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## Two new species for *Gonotrichidia* from West and East Africa (Lepidoptera, Lasiocampidae, Lasiocampinae)

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### Abstract

Two new species of the genus *Gonotrichidia* Berio, 1937 (type species *Gonotrichidia modestissima* Berio, 1937 from the Democratic Republic of the Congo) are described: *Gonotrichidia braedan* sp. n. from Malawi, Tanzania and Zambia, and *Gonotrichidia eponine* sp. n. from Ivory coast.

**Key words:** Afrotropical realm, biodiversity, Ivory Coast, lappet moth, Malawi, Tanzania, Zambia.

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## Introduction

The family Lasiocampidae Harris, 1841 is a sole member of the superfamily Lasiocampoidea (Minet, 1994; Regier *et al.*, 2009; Zwick *et al.*, 2011; Hamilton *et al.*, 2019). The last discovery in the suprageneric system of the family was done by Zolotuhin with co-authors (2012a, 2012b) based on the nucleotide sequence of the gene elongation factor-1 alpha. The family resulted in containing five subfamilies and 14 tribes, among which Argudini Zolotuhin, 2012 was established as new and briefly described for eleven Indomalayan and one African genera. Lees & Minet (2022) in the note on Madagascan Lasiocampidae legitimately stated that “tribes are not yet clearly established,” though the statement is applicable to the whole family.

Lasiocampidae occur worldwide, except in New Zealand and Socotra archipelago. According to Zolotuhin (2015), among the eight biogeographic realms on Earth, the most diverse fauna of the family Lasiocampidae is in the Afrotropical realm. The fauna is represented by more than 700 species in 115 genera, while about 100 species and 20 genera are yet to be discovered. The Afrotropical fauna shares the genus *Bombycopsis* Felder & Felder, 1874 with the Palearctic realm (see Joannou & Krüger, 2009); and *Estigena* Moore, 1860; *Trabala* Walker, 1856 and *Streblote* Hübner, 1820 with the Indomalayan realm (see Prozorov, 2011; Prozorov *et al.*, 2022).

Six males and one female of an extremely rare *Gonotrichidia modestissima* Berio, 1937 (the type species of the genus *Gonotrichidia* Berio, 1937) was collected during a one-year-long stationary expedition to the buffer zone of the Salonga National Park (Figs 1–3, 5). The Park is situated in the Congolian forests from where we have already described 40 new lasiocampid species, revealing its hidden species richness (Zolotuhin & Prozorov 2010; Prozorov & Zolotuhin, 2012a, 2012b; Prozorov, 2016a, 2016b; Prozorov & Zolotuhin, 2016; Prozorov *et al.*, 2021a, 2021b, 2023a, 2023b, 2023c, 2023d). The species was known to us only by the male holotype kept in the Natural History Museum of Milan (Fig. 4). The collected specimens allowed us to understand external variability of the species, study male (Figs 11–14) and female genitalia (Fig. 17) and distinguish two new species of the genus which we describe below.

## Abbreviations of the depositories used:

**CGM** – collection of Günter Müller (Freising, Germany);  
**CJV** – collection of Julia Volkova (Ulyanovsk, Russia)  
**CVZ** – collection of Vadim Zolotuhin (Ulyanovsk, Russia);  
**CMNH** – Carnegie Museum of Natural History (Pittsburg, USA);  
**MSNM** – Museo Civico di Storia Naturale di Milano (Milano, Italy);  
**NHMO** – Natural History Museum, University of Oslo (Oslo, Norway);  
**USTTB** – l'Université des Sciences, des Techniques et des Technologies de Bamako (Bamako, Mali);  
**ZSM** – Zoologische Staatssammlung München (Munich, Germany).

## Other abbreviations used:

**DRC** – the Democratic Republic of the Congo;  
**GS** – genitalia slide;  
**HT** – holotype;  
**PT** – paratype.

## Material and Methods

Some adults (Figs 1–3, 5) were collected near the Ekongo camp (2.75613S, 20.31538E), Mai-Ndombe, DRC using a traditional white screen lit with a Sylvania Mini-Lynx Blacklight BL368 and a chain of locally made auto-traps with similar bulbs. A Honda EU 20i generator provided the electricity for the screen and the traps.

Genitalia preparations were made following Hardwick (1950). Distal one third of the abdomen of each specimen was put into a separate 50 ml Falcon tube with 10 ml of 13% solution of potassium hydroxide (KOH). Several tubes with abdomens and KOH were placed into a small pot with hot water for 20 minutes.

The tubes thereafter were removed from the pot and the abdomens were rinsed with water several times to remove any remaining scales and soft tissue. Cleaned abdomens were then transferred into separate cells of the Corning Costar 96 Well Cell Culture Cluster with a small quantity of water to keep them moist during preparation. Sequentially, abdomens were cleaned with a soft brush and dissected using Dumont Tweezers Style 5 and “no name” micro scissors in a Petri dish under the microscope. Aedeagus was extracted and vesica everted with an insulin syringe and a 32G or 33G needle for mesotherapy. Male’s vesica was stained with the Evans blue. The dissected genitalia were rinsed in 50, 70 and 96% ethanol and then mounted on a microscope slide in Euparal and covered with a cover slip.

Adults were photographed with an Olympus C-750 UZ, a Nikon D3300, a Nikon 40mm f/2.8G and a Nikon R1C1. Slides were photographed using a Fujifilm XT-10 and a Leica MC170 HD. All images were processed with Photoshop CS6 and InDesign CS6.

Morphological terminology follows Zolotuhin (2015). Distribution map was made with Google My Maps service (<https://www.google.com/maps/>). Altitude for collecting sites was taken from Google Earth Pro if missing from labels. Ecoregions listed in the Distribution section of the species follow Dinerstein *et al.*, 2017.

## Taxonomical part

### *Gonotrichidia braedan* sp. n.

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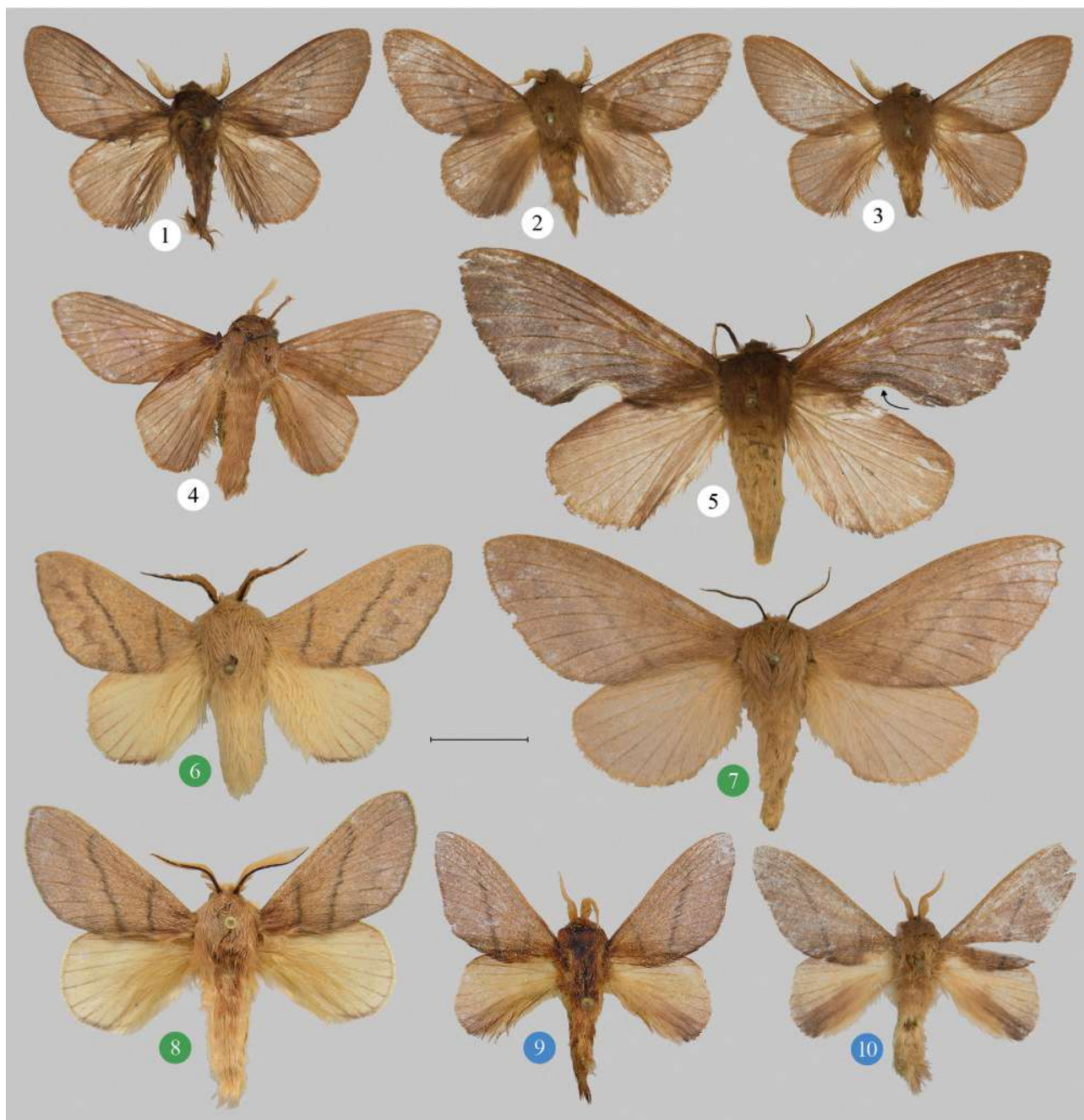
(Figs 6–8, 16, 18, 20)

**Holotype:** ♂, Malawi, Nyika National Park, 17 km from Thazima Gate, 10.73 S, 33.63 E, 1700 m, 8.VIII.2004, leg. R. J. Murphy, GS 29715 (CGM/USTTB). **Paratypes. Malawi:** ♀, Nyika National Park, 18 km from Thazima Gate, 10.7283 S, 33.655 E, 1930 m, 7.I.2012, leg. R. J. Murphy, GS 29716 (CGM/USTTB); ♂, Malawi, Nyika National Park, 20 km N Thazima Gate, 1930 m, 7.I.2009, leg. V. Anikin (CVZ/CJV); ♂, Mzimba District, 6 km ENE Mzuzu, 30.I.1989, leg. J. Rawlins & S. Thompson (CMNH); ♂, Mzimba, Viphya Mountains on Luwawa Rd., 28.I.2001, leg. R. J. Murphy (DMNH, ex J. G. Joannou coll.). **Zambia:** ♂, Northern Province, Mutinondo, wet Miombo, 12.3919 S, 31.3233 E, 1390 m, 28.XII.2010, leg. J. Lenz (ZSM). **Tanzania:** ♂, Mpanda District, 37 km S Uvinza, 1550 m, 18.VIII.1989, leg. Bjørnstad (NHMO).

**Description. Male** (Figs 6, 8). Flagellum covered with speckled black and fawn scales. Head and thorax fawn, abdomen beige. *Forewing.* Forewing length: 20–21 mm. Elongated, somewhat triangular with bunt apex. Background color speckled fawn and beige. Blackish pattern consists of discal dot, unbroken transversal ante- and postmedial lines, and fragmented vague external line. Fringe speckled blackish and fawn. *Hindwing.* Somewhat oval with smooth outer margin. Background color beige, costal field and distal half veins fawn. Fringe speckled beige and fawn with blackish scales near tornal angle. *Genitalia* (Fig. 16). Vinculum triangular with widely rounded distal apex, laterobasally bears a pair of socii. Socii tubercle-like, sparsely covered with setae. Cucullus finger-shaped with bent pointed apex. Saccus compact, somewhat c-shaped, sparsely covered with setae. Juxta small, stem-like, ventrobasally fused with aedeagus. Aedeagus c-shaped with blunt apex. Vesica small, conical, medially sclerotized. Vinculum ventrally elongated forming cup-like saccus with two distal apexes. The eighth sternite somewhat trapezoid with a pair of small sclerotized mediodistal dents, concavity with sclerotized outer margin between them, and basal apodemes. **Female** (Fig. 7). Flagellum covered with speckled black and brown scales. Head and thorax brown, abdomen fawn. *Forewing.* Forewing length: 28 mm. Elongated, somewhat triangular, with blunt apex. Background color speckled fawn and brown. Pattern similar to male but faded. Fringe speckled brown and dark brown. *Hindwing.* Somewhat ovaloid with smooth outer margin. Background color speckled fawn and beige, basally lighter. Fringe fawn, darker near tornal angle. *Genitalia* (Fig. 18). Papillae anales oval, densely covered with setae. Posterior and anterior apophyses equal in size. Antevaginal plate absent. Postvaginal plate small, somewhat v-shaped, medially wrinkled. Ostium amorphous. Ductus bursae short, wrinkled. Corpus bursae medium-sized, oval.

**Diagnosis.** Adult males of *G. braedan* sp. n. are overall paler, have dark flagellum, better pronounced pattern on forewings (especially, external line), beige hindwings (Figs 6, 8), apically broad apex of tegumen, two distal apexes of saccus, unpronounced cornuti on vesica, highly sclerotized outer margin of

the eighth sternite's concavity (Fig. 16); while adult males of *G. modestissima* are overall darker, have pale flagellum, rather faded pattern on forewings, brown hindwings (Figs 1–4), apically narrow apex of tegumen, one distal apex of saccus, cornuti on vesica, regularly sclerotized outer margin of the eighth sternite's concavity (Figs 11–14). Adult female of *G. braedan* **sp. n.** is overall lighter, lacks concavity on anal margin of forewings (Fig. 7), has medially sclerotized postvaginal plate with rounded lateral lobes (Fig. 18); while adult female of *G. modestissima* is overall darker, has concavity on forewings (Fig. 5), has medially membranous postvaginal plate with trapezoid lateral lobes (Fig. 17). *Gonotrichidia braedan* **sp. n.** is spread in East Africa (Fig. 20); while *G. modestissima* is only known from DRC (Fig. 20).



**Figures 1–10.** Adults of *Gonotrichidia* spp. 1–5. *G. modestissima*, DRC. 1–3, 5. ♂ and ♀, Ekongo, GS 0607, 0606, 0605, 0785 (CGM/USTTB). 4. HT ♂, between Mbandaka and Kisangani (MSNM). 6–8. *G. braedan* **sp. n.**, Malawi. 6–7. HT ♂ and PT ♀, Nyika National Park (CGM/USTTB). 8. PT ♂, 6 km ENE Mzuzu (CMNH). 9–10. *G. eponine* **sp. n.**, Ivory Coast, Danane (CGM/USTTB). 9. HT ♂. 10. PT ♂. Scale bar – 1 cm.





**Figures 11–16.** ♂ genitalia of *Gonotrichidia* spp. (CGM/USTTB). 11–14. *G. modestissima*, DRC, Ekongo. 11. GS 0582. 12. GS 0605. 13. GS 0607. 14. GS 0606. 15. *G. eponine* sp. n., PT, Ivory Coast, Danane, GS 29717. 16. *G. braedan* sp. n., Malawi, Nyika National Park, GS 29715. Scale bars for genitalia and magnified apical part of aedeagus – 1 mm.

Adult males of *G. braedan* sp. n. are overall larger with more rounded forewings and pronounced external line on forewing (Figs 6, 8), have apically broader tegumen, saccus with two apexes and highly sclerotized

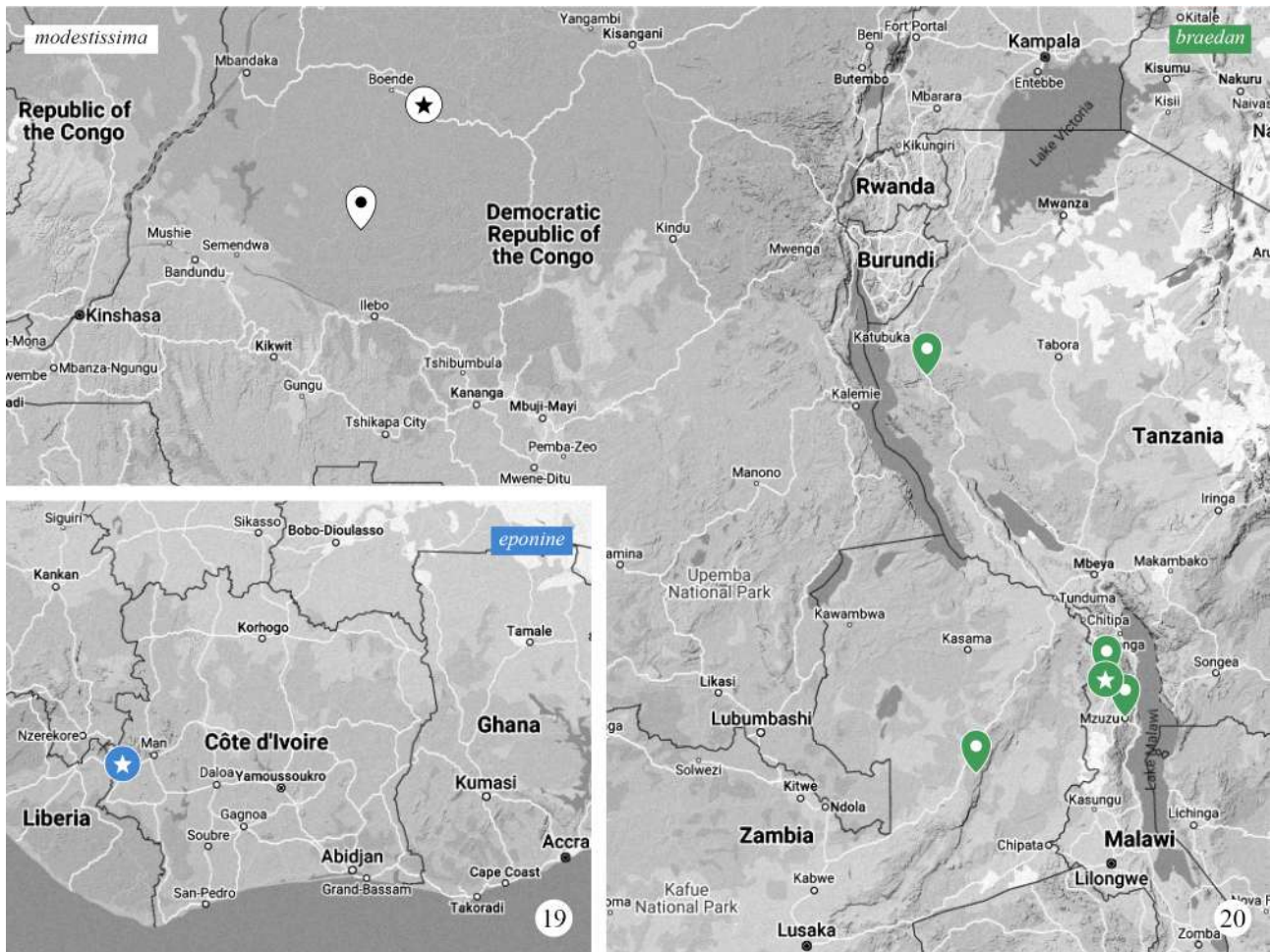
outer margin of the eighth sternite's concavity (Fig. 16); while adult males of *G. eponine* **sp. n.** are overall smaller with more triangular forewings and unpronounced external line on forewings (Figs 9–10), have apically narrower tegumen, saccus with one apex and regularly sclerotized sclerotized outer margin of the eighth sternite's concavity (Fig. 15). *Gonotrichidia braedan* **sp. n.** is spread in East Africa (Fig. 20); while *G. eponine* **sp. n.** is only known from Ivory Coast (Fig. 19).



**Figures 17–18.** ♀ genitalia of *Gonotrichidia* spp. (CGM/USTTB). 17. *G. modestissima*, DRC, Ekongo, GS 0785. 18. *G. braedan* **sp. n.**, PT, Malawi, Nyika National Park, GS 29716. Scale bar – 1 mm.



**Distribution** (Fig. 20). Central Zambezan wet miombo woodlands in Tanzania, Central Zambezan wet miombo woodlands in Malawi and Zambia.



Figures 19–20. Distribution maps of *Gonotrichidia* spp. 19. *G. eponine* sp. n. 20. *G. modestissima* (white) and *G. braedan* sp. n. (green).

**Biology.** Adults were collected in January, August and December from an altitude of 1390–1930 m. Preimaginal stages unknown.

**Etymology.** The species is named in honor of Braedan Taormina (Nesconset, USA).

***Gonotrichidia eponine* sp. n.**

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(Figs 9–10, 15, 19)

**Holotype:** ♂, Ivory Coast, Danane, 7.2676 N, 8.14478 W, 350 m, 4.III.1981, GS 10-098 (CGM/USTTB).

**Paratype:** ♂, same data as holotype, GS 29717 (CGM/USTTB).

**Description. Male** (Figs 9–10). Flagellum covered with speckled brown and fawn scales. Head and thorax brown, abdomen fawn or beige. *Forewing.* Forewing length: 18 mm. Elongated, somewhat triangular with bunt apex. Background color speckled reddish brown and beige. Blackish pattern consists of barely visible discal dot, transversal faded ante- and postmedial lines. Fringe speckled reddish brown and fawn. *Hindwing.* Somewhat oval with smooth outer margin and slight concavity between  $R_s$  and  $M_3$ . Background color speckled beige with reddish brown, costal and anal fields reddish brown. Fringe speckled beige and reddish brown with brown scales near tornal angle. *Genitalia* (Fig. 15). Vinculum triangular, apically broad, laterobasally bears a pair of socii. Socii tubercle-like, sparsely covered with setae. Cucullus finger-shaped with bent pointed apex. Saccus compact, somewhat v-shaped, sparsely covered with setae. Juxta small,

stem-like, ventrobasally fused with aedeagus. Aedeagus c-shaped with blunt apex. Vesica small, conical, medially bears numerous tiny cornuti. Vinculum ventrally elongated forming cup-like saccus. The eighth sternite somewhat trapezoid with a pair of small mediodistal dents, concavity between them, and basal apodemes. **Female** remains unknown, but expected to be bigger and darker than male.

**Diagnosis.** Adult males of *G. eponine* **sp. n.** have narrower and rather triangular forewings, beige hindwings with darker costal and anal fields (Figs 9–10); while adult males of *G. modestissima* have broader and rounded forewings, brown hindwings (Figs 1–4). *Gonotrichidia eponine* **sp. n.** is known from Ivory Coast (Fig. 19); while *G. modestissima* is known from DRC (Fig. 20).

Adult males of *G. eponine* **sp. n.** are overall smaller with more triangular forewings and unpronounced external line on forewings (Figs 9–10), have apically narrower tegumen, saccus with one apex and regularly sclerotized outer margin of the eighth sternite's concavity (Fig. 15); while adult males of *G. braedan* **sp. n.** are overall larger with more rounded forewings and pronounced external line on forewing (Figs 6, 8), have apically broader tegumen, saccus with two apexes and highly sclerotized outer margin of the eighth sternite's concavity (Fig. 16). *Gonotrichidia eponine* **sp. n.** is only known from Ivory Coast (Fig. 19); while *G. braedan* **sp. n.** is spread in East Africa (Fig. 20).

**Distribution** (Fig. 19). Western Guinean lowland forests in Ivory Coast.

**Biology.** Adults were collected in March from an altitude of 350 m. Preimaginal stages unknown.

**Etymology.** The species is named in honor of Eponine Taormina (Nesconset, USA).

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