "Planète Revisitée Guyane, 2015, Monts Tumuc-Humac, Massif du Mitaraka," (54.44768 O 2.235494 N (C100) 350 m) – (54.4419 O 2.233664 N (C1000) 415 m), "23 II – 10 III 2015," "nuit" (GF-FL161 and

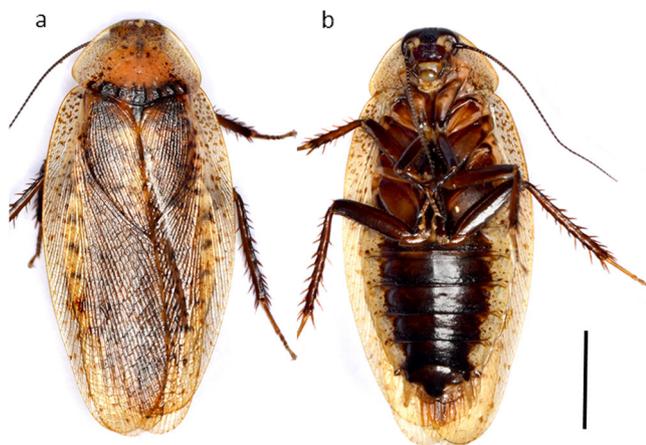


Fig 9 *Epilampra egregia* Hebard, 1926, adult male. **a** Dorsal habitus. **b** Ventral, whole body.

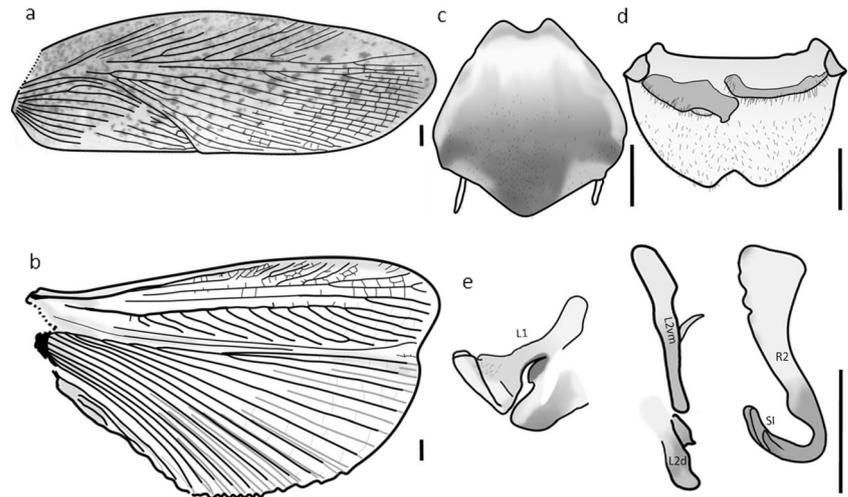


Fig 10 *Epilampra egregia* Hebard, 1926, illustrations of adult male. **a** Tegmina. **b** Hind wing. **c** Subgenital plate, ventral view. **d** Supra-anal plate and paraprocts, ventral view. **e** Genitalia with phallomeres labeled as seen from ventral view with posterior end oriented downward on page. All scale bars 1 mm.

GF-FL243); “Planète Revisitée Guyane, 2015, Monts Tumuc-Humac, Massif du Mitaraka,” (54.455612 O 2.235396 N (sommets) 415 m) – (54.462592 O 2.232997 N (savane) 510 m), “23 II – 10 III 2015,” “nuit” (GF-FL482); APA 973-1. Collection date: “23 II – 10 III 2015.” Collectors: Frédéric Legendre & Sylvain Hugel.

Diagnosis: We identified this species by the large body size, stark black coloration, shape of the subgenital plate, and pattern of sclerotization on the supra-anal plate (weakly sclerotized area central and symmetrical).

Known geographic distribution: Guyana, Suriname, Brazil (Para), French Guiana (new record).

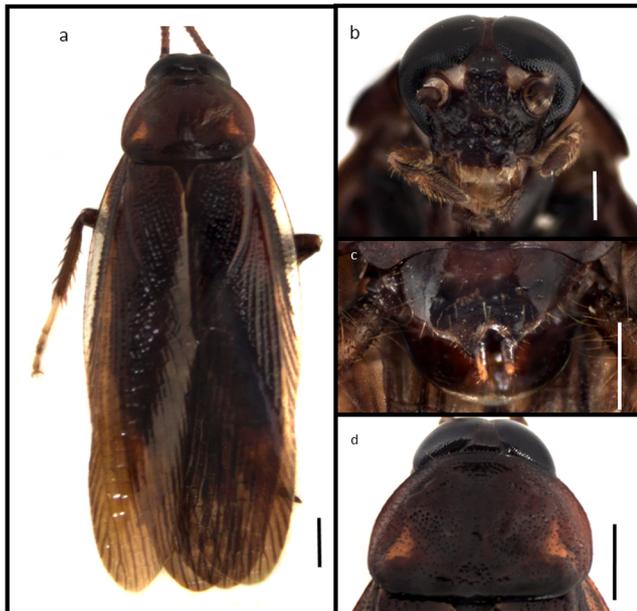


Fig 11 *Ischnoptera miuda* Lopes, 2009 adult male. **a** Dorsal habitus. **b** Ventral head, showing details of facial coloration, rugosity, and eye shape. **c** Subgenital plate and styli, ventral view. **d** Dorsal pronotum. All scale bars 1 mm.

Genus *Euhypnorna* Hebard, 1921

Family: “Ectobiidae”; Subfamily: Blattellinae

Remarks: Hebard (1921a) first described this genus designating *Euhypnorna grata* Hebard, 1921 as the type species from Panama, and placed the genus in a group related to *Hypnorna* Stål, 1860; *Hypnornoides* Rehn, 1917; and *Calhypnorna* Saussure & Zehntner, 1893. The closest relationship given by Hebard (1921a) was with *Hypnorna* Stål, 1860, with which he differentiated *Euhypnorna* by the following characteristics: male interocular space narrow in *Euhypnorna*, wide in *Hypnorna*; posterior margin of pronotum convex in *Euhypnorna*, truncate in *Hypnorna*; apical end of tegmina broadly rounded in *Euhypnorna*, tapered and narrow in *Hypnorna*; head without carina in *Euhypnorna*, with carina in *Hypnorna*; hind wings with subcostal branches not clubbed in *Euhypnorna*, clubbed in *Hypnorna*; branches of the cubitus in tegmina closer to parallel with posterior margin (original wording “longitudinal”) in *Euhypnorna*, more oblique in *Hypnorna*. From Hebard’s original description and the description of the new species we can add further characteristics of the genus: tergal gland present and formed from a deep concave hole filled with long, dense, agglutinated setae; subgenital plate concave between styli; styli mostly simple and unmodified; left paraproct with a fang-like tooth. The genus can be easily differentiated from *Hypnorna*, *Calhypnorna*, and *Hypnornoides* by the following: tergal gland (7th tergite) present in *Euhypnorna*, absent in *Hypnorna* and *Calhypnorna*; styli simple and stout in *Euhypnorna*, elongated and simple in *Hypnorna* and modified and elongated (like *Chorisoneura*) in *Calhypnorna*; female supra-anal plate simple in *Euhypnorna*, divided in *Calhypnorna* and *Hypnornoides*; female brachypterous in *Euhypnorna*, macropterous in *Hypnorna*, *Calhypnorna*, and *Hypnornoides*; hind wing radial rami not clubbed in *Euhypnorna* and clubbed in *Hypnorna*; hind wing CuA divided once and then merged again into a single vein, *Calhypnorna*

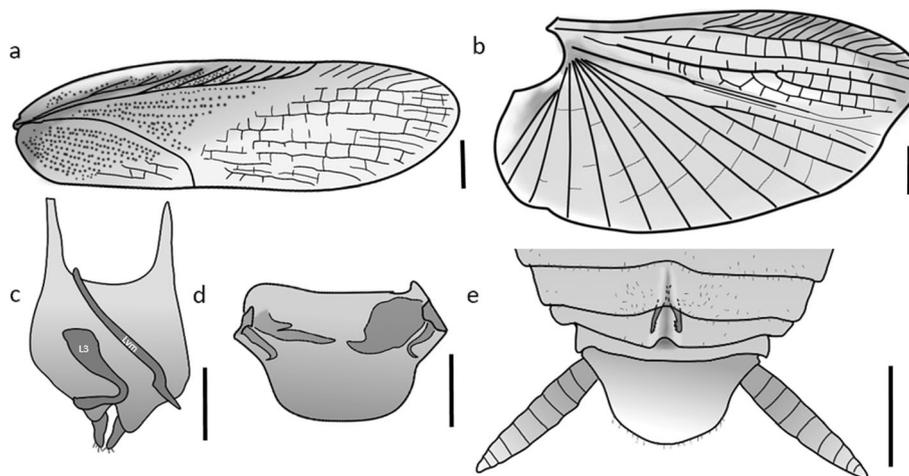


Fig 12 *Ischnoptera miuda* Lopes, 2009 adult male illustrations. **a** Tegmina. **b** Hind wing. **c** Subgenital plate and genitalia as seen from dorsal view. **d** Supra-anal plate and paraprocts from ventral view. **e** Supra-anal plate, tergal gland, and dorsal terminalia. All scale bars 1 mm.

and *Hypnorna* without any division; head without sulcus or carina in *Euhypnorna*, with sulcus and carina in *Calhypnorna* and *Hypnorna*. Given the shape of the subgenital plate (one male examined at MNHN, Paris; label: “*Calhypnorna saperdoides* Walk.”; “JATAHY, GOYAZ.BRESI”) and the molecular results discussed in Evangelista *et al* (2015), *Calhypnorna* should be considered closely related to *Chorisoneura*.

Given the morphology of *Euhypnorna bifuscina* sp. nov., we place *Euhypnorna* in Blattellinae (genitalia with hooked phallomere on left), and near to *Dasyblatta* as it shares traits with *Dasyblatta warei* Mendoza and Evangelista, 2016 (body somewhat setaceous, similar body coloration, female brachypterous and male macropterous).

Euhypnorna bifuscina Evangelista, Varadinova and Juna, **sp. nov.**

Figs 13, 14, and 15; Table 3

Material examined: 2 males, 1 female. Holotype: MNHN-EP-EP4278. Male. Reserve Naturelle Nationale des Nouragues (4°5'34"N, 52°40'39"W). Collectors: František Jůna. Allotype: MNHN-EP-EP4118. Female with ootheca. 3 labels. “chasse de nuit,” “Sinnamary. Paracou. Foret sur sable blanc. 31.VIII.1988. ‘3’,” “MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec.” Paratype: Male. 3 labels. “Foret de crete chasse de nuit. Ch. Grumage tronc.” “Sinnamary Paracou. Foret sur sable blanc. 27.VIII.1998. ‘4’.” “MUSEUM PARIS. GUYANE FRANCAISE. L. Desutter & P. Grandcolas rec.” Paratypes: MNHN-EP-EP4114, MNHN-EP-EP4115, MNHN-EP-EP4116, MNHN-EP-EP4117.

Diagnosis: We placed this specimen in *Euhypnorna* because of the similarity to *E. grata* in coloration, configuration of the tergal gland, subgenital plate, and hind wing venation.

Yet, *E. bifuscina* differs from *E. grata* in subgenital plate shape, coloration, and body proportions. *Euhypnorna*

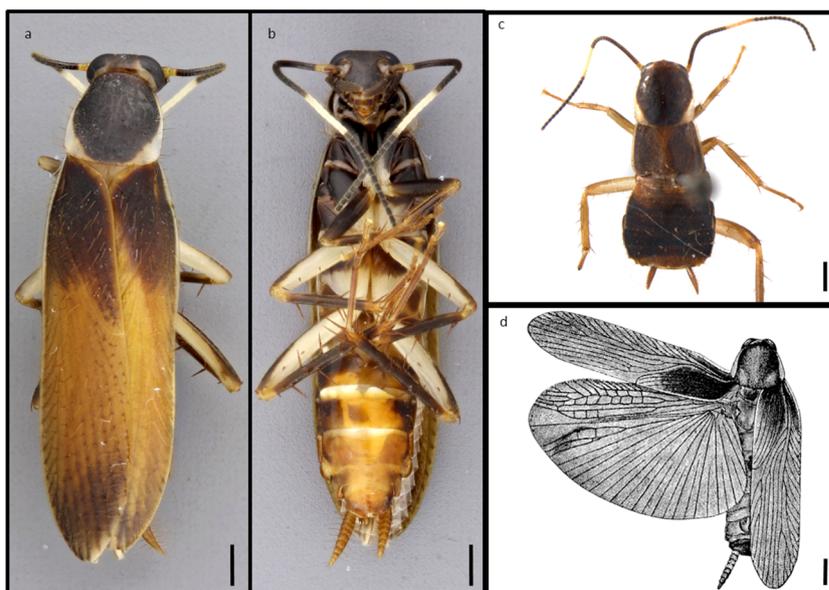


Fig 13 *Euhypnorna* spp. **a–c** *Euhypnorna bifuscina* sp. nov. **d** Illustration of *Euhypnorna grata* Hebard, 1921 from original publication. **a, d** Dorsal habitus of males. **b** Whole body, ventral. **c** Dorsal habitus of female.



Fig 14 *Euhyponna bifuscina* sp. nov. photographic details. **a** Ventral head, antennae, and foreleg femur. **b** View of subgenital plate and complementary tergum, showing possibly interlocking spines. **c** Lateral view of tergal spine seen in **b**. **d** Ventral edge of tegmina with stout setae on radial rami. **e** Lateral view of ootheca (scale bar 1 mm).

bifuscina has styli close together and medial, while *E. grata* has them further apart, with the left stylus near the cercal base; *E. bifuscina* with color covering the base of R and M+C, and *E. grata* is lacking such coloration; *E. bifuscina* with white lateral margin on pronotum greatly expanded posteriorly and occupying $\sim 2/3$ of the posterior margin, whereas in *E. grata* the white lateral margin is only slightly expanded

posteriorly, and occupying little to none of the hind margin; *E. bifuscina* with smaller cerci (1:8, cerci length to body length), *E. grata* with larger cerci (1:5.5, cerci length to body length).

Description of male: Head lacking visible ocelli; uniformly black; labrum slightly lighter than frons; frons with large setae sparsely separated. Antennal scape dark brown; pedicel

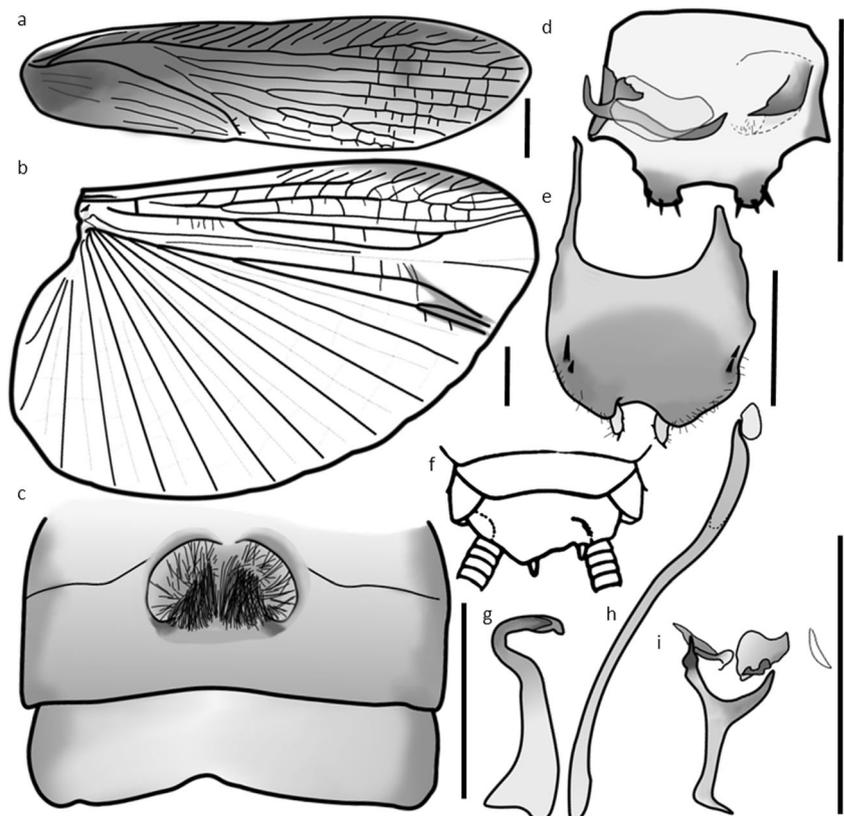


Fig 15 *Euhyponna* spp. illustrations. **a–e**, **g–i**, *Euhyponna bifuscina* sp. nov. adult male type illustrations. **a** Tegmina. **b** Hind wing. **c** Dorsal abdomen and external portion of tergal gland. **d** Subgenital plate and paraprocts, ventral view. **e** Subgenital plate, dorsal view. **g** Left phallomere, L3. **h** Ventral-medial phallomere, Lvm. **i** Right phallomere, R2. All scale bars 1 mm. **f** Illustration of *Euhyponna grata* Hebard, 1921 subgenital plate and styli in the ventral view reproduced from original publication.

Table 3 Allometry of two Blattellinae species reported from French Guiana, including *Euhypnorna bifuscina* sp. nov. “NA” indicates a missing morphological feature. “est.” indicates an estimated length, usually because the specimen was damaged.

Morphological feature		<i>Euhypnorna bifuscina</i> sp. nov.			<i>Ischnoptera miuda</i>	
		Adult ♂	Adult ♂	Adult ♀	Adult ♂	
Head	Greatest width	1.6	1.5	1.5	1.5	
	Medial length	2.0	1.6	1.5	2.0	
Pronotum	Greatest width	2.4	2.25	2.0	2.8	
	Medial length	2.0	2.0	2.0	2.0	
Leg	Front	Femur	2.1	2.0	1.75	1.3
		Tibia	1.6	1.6	1.2	1.0
	Middle	Femur	2.7	3.0	2.5	2.0
		Tibia	2.5	2.5	2.0	1.6
	Hind	Femur	2.8	3.0	3.0	NA
		Tibia	3.8	3.8	3.0	NA
Cerci length		NA	1.5	0.8	1.5	
Tegminal length		9.5	9.5	1.6	9.5	
Total body length		10.5	10 (est.)	7.0	9.5 (est.)	

light brown; flagellum black on proximal 23 segments, then white for next six segments before returning to black for the remaining. Terminal maxillary palp without terminal cup or desclerotized area.

Foreleg ventro-anterior margin with a row of small stout spines (16), one large preapical spine and one large apical spine; genicular spine absent. Middle and hind femora ventro-anterior margin with three large spines; no apical spines; genicular spine present. Foreleg with five tarsal segments, each of which bears a small pulvillus apically (largest on the fourth segment). Arolia large; tarsal claws unspecialized and symmetrical. Leg coloration: coxa dark brown basally and white apically, front leg with white area smaller and rectangular shaped; all tibia dark brown, middle and hind leg femur mostly light with dark brown dorsally, front leg femur nearly entirely brown.

Pronotum covered in long setae overall but not dense; subquadrate with anterior margin more rounded than posterior; black central area with buffy lateral margin; buffy margin thin anteriorly and wide posteriorly, taking up 2/3 of the posterior margin.

Wings with large apical area, folded toward the anterior portion of the wing when at rest; slightly stronger sclerotization in costal margin at the subdivisions of the subcosta and radius as well as apically at the first branches of the anal veins; arculus strong and connecting the subcosta and CuA veins; subcostal vein meeting wing base, connected to radius by cross veins and meeting anterior edge of wing in the apical half, where it has a few short, unbranched rami; radius with primary and secondary branching, as well as small vein twigs, mostly in apical half; media originating from the radius, unbranched and connected to both the radius and CuA with cross veins; CuA divided into two branches at basal 1/3, which then meet again to form a single vein in the apical

1/4; apical field supported by CuA anteriorly, branched axillary (anal vein) posteriorly, and with plical vein 3 in the middle; plical vein 1 (possibly CuP) 2/3 the length of the wing; plical vein 2 reduced to the fold of the wing for most of its length; plical vein 3 only present apically, and nearly meeting the most apical point of the wing; anal region with 13 major veins connected to each other via the basal arch, with three small veins disconnected from the arch at the inner portion of the folded section; anterior branches of the anal vein system (i.e., branched axillary) with some cross branches in apical third, and a very apical subdivision in second branch of anal vein system, also with some small cross veins. Tegmina darkened basally with a light medial region and darker apical region, the latter of which is only pronounced on the left tegmina; uniformly covered in setae with medium density; subcosta short and unbranched; media and CuA with approximately eight total branches combined; anal area very elongated; ventral tegmina (right) bearing small patches of short, rigid setae on the apical end of the radial rami.

Dorsal abdomen bearing pronounced tergal gland on 7th tergite, composed of a deep basin densely filled with thick, rigid setae (Fig 15c).

Subgenital plate only slightly asymmetrical; styli short, simple, slightly pointed medially and bearing a few small sclerotized spines along the medial side and apically; margin between styli narrow and concave; medium sized setae at the posterior margin, lateral to the styli; lateral posterior corners bearing two stout spines projecting dorso-anteriorly (Figs 14b and 15e).

Hook-like phallomere on the left side (L3) bearing a sub-apical incision; medial phallomere slender, curved, divided at anterior 1/3 and with a small lightly sclerotized glob at the anterior end; right phallomere (R2) “Y” shaped, with the undivided portion having a pronounced bend at the end, part

of the divided portion with a sclerotized knob bearing a tooth, and two accessory sclerites within the divided portion (Fig 15i).

Supra-anal plate specialized and symmetrical; bilobed with wide rectangular division between lobes; lobes knob shaped, each bearing three robust spines apically (two spines in paratype). Paraprocts asymmetrical and somewhat specialized; left paraproct with sclerotized area small, bearing a small patch of setae and a single spine; right paraproct with long sclerotized area, an anteriorly directed hooked spine on the lateral edge, elongated medial area coming to a pointed spine medially, and a small sclerotized ventral portion enclosing a larger central unsclerotized portion.

Morphological notes: Upon examination, it appears that the complementary spines on the subgenital plate and opposite tergite (8th) could possibly interlock, as they form non-parallel angles with each other (i.e., in their natural orientation they could cross each other, as opposed to laying adjacent to each other). Given that this was discovered after dissection, their exact operational placement in life is not known.

Description of female: Same as male, except for the following characters: tegmina and wings brachypterous and reaching middle of the hind thoracic segment; dorsal abdomen with large setae on the posterior margin the segments; supra-anal plate truncated, simple; subgenital plate wide, simple; ventro-anterior margin of forelegs as in male, except with 14 spines (left), 13 spines (right); arolia medium sized; hind tarsus (right) three or four segmented; if the latter, third segment reduced, possibly bearing a pulvillus; other segments lacking pulvili.

Description of male (paratype): Same as holotype except for the following characters: middle and hind leg tarsi lacking pronounced pulvilli except on third segment; four total segments; knobs on supra-anal plate with only two spines each.

Etymology: The specific epithet “bifuscina” refers to the dual spined projections on the supra-anal plate. “Fuscina,” another word for trident, is also reminiscent of “fuscous” which might be used to describe the color of this insect, the tegmina in particular.

Known geographic distribution: French Guiana (new record).

Conclusions

With the species reported here, and inclusion of described species reported in two publications (Grandcolas 1994a, b) previously unrecognized in Evangelista *et al* (2015, 2016), French Guiana is known to have 163 species of cockroaches (Online Resource 1). The specimens for these potential new records await description, when the cockroach fauna of French Guiana and the Guiana Shield can be further updated.

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Nomenclature Zoobank Registration number: <http://zoobank.org/urn:lsid:zoobank.org:pub:93C9C85E-FE48-49DE-BB98-AB7FD35D84B3>

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Author Contributions ZKV set the scope of the study. FJ, PG, and FL collected specimens and curated them along with DAE and ZKV. DAE, ZKV, PG, and FL provided preliminary identification of specimens. DAE and ZKV took photos and collected data. DAE made illustrations and final taxonomic determinations and wrote descriptions. DAE and ZKV wrote the manuscript and PG and FL provided improvements.

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Compliance with Ethical Standards

Conflict of Interest The authors declare that they have no conflict of interest.

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