

Four new species of *Leptometa Aurivillius* from African tropical forests

(Lepidoptera, Lasiocampidae)

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Three species of the genus – *Leptometa matuta* Schaus, 1893; *Leptometa sapelensis* Aurivillius, 1927; and *Leptometa hintzi* Hering, 1928 – are briefly reviewed. Four new species are described from African tropical forests with the type locality of Ekongo camp, Mai-Ndombe, DRC: *Leptometa knudlarseni* sp. nov., *Leptometa adalensis* sp. nov., *Leptometa sophiae* sp. nov., and *Leptometa editae* sp. nov. Eggs, exochorion ultrastructure and early larval stages are described for two out of the four new species.

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Introduction

The family Lasiocampidae Harris, 1841 contains around 2000 species worldwide, or 1953 described species sensu Zolotuhin (2015). Among the biogeographic realms, the Afrotropical one houses the most diverse lasiocampid fauna: 29 genera and 101 species in Madagascar (Lees & Minet 2022) plus around 84 genera and 600 species in sub-Saharan Africa (Zolotuhin 2015).

Madagascar, considered a part of the realm, shares no species but only two genera *Odontocheilopteryx* Wallengren, 1860 (subgenus *Lestina* Zolotuhin & Gurkovich, 2009) and *Lechriolepis* Butler, 1880 with the continent. A comprehensive revision of lasiocampids of the island was done 51 years ago by de Lajonquière (1972) and published fully in black and white. Several taxa were described lately (Lajonquière 1973, Basquin 2017). Lees & Minet (2022) considered the Madagascan “Lasiocampidae arrangement [...] very unsatisfactory.” Though, the same statement is applicable to sub-Saharan fauna too.

Several revisions and reviews of sub-Saharan genera have been published but they dealt with only a part of the 84 genera and 600 species mentioned (Joannou & Krüger 2009, Joannou & Gurkovich 2009, Gurkovich & Zolotuhin 2009, Zolotuhin & Gurkovich 2009, Zolotuhin 2010, Zolotuhin & Prozorov 2010, Prozorov 2011, 2016, Prozorov & Zolotuhin 2012, 2013a, 2016, Prozorov et al. 2021b).

Here we would like to review the genus *Leptometa* Aurivillius, 1927. It currently includes three valid species (De Prins & De Prins 2022), each of them was described from a single female: *Leptometa matuta* Schaus, 1893 from Sierra Leone (Figs 1,2), *Leptometa sapelensis* Aurivillius, 1927 from southern Nigeria (Fig. 3) and *Leptometa hintzi* Hering, 1928 from Guinea-Bissau (Fig. 4). Prozorov & Zolotuhin (2013b) synonymized *Gastroplakaeis irrorata* Tams, 1929 from Cameroon (Figs 5,6) with *L. sapelensis* because of the external identity of the type females (Figs 3,6) and similar origin from wet broadleaf forests about 700 km away from each other. No supplementary data on the genus and included species were published apart from the original descriptions and the mentioned publication.

Present article is dedicated to the description of four new species, including the preimaginal stages of two of them, and provides additional notes on the genus and previously known species. The study is partially based on the original data collected during a one-year-long expedition near the Ekongo camp (2.75613°S, 20.31538°E), Mai-Ndombe, Democratic Republic of the Congo (DRC). Two studies previously reported five new Lasiocampidae species from the Ekongo camp (Prozorov et al. 2021a, 2021b).

Material and methods

Adults were collected using a traditional white screen lit with a Sylvania Mini-Lynx Blacklight BL368 20W and a chain of locally made auto-traps with the same type of bulb (or an analog). Both the screen and chain of traps ran off a Honda EU 20i generator.

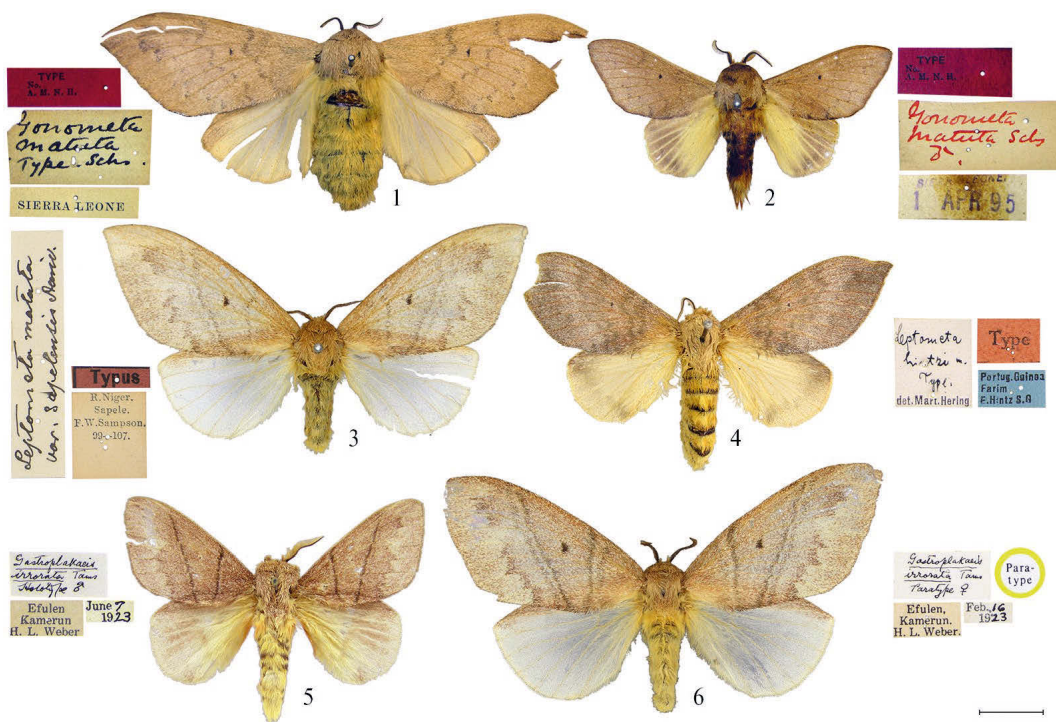
Eggs were obtained from living females, first photographed and then taken from the screen. They were kept for a few days inside paper bags until eggs were laid. The eggs were then photographed, and some were preserved with pure ethanol inside 1.5 mL Eppendorf microcentrifuge tubes while others were left to hatch. Preserved eggs were later dried, coated with gold, and photographed with a scanning electron microscope (SEM) Leo 1430VP, and stored in the Bavarian State Collection of Zoology (ZSM). A few hatched larvae were preserved, together with eggs, for future study of their chaetotaxy, while the others were kept for breeding purposes.

Adults were photographed with Olympus C-750 UZ, a set of Nikon D3300 with a Nikon 40mm f/2.8G and a Nikon R1C1 macro flash. Morphological preparations were photographed using Fujifilm X-T10 with Motic SMZ-161-TLED. All images were processed in Photoshop CS6 (Adobe, 2012).

Terminology follows Zolotuhin & Kurshakov (2011) and Zolotuhin (2015). Ecoregions listed in the Biology sections of each species follow Dinerstein et al., 2017. Elevation ranges were taken from Elevation Finder (Free Map Tools – <https://www.freemaptools.com/>). Distribution maps were made with Google My Maps service.

Specimens from the following collections were examined:

ANHRT	African Natural History Research Trust (Leominster, UK)
CAC	Collection of Alexandre Cipolla (Grivegnée, Belgium)
CGM	Collection of Günter Müller (Freising, Germany)
CMNH	Carnegie Museum of Natural History (Pittsburgh, PA, USA)
CMS	Collection of Manfred Ströhle (Weiden in der Oberpfalz, Germany)
MfNB	Museum für Naturkunde (Berlin, Germany)
MNHN	Museum national d'histoire naturelle (Paris, France)
MWM	Museum Witt Munich (Munich, Germany)
NHML	Natural History Museum (London, UK)
RBINS	Royal Belgian Institute of Natural Sciences (Brussels, Belgium)
RMCA	Royal Museum for Central Africa (Tervuren, Belgium)
SNHM	Swedish Natural History Museum (Stockholm, Sweden)
USNM	United States National Museum (Washington, USA)
USTTB	University of Sciences, Technics and Technologies (Mali, Bamako)
ZSM	Bavarian State Collection of Zoology (Munich, Germany)



Figs 1–6. Type specimens of *Leptometa* spp. and their labels. 1. Holotype female of *Gonometta matuta*, type species of *Leptometa*, Sierra Leone (USNM). 2. Male of *Gonometta matuta*, was not in the type series, Sierra Leone (USNM). 3. Holotype female of *Leptometa matuta* var. *sapelensis*, Nigeria, Sapele (SNHM). 4. Holotype female of *Leptometa hintzi*, Guinea-Bissau, Farim (MfNB). 5. Holotype male of *Gastroplakaeis irrorata*, Cameroon, Efulan (CMNH). 6. Paratype female of *Gastroplakaeis irrorata*, Cameroon, Efulan (NHML). Scale bar: 1 cm.

Results

Lasiocampidae, Lasiocampinae

Leptometa Aurivillius, 1927

In: Seitz, A. (ed.), *Die Großschmetterlinge der Erde*, 14, 272. Type species: *Gonometta matuta* Schaus, 1893, in Schaus & Clements, *On a collection of Sierra Leone Lepidoptera*, 32. Type locality: “the rocky peninsula of Sierra Leone” [Sierra Leone, Western Area, exact site is unknown].

Preimaginal stages are known for *L. knudlarseni* sp. nov. (eggs and L1 only) and *L. adalensis* sp. nov. (eggs and L1–L3).

Egg (Figs 7, 11). Upright, almost spherical, slightly elongated along the z-axis, upper half is slightly wider. About 2 mm tall. Almost white with the creamy latitudinal band a little lower than the equator, upper third is creamy, upper pole is dark brown. Micropylar plate is somewhat

round (Figs 8, 12). Micropylar rosette consists of 6–8 petal-shaped primary cells and thus 6–8 openings; it is about 40 microns in diameter. The transitional zone between the micropylar rosette and the egg’s main body, the aeropylar net, consists of 5–7 rows of cells with gradually growing relief; it is about 100 microns long (Figs 9, 13). Aeropylar net consists of variable amorphous or oval cells of about 20 microns in diameter (Figs 10, 14). They are bounded by wide ridges with 5–8 aeropylar openings, both ridges and the bottom of cells have wrinkled structures. Ridges and bottom of cells are better divided with relief in *L. adalensis* sp. nov., while in *L. knudlarseni* sp. nov. the transition between them may be weakly defined.

Larva. The first instar larva (L1) is almost completely black with a yellow and white pattern (Figs 15–16). It becomes semi-transparent and less vivid before shedding its skin (Fig. 17). Larvae of *L. adalensis* sp. nov. have more pronounced contrasting pattern. Head capsule is black, clypeus and antenna are yellow. The prothoracic shield has yellow lateral spots close to it. T1–T3 are black.

A1 and A2 segments are greyish to white with yellow spots, A3–A6 have dorsal yellow spots, A7 is white and yellow, and A9 has dorsal yellow spots. The second instar larva (L2) is orangish and greyish brown with a black spotted pattern (Fig. 18), and becomes less vivid before shedding its skin (Fig. 19). T1 segment is orange and black with lateral stripes, T2 dorsally bears a tubercle with long black chaetae, T3 is similar to T2; A1–A2 laterally have white stripes, A3–A6 dorsally bear a tubercle with long black chaetae, A7 and A8 have white stripes laterally, A8 bears a tubercle with long black chaetae. The third instar larva (L3) is orangish and pale brown with a black spotted pattern (Fig. 20). T1–T3 are orange and black, T2 dorsally bears a tubercle with black chaetae; A1–A7 have lateral black and white stripes, A1–A8 dorsally bear a tubercle with black chaetae.

Imago. Venation (Fig. 21). Similar to *Gastropylakaeis rufescens* Aurivillius, 1905 (Fig. 22); *Cosmotriche lobulina* Denis & Schiffermüller, 1775 (Fig. 23); and *Euthrix potatoaria* (Linnaeus, 1758) (Fig. 24). On the forewing: Sc and R1 are free, R2 and R3 on the stem of about one half of the branch length, R4 is free, R5 and M1 are on the stem of about one fifth of the branch length, M2 and M3 share the origin, CuA1 and CuA2 are free, CuP is absent, 1A fuses with 2A (1A+2A). On the hindwing: Sc and R1 form a humeral cell about the size of R-Cu cell, then fuse (Sc+R1), Rs and M1 are free, M2 and M3 are on the stem of about one eighth of the branch length; CuA1, CuA2, 1A, and 2A are free. Resting pose (Figs 25–30). Similar to *Gastropylakaeis forficulatus* Möschler, 1887 and *Mallocampa audea* (Druce, 1887) (Figs 31–32). Antennae rest laterally along thorax, may be hidden under wings. Forewings form a “tent” above the abdomen, and the anal margins adjoin. Hindwings move out laterally from under forewings until about Rs. The top of the abdomen may protrude from under the wings. Adults may play dead if disturbed while resting (Figs 33–34). Male genitalia (Figs 35, 37, 56–75). Tegumen is helmet-like, bears one or two pairs of outgrowths. Socii are mitten-like, dorsal ridge is more sclerotized, covered with chaetae. Valvae are short finger-shaped, basally widened, and fused with juxta. Juxta is an oval plate surrounding aedeagus, it has a pair of extensions along aedeagus. Aedeagus is claw-shaped, slightly curved with tiny vesica everting laterally. Vinculum is medially split into a pair of elongated somewhat triangular projections. The eighth sternite is trapezoid with two big dents on the caudal margin and elongated apodemes. Female genitalia (Figs 36, 38–40, 76–80). Papillae anales are semispherical, densely covered with chaetae. Posterior apophyses are longer than the anterior. Sterigma is V-shaped with a round ostium in the center or may have massive medial extension.

Ostium is round. Ductus may be well pronounced. Corpus bursae is egg-shaped, may bear signum.

Leptometa matuta (Schaus, 1893)

Figs 1–2, 35, 81

Gonometa matuta Schaus, 1893, in Schaus & Clements, On a collection of Sierra Leone Lepidoptera, 32. Type locality: “the rocky peninsula of Sierra Leone” [Sierra Leone, Western Area, exact site is unknown]. Holotype female (USNM).

Diagnosis. The species (Figs 1–2) is similar to *L. hintzi* (Fig. 4) because of the coloration and crenulated medial lines on the forewing, but overall, it is larger and the lines are not doubled. It does not have any of the dark pattern elements or split medial field like *L. knudlarseni* sp. nov., *L. adalensis* sp. nov., *L. sophiae* sp. nov., or *L. editae* sp. nov. (Figs 41–55).

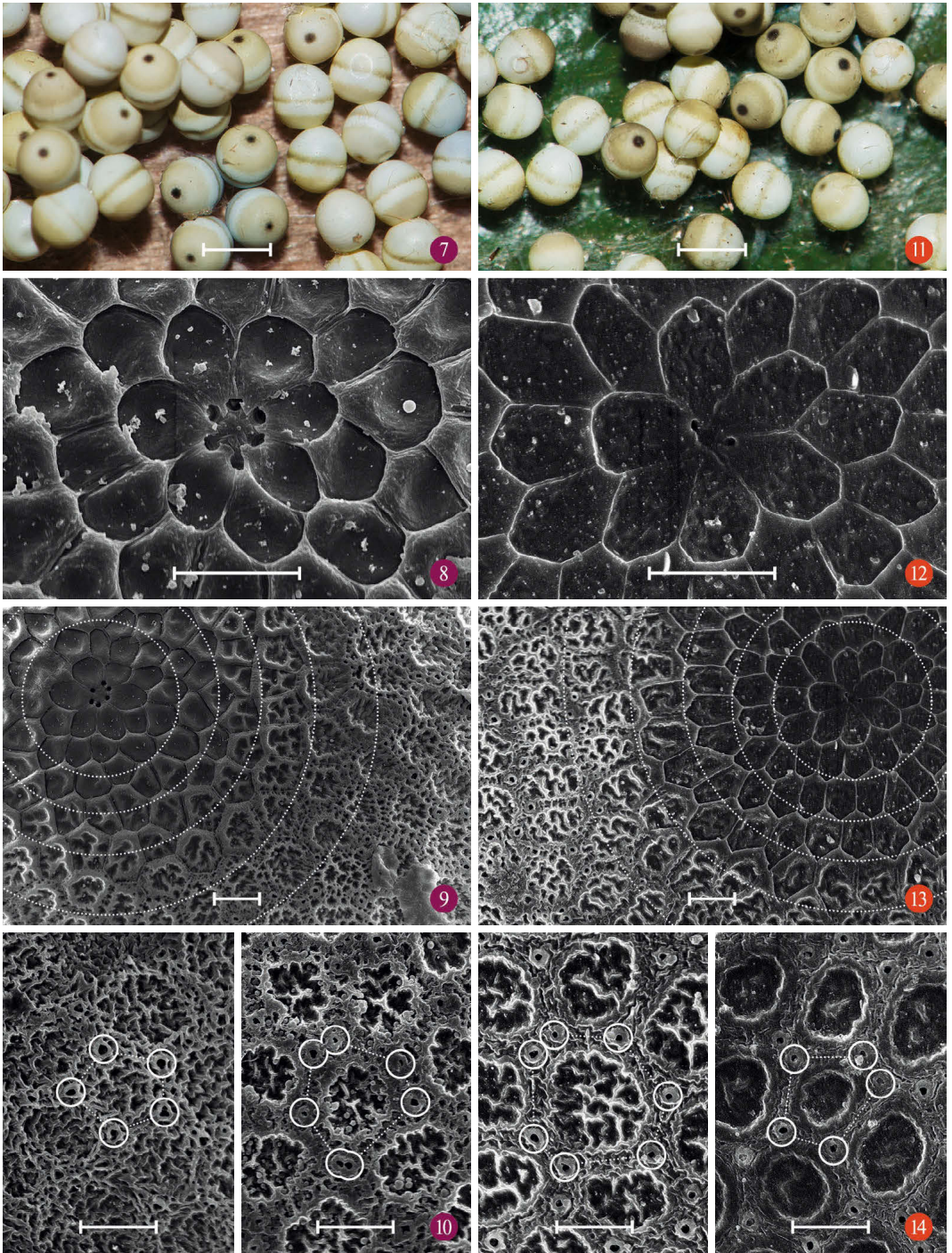
Imago. Male genitalia (Fig. 35). Tegumen is helmet-like with two pairs of outgrowths: short finger-shaped dorsal (Fig. 35I) and somewhat triangular dorsolateral ones (Fig. 35II). Juxta has a pair of short extensions along aedeagus (Fig. 35IV). Female genitalia are not studied.

Distribution (Fig. 81). Sierra Leone.

Taxonomic note. 1. Schaus and Clements co-authored the book: ‘On a collection of Sierra Leone Lepidoptera’, but Schaus is the only author of the species descriptions as Clements clearly states in the last paragraph of the introduction after expressing his “great indebtedness to Mr. William Schaus” – “The descriptions of new species are from his pen”.

2. There is one male from USNM with the red type label (Fig. 2). It was collected together with the holotype female according to the label which both bear “No. 19249 W. Schaus Collection”. The male was not mentioned in the original description; thus, this specimen does not belong to the type series. Aurivillius also did not know the male of the species, and the female was “known to me only from the figure [from the original description]” (1927: 272).

3. The type locality for the species is Sierra Leone, although Clements specifies in the introduction that “with few exceptions [...] habitat was the rocky peninsula of Sierra Leone, which has an area of some twenty square miles. It is very hilly, some of the hills rising to a height of from 3000 to 4000 feet [915 to 1220 m].” It looks like Clements collected insects somewhere on Freetown Peninsula, it has a hilly relief with summits up to 891 m and these are the only high hills along the coast. The distribution area and intraspecific variability of the species are yet to be studied and described.



Figs 7-14. Eggs and exochorion ultrasculpture of *L. knudlarseni* sp. nov. (7-10) and *L. adalensis* sp. nov. (11-14) under SEM. Rows of transitional zone cells roughly showed with the dotted circles. Aeropyle openings marked with white circles and cell ridges with dotted lines. Scale bars: ca. 2 mm for regular photos and 20 microns for SEM photos.



Figs 15–20. Larvae of *L. adalensis* sp. nov. (15) and *L. knudlarseni* sp. nov. (16–20). Photos were taken in the Ekongo camp, DRC.

***Leptometia sapelensis* Aurivillius, 1927**

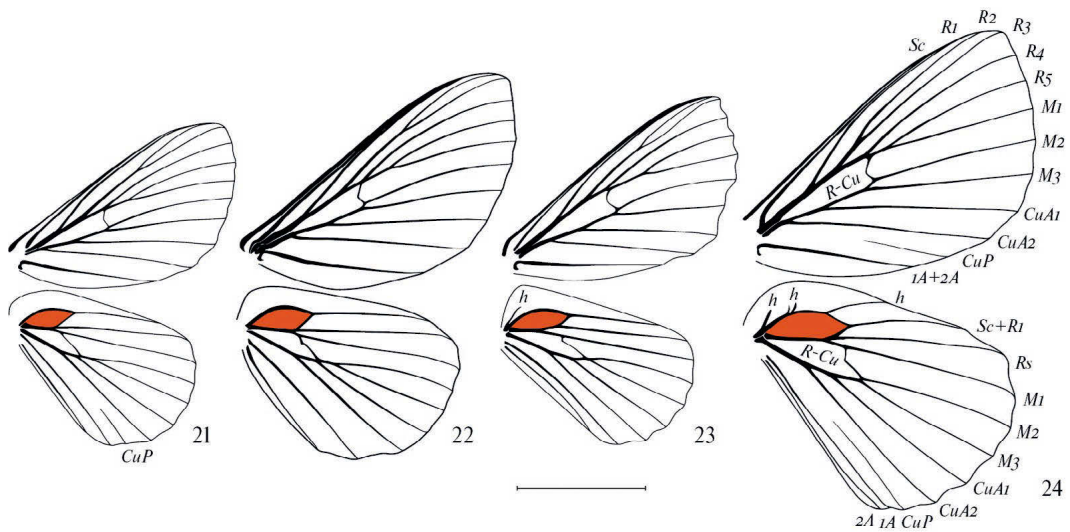
Figs 3, 5–6, 30, 37–40, 82

Leptometia matuta var. *sapelensis* Aurivillius, 1927, Die Großschmetterlinge der Erde, 14, 272. Type locality: “Nigeria: Sapele” [5.9°N, 5.666667°E]. Holotype female (SNHM).

= *Gastropylakaeis irrorata* Tams, 1929, Annals and Magazine of Natural History, Series 10, 3(14), 159. Type locality: “Cameroon, Efoulen” [Cameroon, Yaoundé, Efoulan, 3.836389°N, 11.506111°E]. Holotype male (CMNH).

Diagnosis. Both sexes differ from *L. matuta* and *L. hintzi* by the almost straight medial lines of the forewing, which are crenulated in the congeners. It does not have any of the dark pattern elements or split medial fields like *L. knudlarseni* sp. nov., *L. adalensis* sp. nov., *L. sophiae* sp. nov. or *L. editae* sp. nov. Tegumen bears only dorsolateral outgrowths (Fig. 37 II) and lacks dorsal ones, while other species of the genus have them (Figs 35, 59, 63, 66 I).

Imago. Male genitalia (Fig. 37). Tegumen is helmet-like with pair of dorsolateral outgrowths (Fig. 37 II). Juxta has a pair of short extensions along aedeagus



Figs 21–24. Wing venations. 21. *Leptometa matuta*. 22. *Gastroplakais rufescens*. 23. *Cosmotriche lobulina*, type genus of Selenepherini. 24. *Euthrix potatoria*. Note the size of the humeral cell, red. Scale bar: 1 cm.

(Fig. 37IV). Female genitalia (Figs 38–40). Posterior apophyses are slightly longer to twice longer than anterior ones. Sterigma is V-shaped with a round ostium in the center. Ductus bursae is not pronounced. Corpus bursae medially bears a tiny couple of fused signa.

Distribution (Fig. 82). Nigeria, Cameroon, Gabon, Congo (new record) and DRC (new record).

Biology. Adults were collected from September to May. The ecoregions it inhabits are Nigerian lowland forests, Niger Delta swamp forests, Cross-Sanaga-Bioko coastal forests, Northwest Congolian lowland forests, Congolian coastal forests, Northwest Congolian lowland forests, Western Congolian forest-savanna, Western Congolian swamp forests, and Central Congolian lowland forests. The species was collected from the altitudes up to 718 meters above sea level.

Type material: **Holotype** ♀, Nigeria, Sapele, 5.8751 N, 5.6931 E, leg. F. W. Sampson, slide 10961 (SNHM). **Cameroon:** holotype ♂ of *Gastroplakais irrorata*, Yaoundé, Efoulan, 3.836389° N, 11.506111° E, 7.VI.1923, leg. H. L. Weber (CMNH); paratype ♂ of *Gastroplakais irrorata*, Yaoundé, Efoulan, 3.836389° N, 11.506111° E, 27.IX.1922, leg. H. L. Weber, slide 2008-23 (NHML); paratype ♀ of *Gastroplakais irrorata*, Yaoundé, Efoulan, 3.836389° N, 11.506111° E, 16.II.1923, leg. H. L. Weber, slide 2008-53 (NHML). – **Additional material:** **Nigeria:** ♀, Sapele, 5.8751 N, 5.6931 E, leg. F. W. Sampson (NHML); 2 ♂, ♀, Sobo plain, near Sapele, 26.II.1957, 6.III.1957, 26.IV.1957, leg. B. J. MacNulty (NHML);

♀, Port Harcourt, 4.8261 N, 7.0172 E, 22.XII.1957, leg. B. J. MacNulty (NHML); ♀, Ikom, 5.9681 N, 8.7260 E, 22-24.XII.1970, leg. H. Politzar (MWM/ZSM). **Cameroon:** ♂, ♀, Yaoundé, Efoulan, 3.836389° N, 11.506111° E, 21.X.1922, 16.II.1923, leg. H. L. Weber (CMNH). **Gabon:** ♀, Mouila, 1.869103° S, 11.053576° E, 10.IX.1964, V. Allard, slide 000005094 (RMCA); ♂, Monts de Cristal, 0.533056° N, 10.215278° E, 25.05.2011, 139 m, leg. Sinaiev & Murzin (CGM). **Congo:** ♂, Odzala NP, 0.383 N, 14.83 E, 29.I.–3.III.1997, leg. Sinaiev & Murzin (CGM). **DRC:** ♀, Ukaturaka, 1.8535° N, 20.01965° E, 29.XII.1948, leg. T. Wikeley (NHML); ♂, ♀, Mai-Ndombe, Ekongo camp, 2.75613 S, 20.31538 E, X.2017, XI.2017 (CGM/USTTB).

Taxonomic note. Two genitalia preparations from Cameroon and Gabon (Figs 38–39) have thinner sterigma and more compact signa – a round spot, while sterigma of the holotype from Nigeria (Fig. 40) is thicker and signa form a line. More preparations of male and female genitalia must be done to understand the intraspecific variability.

Leptometa hintzi Hering, 1928

Figs 4, 36, 81

Leptometa hintzi Hering, 1928, Mitteilungen aus dem Zoologischen Museum in Berlin, 14 (3–4), 498. Type locality: “Portuguese Guinea, Farim” [Guinea-Bissau, Farim, 12.483889 N, 5.221667 W]. Holotype female (MfNB).

Diagnosis. Male of the species remains unknown and thus only females can be compared. Holotype

female similar to *L. matuta* (Fig. 1) due to the coloration and crenulated medial lines on the forewing, but it is overall smaller and the lines are doubled. It does not have any of the dark pattern elements or split medial field like *L. knudlarseni* sp. nov., *L. adalensis* sp. nov., *L. sophiae* sp. nov., or *L. editae* sp. nov. (Figs 41–55).

Imago. Female genitalia (Fig. 36). Posterior apophyses are about one third longer than the anterior ones. Sterigma is V-shaped with a round ostium in the center. Ductus bursae is not pronounced. Corpus bursae bears no signum.

Distribution (Fig. 81). Guinea-Bissau.

Leptometa knudlarseni sp. nov.

<http://zoobank.org/urn:lsid:zoobank>.

org:act:751698FB-9507-427F-B52F-F4A11E3C3825

Figs 7–10, 16–20, 25–26, 33, 41–45,
56–59, 67–69, 76–77, 83

Type material: **Holotype** ♂, DRC, Mai-Ndombe, Ekongo camp, 2.75613°S, 20.31538°E, III.2018, slide 0831 (ZSM). – **Paratypes** (200 ♂, 9 ♀ total). **DRC:** 3 ♂, 2 ♀, data as for holotype but collected in X.2017, XI.2017, I.2018, leg. A. Prozorov, T. Prozorova, V. Kravchenko et al., slides 0832–0836 (CGM/USTTB); 180 ♂, 3 ♀, Kasai-Occidental, NE Ilebo and Kasai River, moist broadleaved forest/savanna mosaic, I–III, V–VI, X–XII.1997 (CGM/USTTB). **Gabon:** ♂, Monts de Cristal, Kinguelé, 600 m, 2.IV.2019, leg. P. Basquin (CAC); ♂, Monts de Cristal, Kinguelé, 11.IX.2007, leg. Ph. Oremans (CAC); ♂, Kinguelé, 1995 (CAC); 4 ♂, Monts de Cristal, 700 m, 20.V.1990, 24.IX.1992, 16.IV.1993, leg. P. Basquin (CAC); ♂, Monts de Cristal, 7.XII.1991, leg. P. Basquin (CAC); 2 ♀, Mandji-Yeno, 2.0500°S, 9.6167°E, 30 m, 3–11.VII.1992, leg. P. Basquin (CAC); ♀, Lastourville, 24.XII.1991, leg. P. Basquin (CAC); ♂, Woleu-Ntem: Crystal Mt., Kinguelé NP, 0.4544°N, 10.2778°E, 90 m, 19–30.XI.2019, leg. K. Larsen, slide Lazlas019, BOLD ID CTBB-3200 (CAC); 2 ♂, Woleu-Ntem: Crystal Mt., Kinguelé NP, 0.4544°N, 10.2778°E, 90 m, 19–30.XI.2019, leg. K. Larsen, (CAC); ♂, Belinga, Camp Central, 2.VI.1963, leg. G. Bernardi, slide 2011-017 (MNHN); ♂, Mbei valley, Tchimbéle, 0.51°N, 10.51°E, 15.IV.2007, leg. Ph. Oremans, BOLD ID LBEOW1351-11 (CMS); 3 ♂, Mikongo (Rougier), Monts de Cristal (Secondary Forest), 0.496389°N, 11.178333°E, 430 m, 28.VII.–12.VIII.2019, leg. J.-L. Albert, M. Aristophanous, J. Bie Mba, V. Dérozier, P. Moretto, ANHRT:2019.17 (ANHRT). **Cameroon:** ♂, Edea, PK20, II.1990 (CAC); ♂, 20 km on the road Edea–Douala, 5.VII.1992, leg. Th. Bouyer, slide 2001-043 (RMCA).

Diagnosis. The forewing medial field consist of the bigger somewhat ovaloid and the smaller round blackish spots. Male genitalia similar to *L. adalensis*

sp. nov., but differ from *L. sophiae* sp. nov. by the short juxta extensions. Sterigma in female genitalia is similar to *L. adalensis* sp. nov., but differs from *L. editae* sp. nov. by the lack of a well-developed peak above ostium; paired signa similar to the ones of *L. editae* sp. nov., but much smaller than of *L. adalensis* sp. nov.

Description

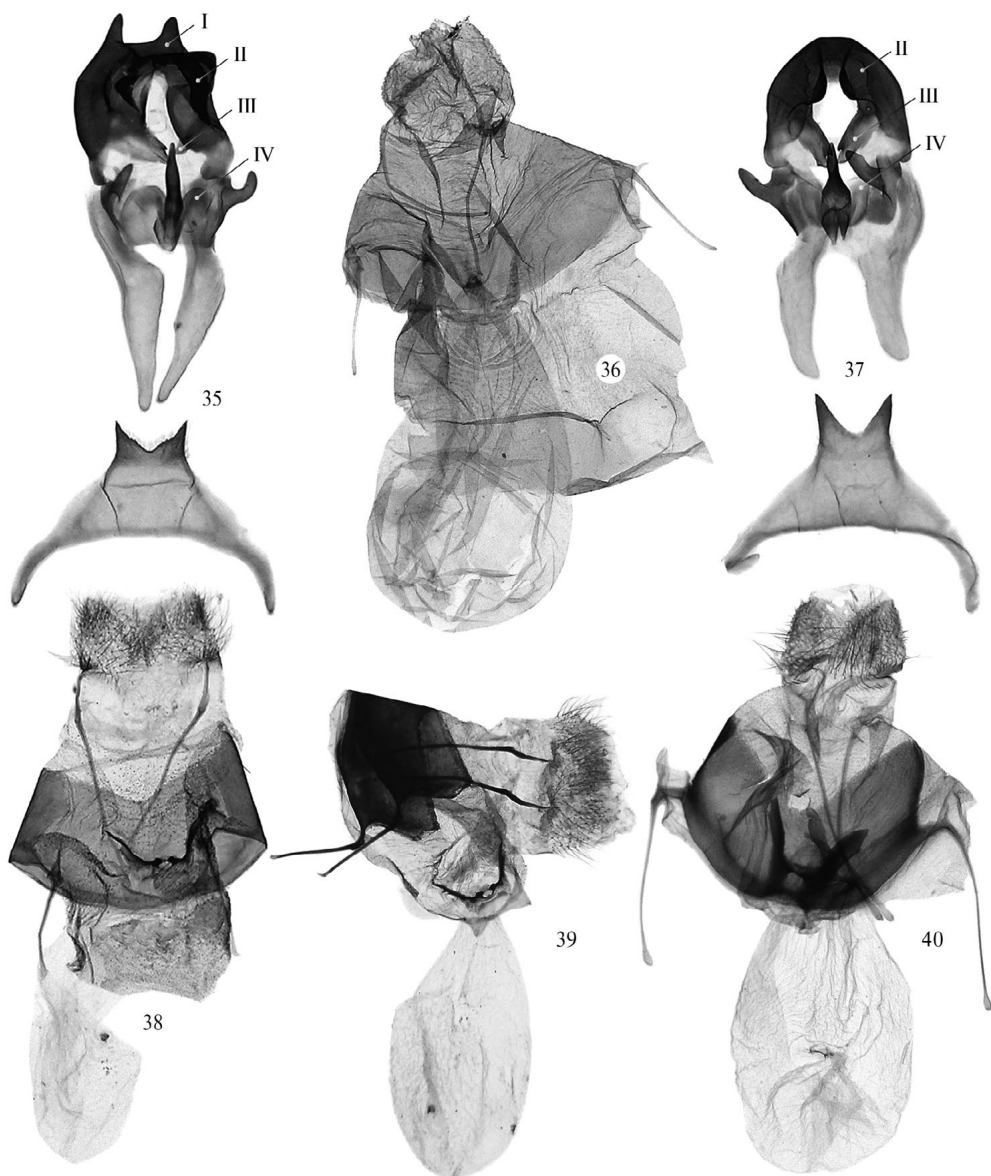
Male (Figs 41–43). Antennae are yellowish, flagellum is covered with blackish scales. Head and thorax are brown, tegulae slightly darker. Abdomen is reddish or orangish yellow with transverse black stripes. Forewing. Forewing length: 20–23 mm; wingspan: 45–49 mm. Somewhat triangle, apex is pointed, outer margin is slightly waved. Background colour brown, basally darker. Pattern consists of the blackish medial field divided into the bigger field spreading from the costal margin until CuA₂ and a small circle near the anal margin, both have pale contours. Cilia yellowish brown. Hindwing. Oval-shaped. Background colour is dark brown with yellow or reddish yellow anal field and veins. Cilia are yellowish brown. Genitalia (Figs 56–59). Tegumen is helmet-like with two pairs of outgrowths: the dorsal short finger-shaped (Fig. 59I) and dorsolateral slightly prominent ones (Fig. 59II). Juxta has a pair of short extensions along aedeagus (Fig. 59IV).

Female (Figs 44–45). Antennae, head and thorax are brown. Abdomen is dark yellow. Forewing. Forewing length: 33–35 mm; wingspan: 66–75 mm. Somewhat ovaloid, apex is pointed, outer margin is slightly waved. Background colour is brown. Pattern is similar to the male but the medial field of a background colour and the spot on R-Cu vein is pronounced. Cilia are light brown. Hindwing. Oval-shaped. Background colour is light brown. Anal field is yellowish. The brown coloration gradually gets lighter from the costal to anal margin. Cilia are brown. Genitalia (Figs 76–77). Posterior apophyses are about twice longer than the anterior ones. Sterigma is V-shaped with a round ostium in the center. Ductus bursae is about half the length of corpus bursae. Corpus bursae medially bears tiny couple of fused signa (Figs 76–77, below).

Variability. An adult male may be overall slightly paler (Fig. 43) or darker coloured (Fig. 42). Two parts of the medial field on the forewing may be split (Figs 41, 43) or partially merged (Fig. 42); external fascia may be absent (Fig. 41) or well pronounced (Fig. 43). Light elements of the hindwing and abdominal pattern may be orangish-yellow (Fig. 42) or reddish yellow (Fig. 41). Male genitalia overall size and shape of every element slightly vary in size; the surface of the dorsolateral outgrowths of vinculum



Figs 25-34. Resting poses of 25-26. *L. knudlarseni* sp. nov., 27-28. *L. adalensis* sp. nov., 29. *L. sophiae* sp. nov., 30. *L. sapelensis*, 31. *G. forficulatus*, and 32. *M. audea*; 33. *L. knudlarseni* sp. nov. and 34. *L. sophiae* sp. nov. playing dead. Photos were taken in Ekongo camp, DRC.



Figs 35–40. Genitalia of *Leptometa* spp. 35. Male of *L. matuta*, type species of *Leptometa*, Sierra Leone, slide 2008-01 (USNM). 36. Holotype female of *L. hintzi*, Guinea-Bissau, slide 2008-36 (MfNB). 37–40. *L. sapelensis*. 37. Holotype male of *G. irrorata*, Cameroon, slide 2008-23 (CMNH). 38. Female, Cameroon, slide 2008-53 (NHML). 39. Female, Gabon, slide 000005094 (RMCA). 40. Holotype female of *L. matuta* var. *sapelensis*, Nigeria, slide 10961 (SNHM). Roman numerals are for the dorsal (I) and dorsolateral (II) outgrowths of vinculum, socia (III) and juxta extension (IV).

is usually smooth (Figs 56–58, n=5) but may be sort of wrinkled (Fig. 59); caudal margin of the eighth sternite has a different number of tiny dents (Figs 67–69). An adult female may be overall paler (Fig. 44) or darker coloured (Figs 45). Female genitalia overall

size and shape of every element slightly vary in size; sterigma shape varies in width from narrower (Fig. 76) to wider (Fig. 77); signa slightly vary in size and relative position (Figs 76–77, below).



Figs 41–55. *Leptometa* spp. 41–45. *L. knudlarseni* sp. nov., all DRC, Mai-Ndombe, Ekongo camp. 41. Holotype male, slide 0831 (ZSM). 42. Paratype male, slide 0832 (CGM/USTTB). 43. Paratype male, slide 0833 (CGM/USTTB). 44. Paratype female, slide 0835 (CGM/USTTB). 45. Paratype female, slide 0836 (CGM/USTTB). 46–49. *L. adalensis* sp. nov., all DRC, Mai-Ndombe, Ekongo camp. 46. Holotype male, slide 0838 (ZSM). 47. Paratype male, slide 0839 (CGM/USTTB). 48. Paratype male, slide 0830 (CGM/USTTB). 49. Paratype female, slide 0707 (CGM/USTTB). 50–53. *L. sophiae* sp. nov. 50. Paratype female, Gabon, Monts de Cristal. 51. Holotype male, DRC, Mai-Ndombe, Ekongo camp, slide 0844 (CGM/USTTB). 52. Paratype male, same data, slide 0846 (CGM/USTTB). 53. Paratype male, same data, slide 0843 (CGM/USTTB). 54–55. *L. editae* sp. nov., all DRC, Mai-Ndombe, Ekongo camp. 54. Holotype female, slide 0005 (ZSM). 55. Paratype female (CGM/USTTB). Scale bar: 1 cm.

Etymology. The species is named in honour of our colleague Knud Larsen, a Danish entomologist specializing in the family Tortricidae worldwide. He provided some specimens from his entomological trip to Gabon for this study.

Distribution (Fig. 83). Cameroon, Gabon and DRC.

Biology. Adults were collected all year round except for August; thus, the species is polyvoltine. The ecoregions it inhabits are Cross-Sanaga-Bioko coastal forests, Congolian coastal forests, Western Congolian forest-savanna, and Central Congolian lowland forests. The species was collected from the altitudes up to 861 meters above sea level.

Leptometa adalensis sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:AB18343C-9500-474A-BB44-FF9D138821B6>

Figs 11–14, 15, 27–28, 46–49, 60–63, 70–72, 79–80, 85

Type material: Holotype ♂, DRC, Mai-Ndombe, Ekongo camp, 2.75613°S, 20.31538°E, X.2017, leg. A. Prozorov, T. Prozorova, V. Kravchenko et al., slide 0838 (ZSM). – **Paratypes** (43 ♂, 3 ♀ total). **DRC:** 5 ♂, 2 ♀, data as for holotype but collected in X.2017, XI.2017, I.2018, III.2018, slides 0707, 0830, 0837, 0839–0841 (CGM/USTTB); 32 ♂, ♀, Kasai-Occidental, NE Ilebo and Kasai River, moist broadleaved forest/savanna mosaic, I–III, XI–XII.1997 (CGM/USTTB); ♂, Kazana, 11–18.I.2016, 2.XII.2016, leg. Th. Bouyer (CAC); ♂, Kazana, 11–18.I.2016, 2.XII.2016, leg. Th. Bouyer, BOLD ID CTBB-3208, (CAC); ♂, Tshopo, Bambaketa, 14–18.VIII.2017, leg. Th. Bouyer, slide LazLas018, BOLD ID CTBB-3207, (CAC); ♂, South Kivu, Shabunda Territory, Makalapongo, 1350 m, 22.X.1943 (RBINS); ♂, Nord Kivu, Irangi, V.1967, leg. Jilly (MfNB). **Gabon:** ♂, Lastourville, 3.I.1992, leg. P. Basquin (CAC).

Diagnosis. The forewing medial field consist of the bigger and smaller somewhat triangular brown spots. Male genitalia similar to *L. knudlarseni* sp. nov., but differ from *L. sophiae* sp. nov. by short juxta extensions. Sterigma in female genitalia is similar to *L. knudlarseni* sp. nov., but differs from *L. editae* sp. nov. by the lack of well-developed peak above ostium; paired signa are bigger than those of *L. knudlarseni* sp. nov. and *L. editae* sp. nov.

Description

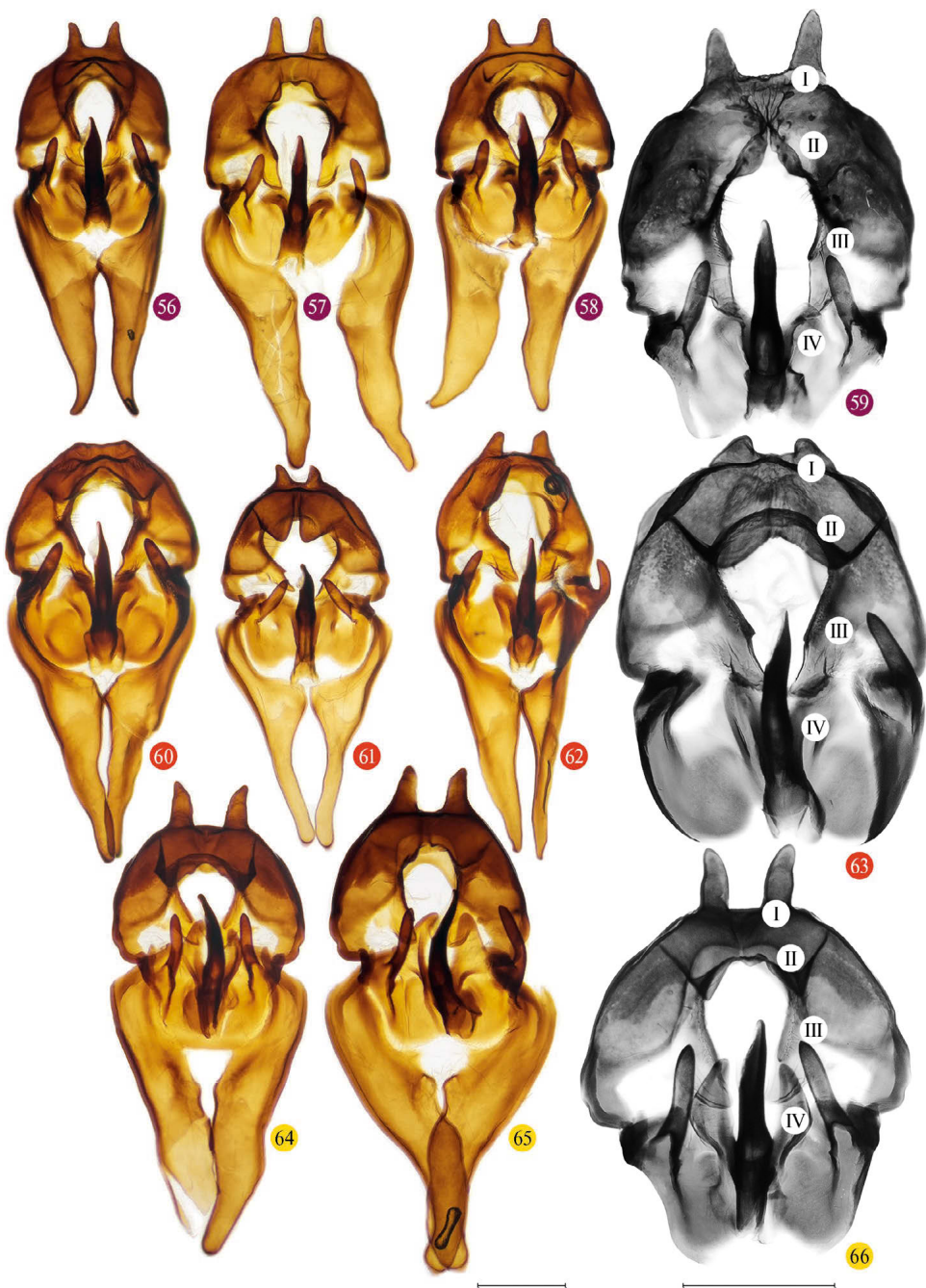
Male (Figs 46–48). Antennae are yellowish, flagellum is covered with blackish scales. Head and thorax are light brown, tegulae are slightly lighter. Abdomen is yellow or reddish-yellow with transverse black stripes. Forewing. Forewing length: 20–24 mm; wingspan: 43–50 mm. Somewhat triangle, apex is

pointed, outer margin is slightly waved. Background colour is yellow. Pattern consists of the dark brown basal field divided into the bigger somewhat triangle part spreading from the costal margin until CuA_1 or CuA_2 and a small triangle near the anal margin, both have dark brown contours; brown blurred field spreading from the outer margin towards the medial field between R_3 and M_1 , M_2 and CuA_2 ; more or less pronounced crenulated external line and a paler external field. Cilia are yellow. Hindwing. Oval-shaped. Background colour is yellow or reddish yellow with dark brown intervein space from the costal margin until CuA_2 . Cilia are yellow. Genitalia (Figs 60–63). Tegumen is helmet-like with two pairs of outgrowths: the dorsal short finger-shaped (Fig. 63I) and dorso-lateral slightly prominent ones (Fig. 63II). Juxta has a pair of short extensions along aedeagus (Fig. 63IV).

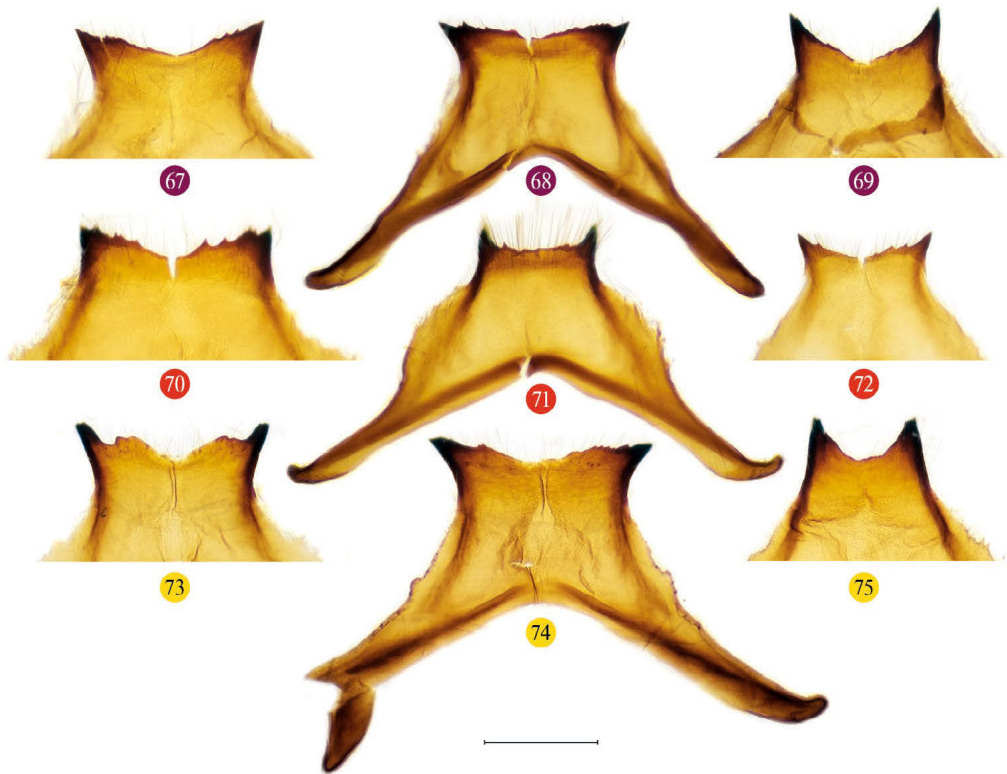
Female (Fig. 49). Antennae, head and thorax are brown, tegulae are slightly lighter. Abdomen is orange. Forewing. Forewing length: 36.5 mm; wingspan: 78–80 mm. Somewhat ovaloid, apex is pointed, outer margin is slightly waved. Background colour is brown. Pattern is similar to male. Cilia are brown. Hindwing. Oval-shaped. Background colour is yellow, costal field is brown. Cilia are brownish yellow. Genitalia (Figs 79–80). Posterior apophyses are about one fifth longer than the anterior ones. Sterigma is V-shaped with a round ostium in the center. Ductus bursae is about half the length of corpus bursae. Corpus bursae medially bears a couple of relatively large fused signa with a number of tiny dents (Figs 79–80, below).

Variability. An adult male may be overall slightly paler (Fig. 48) or darker coloured (Fig. 47). Two parts of the medial field on the forewing may be split (Figs 46, 48) or partially merged (Fig. 47); external fascia may be more or less pronounced as well as the light external field. Light elements of the hindwing and abdominal pattern may be yellow (Fig. 47) or reddish yellow (Fig. 46). Overall size and shape of every element in male genitalia slightly vary in size; the size of the dorsal outgrowth of vinculum ranges from very small (Fig. 60) to elongated (Fig. 62); the size of the dorsolateral outgrowth ranges from small (Fig. 60) to elongated (Fig. 61); caudal margin of the eighth sternite has different number of tiny dents (Figs 70–72). An adult female has more or less pronounced external fascia and the light external field on the forewing. Overall size and shape of every element in female genitalia slightly vary in size; ostium may be smaller (Fig. 79) or wider (Fig. 80); signa slightly vary in size and relative position (Figs 79–80, below).

Etymology. The species is named in honour of the third co-author's wife Adalen Ladeuze, who supports her husband in his entomological work.



Figs 56–66. Male genitalia of *Leptometia* spp., all from DRC, Mai-Ndombe, Ekongo camp. 56–59. *L. knudlarseni* sp. nov. 56. Holotype, slide 0831 (ZSM). 57. Paratype, slide 0832 (CGM/USTTB). 58. Paratype, slide 0833 (CGM/USTTB). 59. Paratype, slide 0834 (CGM/USTTB). 60–63. *L. adalensis* sp. nov. 60. Holotype, slide 0830 (ZSM). 61. Paratype, slide 0838 (CGM/USTTB). 62. Paratype, slide 0839 (CGM/USTTB). 63. Paratype, slide 0840 (CGM/USTTB). 64–66. *L. sophiae* sp. nov. 64. Holotype, slide 0844 (ZSM). 65. Paratype, slide 0846 (CGM/USTTB). 66. Paratype, slide 0843 (CGM/USTTB). Roman numerals are for the dorsal (I) and dorsolateral (II) outgrowths of vinculum, socia (III) and juxta extension (IV). Scale bar: 1 mm.



Figs 67–75. The eight abdominal sternite of males and its fragments of *Leptometa* spp., all from DRC, Mai-Ndombe, Ekongo camp. 67–69. *L. knudlarseni* sp. nov. 67. Paratype, slide 0834 (CGM/USTTB). 68. Holotype, slide 0831 (ZSM). 69. Paratype, slide 0833 (CGM/USTTB). 70–72. *L. adalensis* sp. nov. 70. Paratype, slide 0840 (CGM/USTTB). 71. Holotype, slide 0837 (ZSM). 72. Paratype, slide 0830 (CGM/USTTB). 73–75. *L. sophiae* sp. nov. 73. Paratype, slide 0846 (CGM/USTTB). 74. Holotype, slide 0844 (ZSM). 75. Paratype, slide 0843 (CGM/USTTB). Scale bar: 1 mm.

Distribution (Fig. 85). Gabon and DRC.

Biology. Adults were collected in January–March, May, August, October–December, the species is most likely to be polyvoltine. The ecoregions it inhabits are Central Congolian lowland forests, Victoria Basin forest-savanna, Albertine Rift montane forests, Northeast Congolian lowland forests, and Central Zambeian wet miombo. The species was collected from the altitudes up to 1534 meters above sea level.

Leptometa sophiae sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:80B578C3-35C7-4D2F-BCC0-D81D50197009>

Figs 29, 34, 50–53, 64–66, 73–75, 84

Type material: Holotype ♂, DRC, Mai-Ndombe, Ekongo camp, 2.75613° S, 20.31538° E, XI.2017, leg. A. Prozorov, T. Prozorova, V. Kravchenko et al., slide

0844 (ZSM). – **Paratypes** (85 ♂, ♀ total). **DRC:** 4 ♂, data as for holotype but collected in XI.2017, I.2018, II.2018, slides 0842–0843, 0845–0846 (CGM/USTTB); 72 ♂, Kasai-Occidental, NE Ilebo and Kasai River, moist broadleaved forest/savanna mosaic, I-III, V, X-XII.1997 (CGM/USTTB). **Gabon:** ♂, Monts de Cristal, Tchimbélé, 17.VII.2007 (CAC); 5 ♂, ♀, Monts de Cristal, 700 m, 13.IV.1991, 22.IV.1992, 1.I.1994, 4.IV.1994, 5.VI.1994, leg. P. Basquin (CAC); 2 ♂, Monts de Cristal, 750 m, 5.IV.1992, 28.VI.1992, leg. P. Basquin (CAC); 1 ♂, Ogooue Ivindo, P.N. Ivindo, Station de Recherche d'Ipassa, 450 m, 0°30'43"N, 12°48'12"E, 14–26.VI.2016, leg. E. Ruzzier, T. Tasane, ANHRT:2017.19 (ANHRT).

Diagnosis. The medial field similar to the one of *L. adalensis* sp. nov., but the most-distal part of it is cut before R_2 and R_3 do branch, while the one of *L. adalensis* sp. nov. continues towards the forewing apex. Juxta extensions significantly longer than those of *L. knudlarseni* sp. nov. and *L. adalensis* sp. nov.



Figs 76–80. Female genitalia and signa of *Leptometa* spp., all from DRC, Mai-Ndombe, Ekongo camp (CGM/USTTB). 76–77. *L. knudlarseni* sp. nov. 76. Paratype, slide 0835. 77. Paratype, slide 0836. 78. *L. editae* sp. nov., holotype, slide 0005. 79–80. *L. adalensis* sp. nov. 79. Paratype, slide 0841. 80. Paratype, slide 0707. Scale bar: 1 mm.

Description

Male (Figs 51–53). Antennae are yellowish, flagellum is covered with blackish scales. Head and tegulae are light brown, thorax is medially brown. Abdomen is yellow or reddish yellow with transverse black stripes. Forewing. Forewing length: 20–24 mm; wingspan: 44–50 mm. Somewhat triangle,

apex is pointed, outer margin is slightly waved. Background colour is brownish yellow. Pattern consists of dark brown basal field; brown medial field is divided into the bigger somewhat triangle part spreading from the costal margin until 1A + 2A where it merges with the smaller triangle near the anal margin, both have blackish contour; brown

blurred field spreads from the outer margin towards the medial field between R_3 and M_1 , M_2 and CuA_2 ; more or less pronounced crenulated external line. Cilia are brownish yellow. Hindwing. Oval-shaped. Background colour is yellow or reddish yellow with dark brown intervein space from the costal margin until 1A. Cilia are yellow. Genitalia (Figs 64–66). Tegumen is helmet-like with two pairs of outgrowths: the dorsal short finger-shaped (Fig. 66 I) and dorsolateral slightly prominent ones (Fig. 66 II). Juxta has a pair of elongated extensions along aedeagus (Fig. 66 IV).

Female (Fig. 50). Antennae, head and thorax are brown, tegulae slightly lighter. Abdomen is yellow. Forewing. Forewing length: 38 mm; wingspan: 78 mm. Somewhat ovoid, apex is pointed, outer margin is slightly wavy. Background colour is brown. Pattern is similar to the male but two parts of the medial field do not merge. Cilia are brown. Hindwing. Oval-shaped. Background colour is yellow, costal part is brown. Cilia are brownish yellow. Genitalia were not studied.

Etymology. The species is named in honour of Sophia A. Prozorova, a beloved daughter of the first two authors of the present article.

Distribution (Fig. 84). Gabon and DRC.

Biology. Adults were collected in January–July and October–December, the species is more likely polyvoltine. The inhabiting ecoregions are Congolian coastal forests, Northwest Congolian lowland forests and Central Congolian lowland forests. The species was collected from the altitudes up to 861 meters above sea level.

Leptometa editae sp. nov.

<http://zoobank.org/urn:lsid:zoobank.org:act:9111CC69-2C82-43FF-8718-9FEF0789BE74>

Figs 54–55, 78, 86

Type material: Holotype ♀, DRC, Mai-Ndombe, Ekongo camp, 2.75613°S, 20.31538°E, III–IV.2017, leg. V. Kravchenko et al., slide 0005 (CGM/USTTB). – Paratype ♀, DRC, data as for holotype (CGM/USTTB).

Diagnosis. External margin of the forewing is wavy, while other *Leptometa* species have it smooth to slightly wavy, the pattern is variegated with contrasting white and yellow elements that is unique to this species. Sterigma in female genitalia is medially massive with the peak partially covering ostium, other species have ostium opened.

Description

Male is unknown, expected to be smaller and having the same wing pattern as female.

Female (Figs 54–55). Antenna, head and thorax are brown. Tegulae are dark brown, contoured with yellow scales. Abdomen is brown. Forewing. Forewing length: 31–33 mm; wingspan: 60–67 mm. Somewhat triangle, apex is pointed, outer margin is wavy with the tops on R_3 , M_1 and CuA_1 . Background colour is brown. Pattern consists of multiple elements: dark basal, medial and external fields broken into segments by brown veins; light brown field between the medial and external fields; white triangle spot on R-Cu vein and white medial stroke between CuA_2 and 1A+2A; yellow V-shaped elements in the external field. Cilia are brown. Hindwing. Oval-shaped. Background colour is brown, darkens medially, anal field is light brown. Cilia are yellowish brown. Genitalia (Fig. 78). Posterior apophyses are about two thirds longer than the anterior ones. Sterigma has massive medial extension and narrow lateral arms, round ostium in the center is covered partially with the peak from the top. Ductus bursae is not pronounced. Corpus bursae medially bears relatively small couple of fused signa (Fig. 78, below).

Etymology. The species is named in honour of Prof. Dr. Edita E. Revay.

Distribution (Fig. 86). DRC.

Biology. Adults were collected in March–April. The ecoregion it inhabits is Central Congolian lowland forests. The elevation of the collection site is 350 meters above sea level.

Taxonomic note. The type females have a wavy external margin of the forewings while other species of the genus have it smooth (compare females: Figs 1, 3, 4, 44, 49, 50 and 54). They also have a distinct shape of sterigma with the medial extension which other species lack (compare genitalia: Figs 36, 38–40, 76–80). Overall, externally and morphologically, we could not attribute the species to any other genus known to us, *Leptometa* fits it best.

Conclusion

Three earlier known species of *Leptometa* are briefly reviewed. *Leptometa matuta* is known only from the holotype female (Fig. 1) and a male erroneously considered as a type specimen (Fig. 2). *Leptometa hintzi* (Fig. 4) is only known from the holotype female. *Leptometa sapeleensis* (Figs 3, 5–6) was known

from three countries, here we added two more, so the distribution area of the species stretches from Nigeria to DRC (Fig. 82).

Four new species – *L. knudlarseni* sp. nov., *L. adalensis* sp. nov., *L. sophiae* sp. nov., and *L. editae* sp. nov. – are described. They are distributed mainly within the tropical forests (Figs 83–86) with single records for forest-savannas (*L. knudlarseni* sp. nov. and *L. adalensis* sp. nov.) or wet miombo (*L. adalensis* sp. nov.). Three species seem to be polyvoltine, excluding *L. editae* sp. nov. known only from two females collected in March and April (Figs 54–55).

Eggs and the first instar larvae of *L. knudlarseni* sp. nov. and *L. adalensis* sp. nov. were obtained in the field (Fig. 87). These are the first descriptions of preimaginal stages of *Leptometa*. Eggs of the two species are similar externally (Figs 7, 11), the exochorion ultrasculpture though differs (Figs 10 and 14). The number of the micropylar primary cells and so micropylar openings varies from six to eight within the same batch of eggs and seems to be a week character. Schmidt and Matter (2011), for example, showed that in *Parnassius smintheus* Doubleday, 1847 the number of the primary cells varies even more – from five to twelve. The intercellular ridge in the aeropylar net may almost even out in *L. knudlarseni* sp. nov., while in *L. adalensis* sp. nov. it is raised above the bottom of the cell. Zolotuhin & Kurshakov (2011) showed, for example, that intracellular structure of *Arguda decurtata* Moore, 1879 may be amorphous like in *L. knudlarseni* sp. nov., while *Arguda vinata* Moore, 1865 has the ridge connecting aeropylar openings and another one bounding the oval-shaped intracellular space. Only the first instar larvae are known for both species, *L. adalensis* sp. nov. having a more pronounced contrasting pattern (compare Figs 15 and 16). The second and third instars of *L. knudlarseni* sp. nov. have to be compared with larvae of some closely related genera to see what characters may differ.

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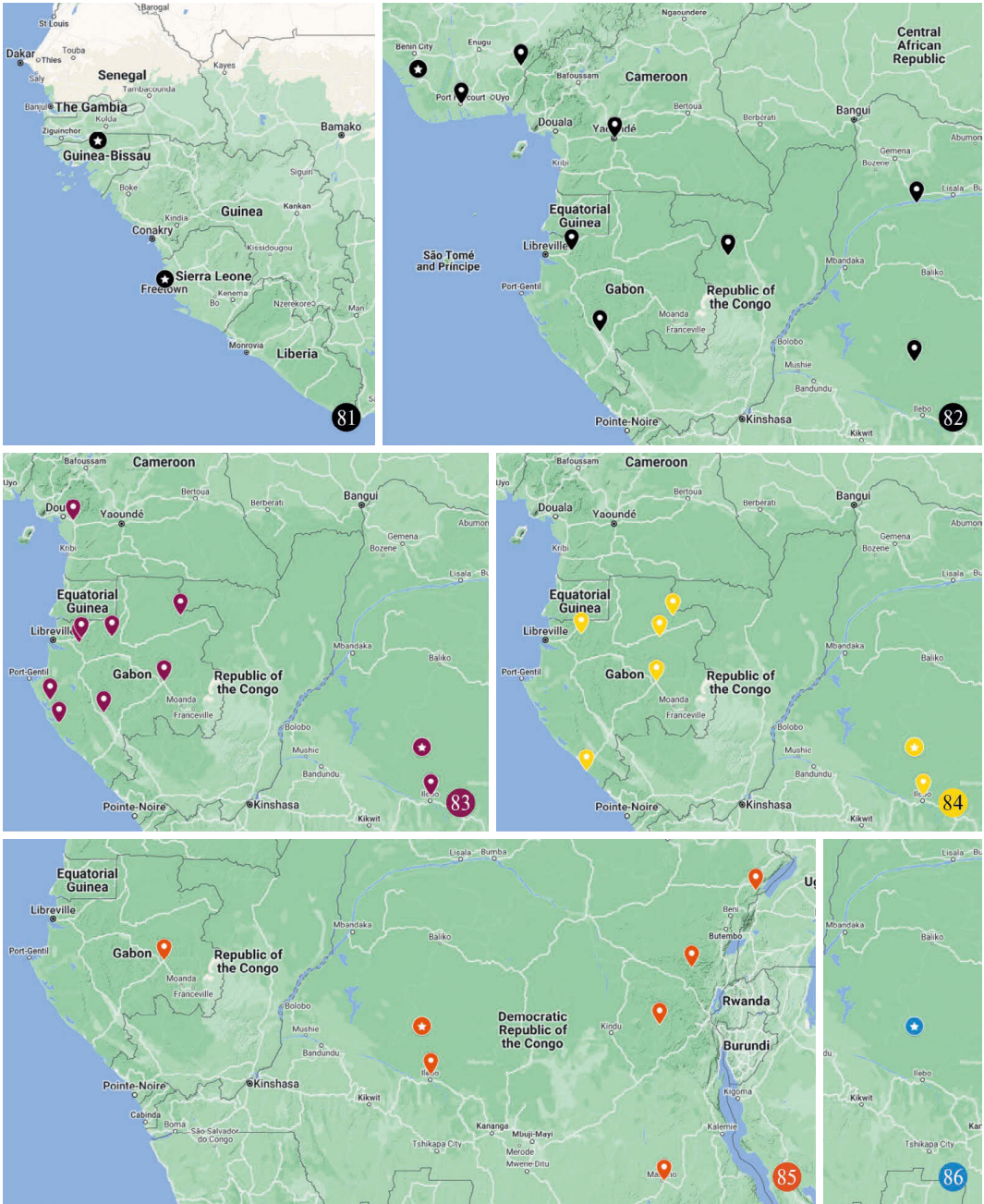
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Figs 81-86. Collecting sites of *Leptometeta* spp., for details visit <https://www.bit.ly/Leptometeta>. **81.** *L. hintzi* (Guinea-Bissau) and *L. matuta* (Sierra Leone). **82.** *L. sapelensis*. **83.** *L. knudlarseni* sp. nov. **84.** *L. sophiae* sp. nov. **85.** *L. adalensis* sp. nov. **86.** *L. editae* sp. nov. The coloured circles with white stars are for the type localities.

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Fig. 87. View of Ekongo camp, Mai-Ndombe, DRC, the type locality of *L. knudlarseni* sp. nov., *L. adalensis* sp. nov., *L. sophiae* sp. nov. and *L. editae* sp. nov.

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